Strategic stakeholder dialogue and social sustainability indicator development for nuclear decision-making in Anglesey, North Wales

by

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Contents

List of Abbreviations

ABWR – Advanced Boiling Water Reactor

AR – Action Research

EIP – Energy Island Programme

FGC – Facilitative Group Contact

FIS – Facility or Infrastructure Siting

CTGYM – Cymdeithas Tir Glas Ynys Môn (Anglesey Grassland Society)

CTGYM F - Cymdeithas Tir Glas Ynys Môn Farmers

DECC – Department of Energy and Climate Change

DGS – Discussion Group Sessions

EU – European Union

GBD – Group-based dialogue

GCS – Groups of Social Commonality

GDA – Generic Design Assessment

GDP – Gross Domestic Product

GSIS – Group-Specific Indicator Sets

GW – Gigawatt

GW/yr – Gigawatt per year

IAEA – International Atomic Energy Agency

IoACC – Isle of Anglesey County Council

LEPS – Local Experts and Public Stakeholders

MPA – Marine Protected Area

NEA – Nuclear Energy Agency

NNB – Nuclear New Build

NPS – Nuclear Power Station

NSIPs – Nationally Significant Infrastructure Projects

PBD – Priority-based Dialogue

PP – Priority Profiles

PPP – Positive Priority Profiles

RWM – Radioactive Waste Management

SDNA – Social Development Needs Analysis

SECTs - Socially and Ethically Contentious Technologies

SGPBD – Social Group Priority-based Dialogue

SgDS – Social group Dialogue Strategy

SoI – Statements of Importance

SSID – Social Sustainability Indicator Development

SSSE – Socially Strategic Stakeholder Engagement

TAN – Technical Advice Note

VOSDA – Value Orientated Social Decision Analysis

UK – United Kingdom

YUB S – Ysgol Uwchradd Bodedern Students

YSTJ S – Ysgol Syr Thomas Jones Students

YSTJ T – Ysgol Syr Thomas Jones Teachers

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Abstract

As new nuclear power developments are proposed for the UK over the coming decades, it is important that public engagement and decision-making processes for these developments are carried out as effectively and sustainably as possible to benefit both current and future generations and mitigate negative social impact and conflict, particularly at the local scale. Alternative approaches are required to those employed historically, which were often expert-led, public-excluding, and vulnerable to extensive critique and opposition, particularly for large-scale and often contentious industrial or technological developments.

The research employs a mixed-method approach to engage with different social groups in Anglesey, North Wales, a predominantly rural island where the Wylfa Newydd Nuclear Power Station is proposed to be developed. Quantitative and qualitative techniques are employed to study intra-community social priorities, both generally and development-related, in order to highlight important social sustainability issues for a potential development. The four social groups that participated in this research included two secondary school student groups (YUB and YSTJ Students) and two adult groups (YSTJ Teachers and CTGYM Farmers), reflecting multi-generational representation.

Similarities and differences between groups are highlighted which suggests that engagement with 'the public' may be more effective if a strategic, social group and priority-based approach was employed, working with existing social collectives at the local scale. The Social Group Dialogue Strategy is proposed to facilitate this approach. I argue that both engagement and decision-making should reflect the pluralism present within local communities, and thereby enhance the effectiveness of stakeholder engagement and legitimacy of decision-making processes. I also argue that deliberative dialogue focussed on understanding social priorities can facilitate indicator development and effective engagement with local communities. Concepts of fairness and justice, such as procedural justice, are identified and discussed in the context of strategic decision-making, sustainability indicator development and dialogue-based engagement with public stakeholders.

1.0 Introduction

'It is all too common for energy researchers to generally undervalue social science discoveries, ignore possible interdisciplinary awareness, and marginalize diverse perspectives'

(Sovacool et al., 2015)

'Developing nuclear power further is a social challenge, not a technical one'

(Kassakian, 2000)

Over recent years, nuclear power development has received renewed attention as governments seek to adopt and develop low-carbon energy sources to succeed carbon-based energy technologies. In 2003, the UK government stated in an energy white paper that "the current economics of nuclear power make it an unattractive option for new generating capacity and there are also important issues for nuclear waste to be resolved" (DTI, 2003: 61). However, within a few years the government view of nuclear power had changed significantly, stating in 2008 that "nuclear power needs to be part of an overall approach to electricity generation" (BERR, 2008: 21). Since 2006 the UK Government has demonstrated increasing favour towards nuclear power, being increasingly viewed as a solution to climate change and energy security, and as "playing a significant role in the delivery of low-carbon transitions" (Butler and Simmons, 2013: 139; DECC, 2011). Nuclear power is proposed as a critical component of the national energy mix and a "flexible energy market offering reliable base load and low carbon electricity at a competitive cost" (Blowers, Boersma and Martin, 2008: 146). The Department of Energy and Climate Change (DECC, 2010), the International Energy Agency (IEA, 2012) and the International Atomic Energy Agency (IAEA, 2009) all suggest that nuclear power has the potential to contribute legitimately towards *a sustainable energy* mix in the UK. However, they also assert that this is only possible should challenges such as significant capital costs associated with the safe disposal of high level radioactive waste for example be addressed (Verbruggen, Laes and Lemmens, 2014).

To demonstrate the shift in governmental attitude towards nuclear power in recent years, decisions have been made by the UK Government to develop a new generation of nuclear power stations across England and Wales, approximately 20 years after the most recent nuclear power station in the UK - Sizewell B Nuclear Power Station in Suffolk - began operating. Arguments for nuclear power state that the development of nuclear energy infrastructure is crucial for reasons of energy security, maintaining UK base-load energy capacity, and the growth of low-carbon energy utilisation in order to combat the issue of carbon-based emissions and resulting global climatic change (*see* DECC, 2010; Fthenakis and Kim, 2007; IEA, 2012; Jun et al., 2010; Visschers,

Keller and Siegrist, 2011). Arguments against nuclear power and for renewable energy suggest that other energy technologies, particularly renewable energy technologies (RETs) such as wind, tidal or solar power, present a safer and more cost-effective solution to the problems mentioned above, that such technologies will contribute to climate change mitigation efforts whilst providing energy without the ethical, environmental, economic and social implications often associated with nuclear power (*see* Hasselman et al., 2003; Jäger-Waldau and Ossenbrink, 2004; Moriarty and Honnery, 2012; Resch et al., 2008; Sovacool, 2008; Warren et al., 2005). The Economic and Social Research Council define social studies as "the study of society and the manner in which people behave and influence the world around us" (ESRC, 2016). Therefore, the term 'social' in this thesis describes a collective society and the individuals who exist within it.

Renewed nuclear power development has been viewed by some as an area of 'technological controversy' in recent years, with some scholars grouping nuclear power and other technologies (e.g. nanotechnologies, geo-engineering, stem cell research) under the category label of "socially and ethically contentious technologies (SECTs)" (Cotton, 2014). This category defines technologies with the "capacity to provoke political controversy, stimulate social movements of opposition, and generate media and academic commentary over their governance" (Cotton, 2014: 1). As such, they provide several challenges to sustainable development efforts and national energy policy, due to the environmental, economic and social impacts related to energy production, as governments attempt to respond to pressing global issues such as energy security and climate change (DTI, 2007; BERR, 2008; DECC, 2009, 2010, 2012). As the 'nuclear renaissance' looks to take place in countries such as the UK with several new nuclear power stations proposed for development, questions of social responsibility naturally follow. On this notion of social responsibility, Mizuo (2008) suggests that for nuclear power it involves an obligation to society and a positive contribution to society, so that nuclear power as a technology should co-exist with stakeholders, of which the author considers 'residents of local communities' as one of five core stakeholders. Mizuo proposes that nuclear-associated organisations and multiple stakeholders should strive to build a "co-prosperous society" (2008: 699); I argue that in order to achieve this, a need exists to conceptualise local residents' priorities as a basis for a co-prosperous society.

Whilst there is considerable attention paid to technical questions surrounding nuclear power, unsurprisingly given the highly technical nature of nuclear technologies, there is also increased attention on the social issues surrounding nuclear power. Public perception and social acceptability are issues perceived as potential barriers to technological fruition without significant delays. As Kassakian (2000) argues, further nuclear power development is primarily a social challenge, not a technical one. In a broader context, Miller, Richter and O'Leary (2015) state that energy is fundamentally social in origin and organisation, and as a result, energy systems are

"deeply enmeshed in broad patterns of social, economic, and political life and organization" (p. 29). Sovacool *et al.* (2015) argues that a primary shortcoming in the energy research literature is the under-examination of social dimensions. Bickerstaff, Walker and Bulkeley (2013) make a similar observation, noting that little attention has been paid to the social and social equity implications of "low carbon policy objectives and decarbonisation infrastructures" (p. 2). Sovacool (2014a) also highlights that in energy research, the social sciences, humanities and arts are all neglected, and that interdisciplinary studies are "stymied by institutional barriers in academia and government" (p. 529). He suggests that academics often target "technical fixes rather than ways to alter lifestyles and social norms" (p. 529), and that energy research must "become more socially oriented, interdisciplinary and heterogeneous" (p. 530). Concurrently, Sovacool *et al.* (2015) observe that "the human elements of energy systems and their consequences are frequently neglected" (p. 96), and that rather than being considered marginal and of little value to energy- based research, the social sciences hold significant contributory potential. This increased attention on the social impacts of energy systems would serve to respond to the serious concerns now being raised about the environmental, economic and social footprints - the sustainability implications - of future energy systems (McLaren, Kreiger and Bickerstaff, 2013). They also assert that "social science is essential in pointing the way to energy systems which respond to human and societal needs" (*ibid*: 98). Another shortcoming in the energy and social sciences literature is research which undertakes a mixed-methods approach, something which the current research seeks to address. Sovacool *et al.* (2015) acknowledge this literary issue, and note that newer, 'less prestigious' journals such as *Energy Research and Social Sciences* are now prioritizing studies which engage with mixed-methods, as well as qualitative and comparative-orientated research. Energy is intertwined with the social, and is complex in its nature. Research must reflect, explore and better understand such complexities, and the approach of the current study responds to this.

Scholars have termed energy developments of significant complexity and physical and financial scale "big technology" or "energy megaprojects"; Sovacool and Cooper (2013) describe an "energy megaproject" as having both a financial (capital intensive; > $1 billion capital investment) and geographical (transnational; transiting at least 3 countries) components. Therefore, it is clear that decisions made regarding the development of large-scale energy technologies, such as new nuclear power in the UK, are constituted through a breadth of debate, challenges and ethical and social considerations, at both the local, national and even international scale. Considering the scale and far-reaching nature - spatially, geographically and temporally - of large-scale energy technologies or energy megaprojects, they are under-studied in energy and policy literature (*ibid*), and in particular, the social aspects and impacts of these developments. This research seeks to contribute to this growing 'energy and society' literature.

This thesis not only considers the perceived and potential social implications of new nuclear power developments according to local stakeholders, but also seeks to explore whether an

alternative social strategy could be further implemented to improve the sustainability of decision-making processes at the local scale. Decision-making is often a multifaceted process, warranting equally multifaceted consideration and examination to ensure its effectiveness. Good decisions are based upon "deliberation, evaluation and thought" (Rao, 2012:183), and rational decision-making requires systematic evaluation of the problems at hand, the development of alternatives, and the most suitable choice to be made based upon the available relevant data (Rao, 2012). In the context of modern technologies and the various debates and decision processes surrounding SECTs, the "cultural, linguistic and participatory-deliberative turns in technology policy" (Cotton, 2014: 161) has served to break processes away from the confines of traditional, expert-dominated "techno-scientific analysis, quantitative risk assessment and forecasting of technological hazards" (*ibid*). Additionally, it has assisted 'decision-makers' to increasingly recognise the capacity of citizens, and the "normative and deliberative competency" (*ibid*) of 'lay-public' perspectives, and to utilise them in decision-making processes.

The decision-making processes considered in this research are those relating to new nuclear power developments in the UK, particularly those which the public may influence. Given that decisions have been made at the national scale on the renewal of nuclear infrastructure development, I consider decision-making at the 'local', community scale through a more site-specific approach to understand the impacts of these developments. The social aspect of decision-making is mentioned above, and it is the social orientation that provides the contextual foundation for this research into nuclear decision-making, whilst the geographical focus is Anglesey in north Wales, which is now discussed to provide contextual background.

1.1 Anglesey – Background and Energy Transitions

There are numerous places in the U.K., including Mid and North Wales, which are currently undergoing significant changes in respects to their energy landscapes. Such changes include the construction of new energy generation infrastructure such as power stations or the construction of transmission infrastructure such as electricity pylons and transmission lines to provide some examples, which have the potential to impact societies, economies and environments on various scales. Anglesey in North Wales is one example of such an area, a predominantly rural island that has undergone in the past and is currently undergoing a series of 'energy transitions' as a series of low-carbon related developments, such as a new nuclear, biomass energy capacity and new electricity transmission infrastructure, are proposed for the island, as part of the Anglesey Energy Island Programme (EIP) (see IACC, 2016), whilst other developments come to the end of their operational life on the island, such as Wylfa Nuclear Power Station on the northern coast. As I state in previous work, energy transitions can have significant social impacts on communities:

"Transitions in socio-energy systems, particularly concerning large-scale energy infrastructure and contentious technologies such as nuclear power, produce wide ranging social impacts and result in power reconfigurations across communities"

(Whitton et al., 2015: 135)

Rural areas in Wales are socially and culturally plural, and as Gardner (2011) notes, are characterised by division and conflict, and trust and cooperation. Anglesey represents one of these rural areas in North-West Wales, constituted of numerous towns and villages which, as Cloke, Goodwin and Milbourne (1997) recognise, are sites of social, demographic and cultural diversity, "characterised by multiple lines of identity" (Gardner, 2011: 97). Considering such diversity, Gardner (2011) states that 'communities' cannot be deemed as so solely based on their geographical location, furthering this by proposing that only when an initiative receives "active participation or indirect support from a large proportion and broad cross section of the local population" (p. 97) can it be deemed as representing 'community action'. In earlier literature, Young (1990) provides a useful definition which has informed this research, proposing that the term 'community' refers to identifying with specific locales, and cultural and group identifications:

"…the term community refers to the people with whom one identifies in a specific locale. It refers to neighbourhood, church, schools. It also carries connotations of ethnicity, race, and other group organisations. For most people, insofar as they consider themselves members of communities at all, a community is a group that shares a specific heritage, a common self-identification, a common culture and set of norms" (p. 235)

Justice issues also lie at the heart of energy transitions. Such energy transitions to low-carbon energy systems, whilst at first appearing to promote justice by combating climate change and addressing energy security issues and therefore protecting current and future generations, involve, as McLaren, Kreiger and Bickerstaff (2013) state:

"…complex socio-technical transformations that raise fundamental issues of social justice at multiple scales across nations and generations" (p. 158)

From an energy research perspective, and provided the geographical and cultural characteristics of the island, I posit that Anglesey is a unique case study in the UK, and is therefore surprising that there exists no significant body of energy and social science research on Anglesey specifically. The current research looks to address this deficit and contribute to this gap in the energy-research literature. At this point, it is important to provide some background detail on Anglesey itself.

1.1.1 Geography and Overview

The island of Anglesey is located off the north-west coast of Wales in the United Kingdom. A predominantly rural island of approximately 714km^2 with approximately 69,750 inhabitants, according to the 2011 Census (ONS, 2011), Anglesey represents 2.3% of the population of Wales (3.1 million inhabitants) and 0.11% of the U.K. population (63.2 million inhabitants) (ONS, 2011). In the sociology literature, Anglesey has been described as one of the "remoter rural districts" of North Wales (Day, 2002: 38), and as one of the "pockets of severe deprivation" in North-West Wales (*ibid*: 137). It is distinct in that it is the only Welsh land mass, which is significantly inhabited, to be located *off* the mainland of Wales. Anglesey is also the largest island in the Irish Sea by area.

Anglesey has historically been a stronghold for the Welsh language, with 90.7% of the population recorded as being able to speak Welsh in 1901. Since this time, the number of people who are able to speak Welsh has decreased steadily, to 57.2% (IACC, 2014). Even at this level, the 2011 census records that the local authority of Anglesey is placed second in regards to the amount of Welsh spoken (ONS, 2011). Although the number of first language Welsh speakers has decreased on the island in recent times, Welsh is still spoken to some degree by the majority of the population. The number of people on Anglesey with no Welsh language skills was recorded in the 2011 Census as 30.4%, whilst the ethnicity of Anglesey is predominantly White British/Irish (97.2%), with only 1.8% of the population represented by mixed or other ethnic groups (ONS, 2011).

The island serves as a transport link from Anglesey to the Republic of Ireland, Northern Ireland, and Cardiff by ferry from Holyhead port in Holyhead, and plane between Cardiff and Anglesey Airport in Valley, which serves as both a public and military airport. The A55 is the main road linking Anglesey to the mainland, which leads to Chester from Holyhead; this road serves as the largest transport corridor across the island. Anglesey and the mainland of North wales are connected by two bridges, spanning the body of water between the land masses known as the Menai Straits acting as the only vehicle routes on and off the island; these are the Menai Suspension Bridge and the Britannia Bridge. The railway infrastructure in Anglesey crosses the Menai Straits from the North Wales mainland, and takes a route across the west of the island to Holyhead where the line terminates, mainly stopping at only two stations (Llanfairpwll and Holyhead). There are numerous urban centres across the island including Holyhead (11,431 residents), Llangefni (5,116) and Amlwch (3,789), representing the three most populated towns on Anglesey as recorded by the 2011 Census (IACC-CG, 2013a).

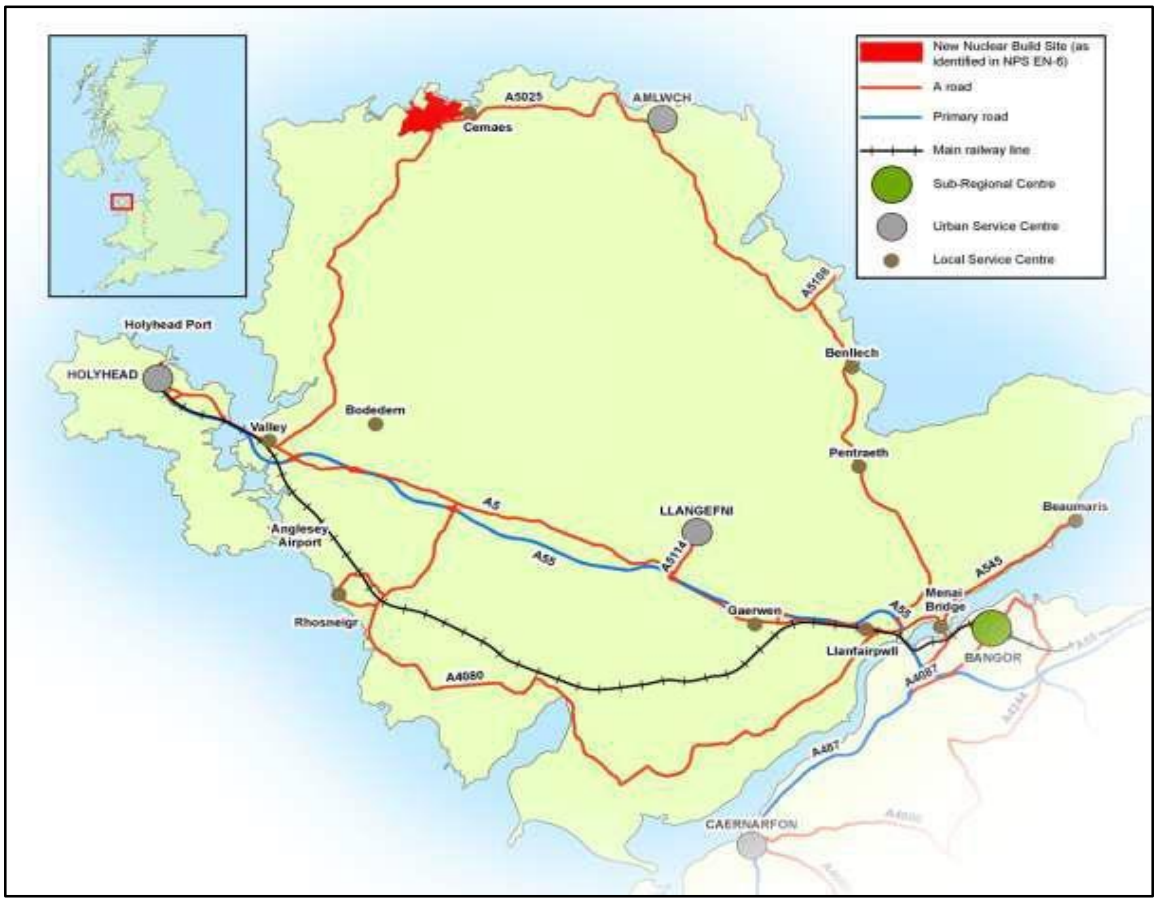

Figure 1 This map shows the location of the proposed New Nuclear Build Site in Anglesey, transport links and service centre locations in Anglesey and on the North Wales mainland (Source: IACC, 2014)

The percentage of the Anglesey population between the ages of 16 and 74 who are 'Economically Active' is 65%, and of this, 7.2% were recorded as unemployed (ONS, 2011). Concurrently, 35% were recorded as 'Economically Unactive', with 14.6% of this proportion of the population recorded as long term sick/disabled (ONS, 2011). Historically, agriculture, tourism and public services have been significant contributors to the local and national economy. The three sectors representing greatest employment were Health and Social Work (15.1%), Wholesale and Retail (14.4%) and Education (11.2%). Agriculture, Foresty and Fishing represented 3.1%, whilst Mining, Quarrying, Energy, Water represented 4.1% (ONS, 2011). In recent years, the significance of agriculture as an employer on Anglesey has declined, and many farmers have looked to diversify in order to continue their farming businesses, many of which have been passed down through families for generations. As the agricultural industry on Anglesey becomes increasingly consolidated, new industries are emerging and receiving greater attention and investment; one of these industries is energy generation, such as the nuclear power industry, symbolised by Wylfa Nuclear Power Station on the northern coast of Anglesey (see Figure 1). In recent years, local media and governmental sources have reported on the potential for the growth

of the energy sector in Anglesey to stimulate a significant growth in employment opportunities, with potential figures of up to 2500 operational and maintenance jobs and 4500-5000 construction jobs on Anglesey and sub-regions by 2025 (Daily Post, 2010; IACC, 2010). Consultant reports have suggested figures of 6800 in the workforce during peak construction of the proposed Wylfa Newydd nuclear power development around 2021 (White and Miller, 2014), whilst Anglesey County Council have suggested that these jobs and associated incomes have the potential to contribute £2.34 billion to the local economy (IACC, 2010).

Certain energy generation technologies are more established than others in Anglesey, with the current nuclear power station on Anglesey, Wylfa, having been constructed in the 1960s and operating since 1971, with generation operations having ceased recently, on the 30th December 2015, after 44 years. The closure sees the number of full-time equivalent staff decrease from 512 to 377 during the transition period to decommissioning, with the number gradually decreasing over time (Daily Post, 2015). The 'Anglesey Energy Island' programme, of which the proposed Wylfa Newydd development is part of, will now be discussed in greater detail.

1.1.2 Anglesey 'Energy Island' Project

Within the last decade, it has been increasingly discussed and proposed that Anglesey has the resources and opportunity to develop a number of energy generation technologies as part of the 'Anglesey Energy Island' (AEI) programme, such as onshore wind, biomass and nuclear power for example, which proposes significant employment opportunities and contributions to both the local and national economy, in addition to electricity contributions to the national grid (IACC, 2010). AEI is marketed as a project seeking to develop Anglesey as a centre-for-excellence for energy-related developments, as "a partnership between public and private sector organisations, putting Anglesey at the forefront of energy research and development, production and servicing" (IACC, 2013: 1). It is promoted within the project's Communication Strategy document as aiming to ensure the quality of life of communities through developing energy capacity and capabilities (IACC, 2013). The document states that the aim of the AEI programme is to "ensure low carbon energy developments come to Anglesey & North Wales enabling job opportunities for local people and local companies so as to sustain our communities" (*ibid*: 1), by fulfilling the following objectives:

- supporting low carbon energy developments;
- enhancing employment growth;
- preparing local businesses; and,
- sustaining communities.

At the centre of this project the proposed Wylfa Newydd Nuclear Power Station, planned to not only replace but increase current generating capacity from the Wylfa Nuclear Power Station, on a site adjacent to the current Wylfa site. The project is being managed by nuclear development

company Horizon Nuclear Power (Horizon from this point forward), who are developing a second nuclear power site in Gloucestershire in south-west England. Reactor designs for the Wylfa Newydd project are being proposed by Japanese company Hitachi-GE, who are currently proposing the Advanced Boiling Water Reactor (ABWR) design to be incorporated and developed at the Wylfa Newydd site, a design which is currently undergoing detailed assessment within the Generic Design Assessment (GDA) process. This process is a requirement in UK pre-licensing process by the UK nuclear regulators (Environment Agency; Natural Resources Wales; Office for Nuclear Regulation) for proposed nuclear power technologies. Wylfa Newydd represents an 'energy transition' occurring not only within Anglesey but reflective of that occurring throughout the UK; the emergence of not only low-carbon energy to replace fossil fuel-based technologies, but of the new generation of these low carbon technologies to replace the old. Examples of other current large-scale energy transitions include the utilisation of hydraulic fracturing to further extract oil and gas, and the deployment of renewable energy technologies to combat climate change (Miller, Richter and O'Leary, 2015); similarly, the expansion of nuclear reflects a transition away from fossil fuel-source base load energy provision in order to address energy security and climate change challenges. As Miller *et al.* (2015) observe, energy transitions are influencing not only energy technology utilisation and their economics, but also "physical and social geographies, social meanings, and the political organization of energy production, distribution, and consumption" (p. 30). It has been argued by other scholars that this a growing trend, with almost all energy technologies encountering a degree of social protest and political controversy (Abramsky, 2010). It has been posited by some that key choices in energy transitions are in fact between different forms of social, economic, and political arrangements associated with new energy technologies as opposed to choices between different fuels (Miller, Iles and Jones, 2013). In addition, it is argued that conflicts associated with energy transitions in coming decades can only be addressed through the conception of energy policy in more social terms (*ibid*).

Some long-term inhabitants of Anglesey have now experienced a full operational life-cycle for the current power station, and indeed the long-term impacts of a nuclear power development, from its construction in the 1960s through to present day operations. Wylfa Newydd will represent the new 'nuclear infrastructural cycle' on Anglesey; with the impacts of the new generation of nuclear power infrastructure to be experienced by new generations of Anglesey residents. The Wylfa Newydd development forms the technological case study for this research, and it is the potential societal impacts of this development that form the topics of discussion as part of the dialogue with community members.

1.1.3 Predicted impacts of Wylfa Newydd: recent reports

The current study seeks to understand the potential social impacts of the Wylfa Newydd development, from the perspective of local stakeholders as opposed to industry experts or 'official' sources. A number of reports have been produced in order to predict the impacts and opportunities presented by such a development in Anglesey, both on the island and for Wales in general. These reports are predominantly business and economy-focussed, and at present there are very few socially-focussed energy studies on Anglesey. LCEE Innovation (Low Carbon Energy and Environment Network for Wales) is one example of a research network reviewing Wales-based research in the fields of low carbon energy and environmental studies (*see* LCEE, 2014). A recent consultancy report commissioned by the Welsh Government (White and Miller, 2014) addresses employment opportunities and workforce potential, and states that:

"The planning, build, operation and maintenance of the proposed Wylfa Newydd plant is forecast to generate an estimated 36,500 years of employment in Wales between 2013 and 2033, the majority of this is temporary and related to the planning and construction phase. Employment is expected to peak around 2021, with some 6,800 in the workforce at peak during construction" (p. 7-8)

Expanding upon this, 'years of employment' figures relate to the employment of one person for a period of one year. As the report states, much of this predicted employment is temporary and allocated to a 20 year period during site development and construction of the power station. The report also states that there is a risk that the Wylfa Newydd development may create 'significant employment displacement' as people leave existing employment to undertake work in positions which are perceived to be better paid, which may result in "employment voids" locally (White and Miller, 2014: 8). This highlights not only economic but also potential social impacts given such predictions, with potential impacts on the livelihoods of local people in both a positive (new employment opportunities) and negative (loss of employees from local businesses and industries) sense, particularly in a rural setting such as Anglesey where employment, particularly highly paid employment, is a persistent issue.

An 'Appraisal of Sustainability' report (DECC, 2010) also highlights the potential impacts of the Wylfa Newydd development on the local area, considering the potential long-term environmental, economic and social effects. The authors also predict significant opportunities for long-term employment and, therefore, 'enhanced prosperity' for local communities. They state that at present, 35% of the population of North Anglesey are currently employed by the current power station, Wylfa, and that due to high levels of unemployment on Anglesey, the Wylfa Newydd development presents significant positive opportunities for "employment, the economy and communities at the local level" (p. 35). DECC also suggest that increased labour demand on a

regional scale, as people move from existing construction jobs to work on the Wylfa Newydd project result in a shortage of local construction workers to meet local demands and serve other industries, effectively resulting in 'employment voids' which could result in "improved provision of education and training for the local population" (DECC, 2010: 35). Whilst these describe socio-economic impacts, the report details that the in-migration of people into Anglesey for employment on the Wylfa Newydd project, particularly during the construction phase, could result in short-term negative social impacts on local communities, primarily in the form of increased pressure on local traffic routes close to the development site, and on basic services and housing. In addition to this, out-migration of Anglesey residents may also become an issue during the period between the closure of the current Wylfa power station and the development of the proposed Wylfa Newydd power station, an impact caused by the "time lag between job losses and job creation" (*ibid*: 35).

Whilst the DECC report above describes the issue of in-migration of workers as an issue in terms of pressure on basic services, transport and housing in Anglesey, the Supplementary Planning Guidance report for the New Build at Wylfa, produced by the Isle of Anglesey County Council (IACC) (IACC, 2014), raises the issue of the potential social impact such in-migration would have on Welsh culture and language, stating that the Wylfa Newydd development has the potential to "significantly affect Welsh culture and linguistic balance in the Island's communities" (p. 71). This changing linguistic balance is highlighted by the recorded decline in the number of Welsh speakers in Anglesey since the 2001 Census, at a rate of 2.9% per year, compared to the national average of decline of 1.7% (IACC, 2014). To further demonstrate the importance of this issue, the report makes reference to the Welsh Government's 'Technical Advice Note (TAN) 20: Planning and the Welsh language' document (TAN 20, 2013). TAN 20 states that where the Welsh language forms a significant part of the 'social fabric', to some or all of the community, "the needs and interests of the Welsh language" (TAN-20, 2013: 11) should be regarded in LDP (Local Development Plan) plan strategies, policies and land allocations, with the suggestions that "appropriate Welsh language indicators should be identified in the LDP and monitored" (*ibid*: 13), and that, in regards to the new development, "site assessment criteria should include the potential impact on Welsh language" (p. 11). The County Council's view towards the importance of the potential impacts of the Wylfa Newydd development on Welsh language is made clear in the following statement:

"Furthermore, the County Council considers that the importance of Welsh language to the Island's identity and the scale of the Wylfa NNB Project is an exceptional circumstance that warrants more detailed consideration of linguistic impacts by the Wylfa NNB promoter both in respect of DCO [Development Consent Order] and associated development applications" (IACC, 2014: 71)

1.2 Nuclear decision-making and social considerations

Why is a social perspective on and inquiry into nuclear decision-making important? It has been argued previously that nuclear power development depends on its ability to deal with pressing social challenges (Assefa and Frostell, 2007). Decision-making processes support and influence the impacts of nuclear power development, and these impacts are experienced by society in different ways, to different degrees, and at different scales (i.e. local, national etc). On a national scale, nuclear power can provide an important source of electricity, but also pose a potential risk to health and safety in the case of an incident or accident, as has been highlighted by the Chernobyl and Fukushima nuclear accidents in 1986 and 2011 respectively. On a local scale, nuclear power developments can serve as a local industry, and an important source of employment and contributor to the local economy. However, it can also result in significant amounts of individuals moving to what are commonly rural areas with low population densities for employment reasons, during the construction and operational phases for a new nuclear power development for example. This has the potential for social disruption should this be inappropriately planned and managed. Therefore, due to the physical and temporal scale, technical complexity, and multifaceted positive/negative impact potential of nuclear power station developments, and their siting in predominantly rural, low population density areas, the potential for impact upon social life and social structures is clear. Thus, it is argued here that the potential social impacts of nuclear power station developments are worthy of multi-disciplinary enquiry and research.

Similar to decision-making processes, society and social life is multifarious, complex, and dynamic. It exists and evolves in time and space, through a multiplicity of social interactions between individuals, groups, organizations and institutions which each possess their own perspectives, viewpoints and priorities which influence their social interactions and their own actions within social life (Boholm and Löfstedt, 2006). Critical social enquiry into decision-making processes can highlight how decision processes could be developed to maximise positive and mitigate negative social impacts resulting from such processes, ensure these processes are fair and equitable so as to ensure *procedural justice and fairness* (see MacCoun, 2005; Siegrist, Connor and Keller, 2012; Visschers and Siegrist, 2012; Walker and Eames, 2006), and understand how positive and negative impacts from decision-making may vary among 'stakeholders' (a term which will be explored further as part of this research). This can serve to reduce or mitigate actual and/or perceived inequality and, therefore, reduce the potential for social conflict. To clarify at this point, the concept of procedural justice and fairness (the two terms are used interchangeably in the literature) refers to the access of individuals to and participation in decision-making processes (Walker and Eames, 2006), and indeed wider governance processes, and to the individuals and knowledge recognised in such processes. The concept of procedural justice and fairness is discussed further in Section 2.2.

I argue that if nuclear power developments in the UK are to address emerging social challenges and experience a sustainable future, whilst mitigating social conflict during their life cycle, then it should be ensured that associated decision-making processes incorporate an enhanced understanding of the diverse range of social impact issues, and of the stakeholders who experience these issues directly. Trust and fairness have also been argued to be crucial factors for the social support or acceptance of, or the mitigation of resistance to, decisions (McComas, Besley and Yang, 2008; Tyler, 2000), in that perceptions of decision fairness and trust of the decision-maker contribute to decision acceptance. However, the value and impact of procedural fairness has been questioned when a decision imposes upon important personal values (Earle and Siegrist, 2008), particularly when people have high moral convictions (Siegrist, Connor and Keller, 2012) and the importance of moral outcomes supersedes procedural correctness. This research aims to highlight such matters and allocations of importance across multiple social groups, and in turn identify the potential for broadly intolerable decisions or actions as perceived by these groups.

Historically, nuclear power development and policy has been dominated by technocratic intentions and led by technocratic elites (*see* Nuttall, 2007), whereby expert knowledge and preferences dominated decision-making processes, reflecting a system of scientific *technocracy*. The term 'technocracy' relates to the dominance of experts, when traditional science and scientific approaches are seen to be superior to other approaches and the opinions of experts rule. It is defined as "the government or control of society by an élite of technical experts" (Elam and Sundqvist, 2007: 6). However, this research questions whether there is an opportunity during the development of the new generation of nuclear power stations in the UK for decisions to be less technocratic and more socially informed, legitimate, and therefore, sustainable. This is considered within the frame of a 'post-normal' age (*see* Section 3.4.4), where a dependency on scientific knowledge alone is deemed insufficient and inappropriate in solving complex science-related problems when factual uncertainties and value disputes exist (see Funtowicz and Ravetz, 1993a; Ravetz, 2004, 2006). Indeed, 'post normal' signifies an age beyond 'traditional' scientific practice where problems were addressed "in ignorance of the wider methodological, scientific, and ethical issues raised by the activity and its results" (Funtowicz and Ravetz, 1993b: 86).

I argue that this can be achieved, at least partially, through the development of more socially strategic approaches to both engagement, and sustainability assessment and monitoring. More specifically, I propose that the identification of key issues and 'social priorities' be identified through dialogue-based engagement with individuals who directly experience development-related impacts, and are able to provide legitimate context to socially- complex scenarios occurring in diverse rural localities.

As I have noted in other work, support for greater dialogue-based engagement has increased in recent years, particularly from central and local government. This reflects what Dryzek (2000)

described as the 'deliberative turn' in democratic theory, with the intention of encouraging public involvement in decision-making processes (Whitton et al., 2015; *also see* Appendix 23), informing a range of issues and policies (Whitton, 2011). However, I also argue that decision-making is once again becoming centralised in the UK, for decisions on nationally significant infrastructure projects (NSIPs) such as the HS2 rail project and the development of shale gas resources, signifying a 'deliberative U-turn' (Whitton et al., 2015). In the current study, I consider individuals engaged at the local scale 'local experts and public stakeholders', and seeks to engage them in priority-based dialogue (PBD), conducted by engaging with different social groups in Anglesey. Thus, the strategic element of this thesis centres upon a developed approach to engagement and communication – what I term social group and priority-based dialogue (SGPBD) - formed within an Action Research-influenced framework. I discuss Action Research in Section 4.1.1. Such an approach is integrative of notions of procedural justice, fairness, equity and familiarity, which permeate through and structure the approach, to both dialogue and also sustainability indicator development, of which this study only identifies the initial stages of. This study does not aim to develop fully-functional indicators to assess or monitor the 'social sustainability' of nuclear power developments as other studies which are detailed later have done. Rather, it identifies important social considerations to inform the initial development of social criteria and indicators, and discussions surrounding future indicator development, in order for sustainable indicators to be socially legitimate and, importantly, 'sustainable' themselves. As I have stated previously, the concept of social sustainability has gained recognition as being critical both for sustainable development purposes and for societal prosperity (Whitton, Parry and Howe, 2014). There are numerous interpretations in the literature on what constitutes social sustainability; for example, Sachs states that social sustainability "must rest on basic values of equity and democracy" (Sachs, 1999: 27), Koning (2002) places great importance on maintaining social values including culture, equity and social justice. Other scholars argue that the central constituents to social sustainability include human well-being, equity, democratic government and democratic civil society (Magis and Shinn, 2009).

1.3 The sustainability of nuclear power

In the context of energy technologies, the current study considers nuclear power, and proposed new nuclear power developments in particular, including the physical infrastructure, construction and operation-related activities, and associated human workforce. In regards to new nuclear power developments, the social sustainability of these new developments is one of the central conceptual considerations of this thesis.

The sustainability of nuclear power as a viable long-term energy option has been considered by various studies, and the question of whether nuclear power is inherently 'sustainable' has been debated and studied since the late 1980s. This debate is also dependent on the context in which

enquiries are framed; which aspects of sustainability are considered? Is it sustainable in all aspects, or only partially? The current study does not attempt to make broad assessments or arrive at conclusions as to the sustainability of nuclear power as an energy technology, nor to develop definitive tools to enable such judgements to be made. What this study does seek to do is examine the existing assessments of sustainability towards nuclear power, particularly those considering the social and socio-economic aspects and impacts of the technology, and to then contribute to this knowledge. The thesis in part aims to identify potential social impacts and therefore areas of consideration for future sustainability assessments, based upon the views of members of the public, of rural communities located close to such large-scale developments. It is these views of people who experience, to a degree, 'living with nuclear' which are of interest here, and it is these local stakeholder perceptions of social impact and determinations social sustainability which provide the basis for the study's contribution to knowledge in this area. As termed by the NEA (Nuclear Energy Agency) in their report for the OECD (Organisation for Economic Co-operation and Development) (NEA-OECD, 2000), the intention is to consider nuclear power in a "sustainable development perspective" (p. 7), in a social context.

David MacKay (2009), formerly the Chief Scientific Adviser to DECC (the Department for Energy and Climate Change) in the UK between 2009 and 2014, poses the broad question 'could nuclear power be "sustainable"?' in his sustainability investigation of nuclear power, among other energy technologies, considering numerous aspects of nuclear power. Among a range of technical and fuel-related factors, MacKay also considers a variety of more socially-related factors, including land use and public safety, which are more closely related to the primarily social considerations of this thesis. For example, he notes that the unit area occupation of Sizewell Nuclear Power Station in the UK is estimated to be less than 1km², whilst it is calculated that fifty-five nuclear power stations would be required to generate sufficient power to accommodate the UK's energy demand. MacKay further states that when sited in pairs around the coastline of the UK, with two every 100km, the total coastline area occupied would be approximately 2%, indicating a relatively small equivalent land usage for the generation of 55GW of power. Such estimates suggest the potential spatial sustainability of the technology, albeit in the idealised scenario of total coastline availability. Land use encompasses various 'localised' social impacts; aside from large, catastrophic impacts which can impact the wider populace, it is coastal communities, often rural in nature, who experience the direct and often regular impacts of nuclear developments. One of these impacts relates to the visual, such as being able to see the power station from a home window, or viewing it on the coastline or horizon whilst outdoors or in passing, which for some people can be experienced on a daily or regular basis. Such visual impacts may commonly be experienced only by a small proportion of a country's, even region's populace, or tourists and visitors to the area, and yet the impacts can be regular and significant to these people. In regards to safety and public health, MacKay (*ibid*) also reports the findings of studies conducted by ExternE, a European Union project, and the Paul Scherrer Institute,

examining the death rates of different electricity generation technologies. The results from the two studies showed wind and nuclear power to have the lowest calculated death rates, of < 0.2 per GWy (gigawatt-year; the energy produced by a 1GW power station if it were to operate at full capacity for a year). Whilst any recorded deaths from energy technologies are viewed by most as unacceptable, such fatality rate estimates indicate that nuclear power is more sustainable than many other energy technologies, such as coal and oil which have much higher fatality rates according to the two studies, in the context of public health risk. Therefore, whilst the uranium fuel source of nuclear power is inherently finite, there exists a sizeable literature that has examined the sustainability of the various aspects of nuclear power as an energy source of the future, which is discussed in Chapter 2. However, the current research focusses on the social aspects of nuclear power in its inquiry.

1.3.1 Public Acceptability

It is suggested that, in a social context, levels of *public acceptability* towards the technology must improve in order for sustainable development goals such as equity and participation to be adequately met (NEA-OECD, 2000). It is this notion of 'public acceptability' that is commonly associated with the socially-successful future of nuclear power; for example, Duffey (2005) suggests that this 'nuclear acceptance' from the public can be achieved through evidencing operational excellence and safety planning, stating that it can be met by "demonstrating a record of safe, stable and sustained excellence in plant operation, coupled with effective and secure plans for waste management and long-term storage, with minimum environmental impact" (p. 536). Speaking more generally, Friedl and Reichl (2016) note that acceptance is important for a range of energy developments, stating that "social acceptance is an important determinant of the time and effort required to realize energy infrastructure projects" (p. 184). However, the European Commission (EC, 2011) raises concerns, and demonstrates apparent frustrations, relating the questioning and debating of energy projects towards gaining public acceptance, and the impact this could have on their deployment and realisation:

> *"The current trend, in which nearly every energy technology is disputed and its use or deployment delayed, raises serious problems for investors and puts energy system changes at risk" (p. 16)*

Whilst appreciating that these factors such as operational excellence, safety planning and plans for waste management and storage are important, I argue that there are s o c i a l factors which more greatly influence 'project acceptance' from the public. I also suggest that the pursuit by officials of 'public acceptance' is one that can be perceived as agenda-laden and strategic, being unhelpful at best and resisted at worst. I argue that this is also reflective of a deficit of understanding of local factors and demonstrative of the prioritisation of 'technical' issues which

often do not reflect or even acknowledge the priorities of local communities or those most directly impacted by nuclear developments. To be clear, during this study, I consider 'community-level' support or resistance to the specific energy project of Wylfa Newydd in Anglesey, acknowledging the distinctions proposed by authors such Friedl and Reichl (2016) between different dimensions - *market, socio-political* and *community* - of social acceptance. Of these dimensions, the authors argue that community acceptance is "more critical than socio-political acceptance", where specific projects are supported or resisted by "residents, local authorities and local politicians", as opposed to 'macro-level' stakeholders (*ibid:* 186).

Instead, I propose the wider use of less-coercively intentioned terminology such as 'public support', which is considered a critical factor when considering whether to build new nuclear power stations (Adamantiades and Kessides, 2009), support which was found to be growing towards the end of the previous decade according to some international polls (see NEI, 2009; EC, 2008). However, Adamantaides and Kessides (2009) find that safety, waste, proliferation and costs are four factors which impede nuclear power in becoming a legitimately sustainable technology capable of garnering pubic support and gaining acceptance. More recently, Mez (2012) asserts that the dangers of nuclear proliferation and the vulnerability of infrastructure to terrorist attacks feed arguments against nuclear power development in democratic societies.

1.3.2 Public Participation

Towards the aim of *enhancing* sustainability, the NEA and OECD (NEA-OECD, 2000) asserts that processes for greater public participation in nuclear issues generally be developed, based upon two-way communication and the utilisation of the 'best scientific information available', with the concerns and perceptions of the public being 'heard and addressed' (p. 53). Whilst continued education, based upon 'accurate information and good science', is described as 'essential' (p. 53), equity and participation are specified as possessing individual importance, with social and political issues being addressed in an 'integrated way' which enables 'the full range of costs, benefits and trade-offs' to be identified with the public (p. 53).

In his paper examining nuclear power as a sustainable energy source, Pearce (2012) highlights equity as a critical issue in regards to the sustainability of nuclear power, for both current and future generations. The notion of 'intra and intergenerational ethics' is a challenge for the progression and realisation of nuclear energy projects as noted elsewhere in recent literature (*see* Verbruggen et al., 2014). This is particularly the case for communities surrounding existing nuclear facilities such as Sellafield in north-west England, Dounreay in Scotland, and Anglesey in north Wales, the latter serving as the focal case study of this thesis. Pearce (2012) suggests that equity forms an important part of a 'sustainable nuclear energy system' when the concept of *just sustainabilities* (Agyeman, Bullard and Evans, 2003; Agyeman, 2005; Agyeman, 2013) is applied, a concept which also incorporates the 'equity deficit' of environmental sustainability (Agyeman, 2005). The notion of 'just sustainability', explored by Agyeman *et al.* (2003) as part of a "sustainability and sustainable development-based discourse" (Agyeman, 2013: 1), describes

the equity and justice issues surrounding environmental quality and human equality. It reflects a "more nuanced definition of sustainable development" (Pearce, 2012: 1174), demanding a better quality of life for current and future generations, "in a just and equitable manner, whilst living within the limits of supporting ecosystems" (*ibid*; *also see* Agyeman, 2005). Just sustainability is also important when considering how to achieve both "a sustainable society and a just one" (Bickerstaff et al., 2013:2) and in highlighting the ties between them (Bickerstaff et al., 2013). One of Pearce's proposals for a sustainable nuclear energy system is the regaining of public trust, which has been degraded over the years from notable nuclear accidents, or the under-reporting of information to the public by officials regarding radioactive releases, such as Three Mile Island in the U.S. (Gundersen, 2009) and Fukushima in Japan (Brasor, 2012). Butler and Simmons (2013) note that criticisms have also been made of the national consultation processes on nuclear power from 2006 – 2007 by the UK government, stating they were subject to a court ruling, whereby the processes were declared as 'flawed', 'misleading' and 'procedurally unfair' (BBC, 2007). Pearce (2012) calls for the elimination of the apparent "disdain by decision makers and government officials for public disclosure of accurate information involving nuclear energy accidents" (p. 1181), in conjunction with greater honesty by officials and the provision of open access to information to the public, for nuclear to experience "a long and sustainable future" (p. 1182). If this is not done, Pearce suggests that rival technologies which exhibit more sustainable characteristics, such as renewables (e.g. solar power, wind power) demonstrating improving technical and economic performance, could push nuclear technologies into "obsolescence" (2012: 1182).

1.4 Strategy for engagement and decision-making

The research also discusses the potential for the development of strategic stakeholder engagement, which in turn may facilitate more sustainable decision-making in respect of nuclear power developments, and large-scale energy infrastructure more broadly. The notion of 'strategy' is important as it reflects decision-making that is intentional towards a set of goals or agreed visions; also described as 'aligned visions' (Wellcome Trust, 2014: 3). Therefore, strategies facilitate decision-making that is to a degree based upon a distinct and agreed purpose. Mintzberg (1978) defines strategy as a stream of decisions where a pattern is identifiable, and, as Lidskog and Lŏfmarck (2016) add, this is so whether the pattern is 'intentionally shaped' or not (p. 180). In the organisational and management literature, strategic decision-making processes are described as "a sequence of steps or phases" (Papadakis and Barwise, 2002: 84), by which strategic decisions are made "in the context of an organisation's environment" (Goll and Rasheed, 2005: 999), where they are influenced by 'environmental attributes' including dynamism and complexity (Goll and Rasheed, 2005). Shepherd and Rudd (2014) assert that such processes are greatly important to organizations due to the insights which they can provide, leading to more effective strategic decisions being made by executives and corporate decision makers; these are valuable in that they then "contribute to the success of organizations" (p. 340). However, keeping

to an organisational strategy too rigidly has been shown to prove troublesome. An example of an organisation's failed strategy in the UK is presented by Upreti and van der Horst (2004), whose study details the failed development of a biomass electricity plant in Crickdale, Wiltshire. The case study demonstrates two distinct, opposing attitudes and strategies of key stakeholder groups; the 'not-in-my-back-yard' attitude and oppositional strategy of public stakeholders, and the 'there-is-no-alternative' attitude and promotional strategy of project developers. The authors note the central contribution of these rigid stances to the project's failure to acquire planning permission, and observe that the national level environmental justification of biomass as proposed by the developers is sometimes insufficient to convince local communities and residents of supporting such developments. In contrast to this, Upreti (2004) presents the case of the Arable Biomass Renewable Energy Power Plant (ARBRE) in Selby, York, a demonstration plant that achieved planning permission with limited local conflict. The author notes that in addition to a carefully managed community relations strategy, the site selection strategy employed by developers was somewhat *socially* strategic, by including social suitability criteria in their assessments. Upreti (*ibid*) and others (*see* Burningham and Thrush, 2004; Toke, 2005; van der Horst, 2007) argue that industrial organisations often encounter less tension and resistance to project development in pre-existing or ex-industrial areas, where communities are often more familiar with industrial developments in their locality, and there a greater knowledge and understanding of electricity generation and its requirements to use an energy-related example. It should be noted that in the ARBRE case, Upreti (2004) describes the absence of broad support towards the project, and the concerns of many local stakeholders that included the increased volume of heavy goods vehicles for wood transportation in the local area. Such studies highlight the potential tension and challenges to be encountered for large-scale infrastructure projects when corporate and even national strategies do not align, or do not sufficiently adjust to more closely align, with those of local stakeholders, and the concerns and priorities of residents are either not sought or insufficiently adopted in favour of a strategy based on corporate and industrial growth.

In this study, I consider strategic decision-making as presenting opportunities to engage with stakeholders more effectively, understand social impacts more accurately, and facilitate social sustainability locally. Decision-making may be strategic and remain insightful to the usual agents of strategy such as organizations, whilst incorporating the social values of local stakeholders, with the aim of not only pursuing corporate goals and 'success', but of also enhancing social sustainability at the local scale; a similar position of reconciling business and community needs within a sustainable development framework is described by Esteves and Vanclay (2009) and is discussed later.

I argue in this thesis that there is an *ethical necessity* for a socially-strategic approach to engagement and decision-making, given the social and socio-economic impact on local, often rural, communities of the large-scale infrastructure – in this case new nuclear power stations - with which strategic decision-making processes are commonly associated. Not only can strategic decisions have profound implications for organizations, both intrinsically and temporally

(Shepherd and Rudd, 2014), but they too can have profound long term and plural (thematically, and generationally) impacts upon communities surrounding the central object of those decisions. This is particularly so if members of those communities play a negligible or marginal role, and therefore have little influence, in decision-making processes impacting current and future generations. I argue that an enhanced social strategy is required for decision-making processes associated with what is termed here as *socially impactful infrastructures* (SII), such as new nuclear build. This strategy should centre upon the focussed and sustained engagement of diverse public stakeholders in a manner that addresses their communication needs and preferences. This should reflect genuine inclusivity and influence of these stakeholders, and the identification of their social values, concerns and priorities to inform decision-making processes. Thus, it should pursue sustainability for both organisations and communities alike.

The benefits of strategic planning and strategic efforts are numerous. For example, Bowen, Newenham-Kahindi and Herremans (2010) note that when private firms engage or 'interface' with communities, a well-designed engagement strategy can result in firms gaining legitimacy, managing social risks and co-developing "innovative solutions to social problems with community members" (p. 297) (*also see* Carey et al., 2007; Lowndes et al., 2001). Conversely, communities can benefit through access to firm-associated finances, training opportunities, influencing and, as previously mentioned, substantive improvements to social problems (Bowen et al., 2010). In regards to community engagement strategies, Bowen *et al*. (2010) define them, similarly to Mintzberg (1978), as a 'pattern of activities' which companies implement in order to "work collaboratively with and through groups of people to address issues affecting the social well-being of those people" (p. 297; also see Fawcett et al., 1995; Scantlebury, 2003). It is due to such opportunities to address impacts on 'social well-being' that strategy becomes a relevant and important concept to examine here, and why the development of a preliminary strategy as a result of research findings is undertaken. In a recent report produced by the Wellcome Trust, which examined the requirements for developing a public engagement strategy to be utilised in their UK centres, critical elements of a developed strategy included priorities for engaging the public (e.g. target audience and topics), rewards and recognition for researchers taking part in public engagement, and embedded evaluation of public engagement activities and programmes (Wellcome Trust, 2014).

The current research aims to understand how a more strategic approach to stakeholder engagement could not only assist in making engagement with communities more effective, in the context of large-scale infrastructure developments such as NSIPs and SECTs, but also how this could facilitate more sustainable decision-making at the local level. My research intentions are to engage with several social groups in Anglesey to understand their social priorities and thus the potential social impacts of greatest importance of a new nuclear development from a community perspective. In addition, social sustainability indicators are developed as a result of this dialogue-based engagement, highlighting the criteria by which different stakeholder groups would deem a

development as socially sustainable; therefore, associated decision-making can be socially informed and sustainable.

1.5 UK Generic Design Assessment (GDA) Public Dialogue Pilot

In addition to empirical work conducted in the study area of Anglesey, I utilise my prior experience and involvement in the recent Generic Design Assessment (GDA) Public Dialogue project (Nov 2014 – September 2015), regarding the Advanced Boiling Water Reactor (ABWR) design proposed by Hitachi-GE for development at two proposed UK sites in Gloucestershire and Anglesey by Horizon Nuclear Power. The GDA process is a pre-licensing requirement for nuclear reactor designs proposed for the UK, involving a multi-step process of assessment for which members of the public are provided opportunity to comment upon (Whitton et al., 2016; *also see Appendix 23*). Alternatively, the GDA Public Dialogue Pilot process is a new pilot approach and study aiming to "provide information for the public through direct dialogue" (*ibid*) by engaging with them in public dialogue workshops. My attendance of public dialogue workshops associated with this project, predominantly in an observational capacity, was useful for comparative and informative reasons in the context of public priorities and communicative and engagement preferences, particularly as one of the public dialogue workshops took place in Bangor in north Wales, a short distance from Anglesey. My involvement in the workshops was in a Welsh-speaking round-table discussion facilitator capacity, at the request of leading workshop facilitators. Details of the GDA Public Dialogue Pilot process and its main findings are provided, and discussed in relation to the current research in Appendix 1.

The following section details the research intentions of the current study; specifically, its research aims, research objectives, and the research questions that will partly frame the analysis of empirical data.

1.6 Research Aims and Objectives

This thesis represents an empirical and methodological study into social groups, their priorities and preferences, and how engagement and dialogue can be further strategized to enhance nuclear decision-making. The research is concerned with concept of social sustainability, and with informing community development through the identification of local 'priority issues'. The key themes which underpin the research goals below are numerous, and also inform the literature review and research methodology:

- Social impacts of large-scale energy developments (specifically nuclear power)
- Public and stakeholder engagement, and deliberative dialogue
- Stakeholder priorities and preferences
- Democracy, and procedural justice and fairness

- Strategic decision-making
- Social sustainability
- Sustainability indicator development

Historically, a technocratic approach was favoured in order to ensure rigour and accuracy in research, enabling hypotheses to be formulated and tested using precise measurement techniques. However, as science evolved and knowledge has been generated through research, researchers have developed more appropriate approaches which suit the nature of their research and research subjects or topics; for example, social science is one of the major disciplines for which traditional scientific approaches are less appropriate for studying society and those within it (della Porta and Keating, 2008). The social world and those individuals inhabiting it cannot simply be observed, tested and measured as would a subject in the laboratory, and diverse social methods of study and enquiry are necessary to reflect the diversity of people and their relationships and interactions (*see* Gomm, 2008). Similarly, the discipline of Science and Technology Studies (STS), also referred to as Science, Technology and Society, analyses both science and technologies "in their social context, as social phenomena in themselves" (Turcanu et al., 2016: 89), considering how social, cultural and political values affect scientific research and technological innovation, and how they then impact upon society, culture and politics. As asserted by Turcanu *et al.* (2016), STS researchers attempt to understand and explain the links between science, technology and society, because society needs science and technology to function just as science and technology does not function without societal support (*also see* Jasanoff, 2004). The current research contributes to the field of STS in understanding how social values and priorities may be further acknowledged in and applied to decision-making process for technological developments, particularly nuclear power, to strategize these processes for the benefit of both expert and lay stakeholders, and in turn, discuss how such strategies may impact upon local societies.

1.6.1 Research Aims

In order to meet the obligations of research, an overarching research aim is required. Therefore, in continuation from the discussion above, the central aim of the thesis is:

To examine and understand the social priorities of social groups in Anglesey, both in general and in the context of a new nuclear power development, in order to inform sustainability indicator development and public stakeholder engagement strategies

1.6.2 Research Objectives

To meet this central aim, I propose the following research objectives, which serve to provide structure to the methodology that constitutes the orientation of the research:

1. Engage with different social groups on Anglesey to understand which social issues are prioritised by each group - in general and in the context of a new nuclear power development

2. Identify with different social groups which social issues should be measured over time to assess the social sustainability of a potential development, in order to inform the development of sustainability indicators

3. Identify, from social group engagement and dialogue, methods and approaches which contribute to, for both facilitator and participant, more effective and positive engagement, to inform public stakeholder engagement strategies for future nuclear developments in Anglesey

1.6.3 Research Questions

The methodological components of the current research, including the methods used for data collection and analysis of empirical data, are informed by the early research questions developed by the research. Research questions enable us to answer questions and further knowledge, utilising empirical data and interpretation of collected data to provide answers, which assist us in progressing knowledge, and developing solutions to identified problems (Bryman, 2012). The research questions, to be addressed and discussed in Chapter 6, are as follows:

1. What are the social priorities of select social groups in Anglesey, are there significant differences between the social priorities of social groups overall, and what are the implications for stakeholder engagement and decision-making strategies?

2. What are the key themes emerging from first group-based dialogue with social groups, what are the similarities and differences between them, and what are the implications for future stakeholder engagement?

3. Which social issues are prioritised, by each group, for the purpose of early stage sustainability indicator development, and reflecting upon the process, how does this inform future indicator development processes?

4. What are the implications of the research findings for public stakeholder engagement and decision-making at the local scale? How do they inform a public stakeholder engagement and dialogue strategy for nuclear decision-making?

Whilst these research questions will provide structure to my discussion of the research findings of the study, the research objectives will be revisited during Chapter 6 in order to assess the extent to which I have met the original aim of the study. At this point, a broad review of literature relevant to the research themes of this thesis in detail is presented, reflecting the thematic breadth of the thesis.

2.0 Literature Review

This chapter details both the academic and grey literature that I have reviewed during the course of this research and which has informed my work. Literature on several subjects and sub-themes are reviewed in this chapter. Nuclear power is considered firstly, as the *technological* component of the thesis, with a focus on various considerations towards the sustainability of the technology in the literature. This is followed by a review of stakeholder engagement and participation literature as the *procedural* component of the thesis, and then by deliberation as its *communicative* and *interactional* component. These sections are followed by a review of literature concerned with communities and public participation at this level, with the 'local' level forming the *scalar* component of this research. The section concludes with a review of the sustainable development literature with particular attention paid to social sustainability research, this being the main *conceptual* component of the research. Each of the six main sections in this literature review is concluded by a brief summary of key points (*see* 'Summary' boxes).

2.1 Nuclear Power: public perceptions and involvement

Nuclear power has the potential to generate substantial amounts of base-load, low-carbon electricity, but also to produce long-lived hazardous waste materials and, in rare cases, cause catastrophic damage. Nuclear facilities have for some time been considered as among the "most dreadful" hazardous facilities to members of the public (Chung and Kim, 2009), for reasons such as its potentially uncontrollable and potentially catastrophic nature, perceptions which have been explored in the literature over many decades, particularly in the late twentieth century (e.g. Fischhoff et al., 1978; Slovic, 1987, 2001; Kim et al., 1995). However, in the UK overall, nuclear power has generated electricity safely and without major incident for decades, and at present, a fleet of new nuclear power stations is proposed for development across England and Wales in the coming decades. Nuclear power represents one of several energy technologies that constitute the predominantly centralised model of electricity generation in the UK, manifested by large-scale infrastructures that are commonly located in rural or remote areas (Batel and Devine-Wright, 2015). In this recent study, Batel and Devine-Wright call for the further use of qualitative methods to understand in greater depth people's beliefs, attitudes and emotions towards energy infrastructures and how local, in addition to other scales, meanings related with such attitudes are constructed. I aim to contribute to this area of energy research, considering local attitudes and meanings towards new nuclear infrastructure in Anglesey.

Due to a number of inherent and persistent issues such as radioactive nuclear waste disposal, nuclear power developments have been grouped by social scientists over the years into facility groupings known as "locally unwanted land uses" (LULUs) (Popper, 1985; Schively, 2007), and more recently, as "socially and ethically contentious technologies" (SECTs) (Cotton, 2014). Popper (1985) argues that LULUs threaten their surroundings by inflicting, or promising to

inflict, negative impacts, whilst Armour (1991) suggests that any land use can potentially be classed as a LULU, as each different land use is likely to impose a cost on another individual. Armour (*ibid*) also observes that the costs of LULUs are often localised, commonly impacting upon residents' environments and health (Chung and Kim, 2009), while the benefits are more broadly distributed; this can lead to social conflict and unrest if this balance is seen to be significantly unbalanced. Whilst this literature is informative to the current enquiry, I aim to contribute towards our understanding on why such developments may be socially contentious and locally unwanted. I achieve this by engaging with local 'affected' communities, and seek the views of community members as to the contention and key issues surrounding these developments from *their* perspective, not experts. I argue that studies explicitly utilizing an 'affected public' approach is lacking from the literature at present, which is dominated by expert assessments of technological contentiousness. Whilst the latter are highly important, I argue that their further integration with the assessments of affected communities is necessary in order for sustainable management of these developments and their impacts to take place.

Engaging with 'the public' has been argued to lead to several positive outcomes. Many authors support the notion that greater public engagement and participation serves to significantly reduce conflict and leads to more robust, sustainable decisions, including those for large energy infrastructure developments such as nuclear power (O'Connor and van den Hove, 2001; Sohn et al., 2001; Dawson and Darst, 2006; Krütli et al., 2010a). Despite not explicitly focusing on members of the public 'local' to nuclear power stations, recent research conducted by Goodfellow and colleagues (Goodfellow et al., 2015; *also see* Goodfellow et al., 2011, 2014) provides a rare example of exploring public participation in decision-making on large infrastructure projects, particularly nuclear power plants. The study details a survey of over 1300 UK adults to understand the views of the public on new nuclear plant designs. Findings indicate that participants were 'willing and able' to express preferences on designs and that meaningful information to inform the work of designers was attainable. The authors argue that public involvement such as that described is important to progressing a "more transparent, participatory approach intended to improve trust in the governance of future energy supply options" (p. 72). The research contributes to the energy governance literature and to research concerned with public involvement in innovation processes, and the author's recommendations for a more transparent and inclusive approach to engaging with the general public align closely with the aims and motivations of my own research. Other studies in the nuclear literature that explore public involvement include that of Krütli *et al.* (2010b), which analyses the 'societal discourse' for a low- and intermediate-level waste project in Central Switzerland. The researchers detail how a 2006 study utilized a range of data collection methods, including "focus groups, expert interviews, a media analysis, a representative canton-wide postal survey and targeted in-depth stakeholder interviews" (p. 229). They find that those who were engaged with understand the need for radioactive waste disposal within a suitably technical system, but that a fair procedure must be guaranteed, leading them to argue that "a sound balance between safety and procedural aspects" must be sought, in the form

of a "functional-dynamic view of public involvement" (p. 229). Such findings contribute to the case for pursuing a more involved and effective role for public stakeholders in nuclear discussions and decision processes, which considers such individuals as more capable of understanding the often complex or technical nature of nuclear.

2.1.1 Nuclear power: interactions at the local level

Nuclear power impacts society at various levels, but I am concerned in this thesis on societal interactions with nuclear power at the local level. It is a traditional and common practice in nuclear decision-making, particularly for nuclear developers and operators, to compensate communities near to a nuclear site economically, through monetary payments or grants. Kunreuther *et al.* (1990) highlight that such compensatory actions can be deemed and interpreted by those in receipt of such economic payments as bribes when they are unrelated to a facility's direct impacts, such as health-related impacts, and may actually backfire upon the operator. I argue that this reflects a 'deficit of understanding' demonstrated by operators and organisations who do not engage sufficiently or appropriately with communities to understand the perceived and *real-life* impacts of such developments. Insufficient engagement with those impacted directly by developments mitigates the ability of developers to understand how these impacts are experienced 'on the ground', and which impacts are felt most strongly by affected communities. I argue that if the main impacts of developments on communities are not economic, then economic solutions are unlikely to adequately address community needs and concerns.

Approaches to technological development which seek to understand local concerns and constructions of the focal technology have been recognised as important for some time, with the literature reflecting this to a degree. Successful examples of such approaches are detailed by Kuhn and Ballard (1998), such as the construction of hazardous waste treatment facilities in Alberta and Manitoba in Canada which resulted from what the authors describe as an 'open process', where local concerns were acknowledged and contributed to siting success:

> *"…focussing on social and political concerns of potentially affected communities and on the process of decision making itself are fundamental to achieving siting success" (p. 533).*

If the concerns of the general public are not sought or understood, conflict can result. Armour's study (1991) on the siting process for the Eldorado low-level radioactive (LLR) waste management facility in Canada highlights the impact of public opposition when planning and decision processes are deemed to be inadequate by local citizens. The siting process was stopped in 1986 by the Canadian Cabinet due to vehement opposition from local residents due to waste-related risks and the decision process itself, notably the validity of site-selection criteria; proponent bias; process unfairness; and the lack of openness of planning and decision-making

processes (*ibid*). Other siting failures detailed in the literature include a failed attempt to site an LLR waste repository in New York State; Freudenburg (2004) details a flawed approach which was predominantly top down and technical in nature, where officials in New York State ignored "the very real impacts created by their own actions" (p. 139), leading to a public outcry. This is an example of the significant limitations of the traditional technocratic and expert-led approach, particularly for the sustainability and legitimacy of processes, which local residents often become aware of and respond to. In regards to the siting of nuclear waste disposal facilities, and specifically in regards to Sweden's success compared to that of the Czech Republic in this context, Dawson and Darst (2006) highlight three key variables for a successful process; open public consultation; widespread and reciprocal trust between society and government and industry; and resilient democratic institutions to efficiently channel opinion.

Research conducted by Glasson (2005) provides a rare insight into the socio-economic impacts of nuclear power in a specific location in the UK, that of Sizewell B in East Anglia. Glasson argues for improved monitoring of nuclear developments in order to better manage their impacts, detailing the socio-economic impacts on the local area surrounding Sizewell B during its construction. The study details several "barometers of local opinion of impacts", which enable "social constructions of the reality of the power station development" (*ibid*: 215) to be revealed and explored. As the author proposes, studies such as this enable local impacts to be better understood and better managed, to enhance the positive and mitigate the negative impacts of major energy projects and ultimately maximise local benefits. I observe that research of this nature is limited in the energy and social science literature, and there is an evident gap in studies examining the socio-economic impacts and sustainability of nuclear power stations, and indeed, other large-scale energy developments, in nearby or local communities. Indeed, other authors have observed that social impacts persist in being 'the poor relations' in UK project assessments in the UK (Chadwick, 2002). The current research contributes to addressing such shortcomings. I concur with Glasson's (2005) assertion that long-term local monitoring and assessment can assist and improve the management of such projects; the current research aims to develop sets of locally-derived sustainability criteria for the purpose of enabling such local sustainability monitoring to occur.

In more recent work, Chung and Kim (2009) argue that new methods are required at the local level that more appropriately encompass the views and experiences of affected communities:

> *"…in order to offset the risks for residents near the facility, we must develop a new method of local referendum, in which the opinions of the residents near a hazardous facility are reflected proportionally to the risks they will face" (p. 15).*

The process of decision-making is important for the sustainability and public support or endorsement of nuclear power developments, as is the understanding of how these decisions impact upon the well-being of local stakeholders and local communities. At this point, I will discuss the subject of decision-making in the literature, focussing on energy and nuclear-related

decision-making.

Summary

- There is broad agreement in the literature that nuclear power is contentious and impactful in numerous ways on society, but the localised accounts and views behind this are insufficiently studied and understood (i.e. from the perspective of 'affected' communities) to better manage development-related impacts
- Many authors argue that greater public engagement and participation in nuclear decision-making can significantly reduce conflict, lead to more robust, sustainable decisions, improve co-learning and knowledge generation, and enhance trust between stakeholders
- Several authors recommend the greater employment of mixed-methods research and engagement of 'affected' stakeholders in order to better understand the complex nature of the societal impacts of nuclear power, and the most effective ways of engaging with diverse communities living near to nuclear facilities to understand local views, experiences, priorities and concerns.

2.2 Decision-making and public participation

Such as social life is complex and dynamic, decision-making is also often a complex process, seldom one-dimensional or clear cut (Bunge, 1998). Concurrent to data and calculations, particularly for decisions which involve technical subjects such as energy generation or bioscience, decisions often involve the consideration of a variety of elements such as beliefs, morals and values, even organizational dimensions (Boholm and Löfstedt, 2006), which as Jaeger *et al.* (2001) assert, cannot be explained by normative assumptions about society. Decision-making incorporates both objective and subjective criteria, and reflects the complexity of social life. For the purposes of this section, decision-making is considered in the context of energy developments and society.

Abelson *et al.* (2003) suggest that involving affected citizens in decision-making is now agreed by many to be of great importance, made clear by the following statement:

"Whether the decisions fall into the environmental, biotechnology or local government sphere, policy makers, regulators, experts and public advocacy groups agree on the importance of involving the citizenry in the decisions that affect them…" (p. 239)

Calls for the utilisation of more effective public participation techniques in decision-making reflect the proposal by some scholars that social capital will be fostered as a result, through collaborative efforts between organisations and community members (Putnam, 1993). In addition,

greater public participation and capacity building are viewed as providing opportunities to "re-create community as the cornerstone to improvements in social and economic conditions" (Abelson et al., 2003: 240; *also see* Putnam, 1993; Sandel, 1996). Collaboration between stakeholders is promoted by Breukers and Wolsink (2007) in regards to decision-making processes for energy policy. The authors propose three main reasons why collaboration of stakeholders should be supported, which includes local citizens:

1. In the project design phase, the participation of stakeholders sees the contribution of knowledge and experiences, enhancing the broader quality of the project.
2. Negative attitudes towards a particular project can be reinforced by perceptions of unfair procedures and decision-making processes, whereas collaborative decision-making is more conducive to facility or project realisation as opposed to "top-down decision-making" (*ibid*: 2738).
3. The democratic legitimacy of innovation processes and project outcomes are enhanced by collaborative decision-making.

2.2.1 Decision-making: procedural justice and fairness

For decision-making processes and procedures to be acceptable to wider society, they must be fair and just, such is the foundation of the notion of *procedural justice* and *fairness*. Walker and Eames (2006) highlight the basis of procedural justice as *participation* and *recognition*; are people afforded access to participate in decision-making processes, and who and what knowledge are recognised as valid to participate? Walker, Wiersma and Bailey (2014) state that procedural justice is concerned with "individual perceptions about the fairness of processes and decision making procedures" (p. 47), whereas Fuller and Bulkeley (2013) describe the focus of procedural justice, in short, as ensuring that decision-making processes are fair. In recent work, Jenkins *et al.* (2016) note that procedural justice is closely associated with stakeholder engagement, in that pursuits of procedural justice inspire research which seeks to "explore the ways in which decision-makers have sought to engage with communities" (p. 175). This in particular is an area of interest for this research. In other work, I argue that maintaining procedural justice throughout a process is essential in order to ensure that it is both *fair* and *legitimate* (Whitton et al., 2015).

Fuller and Bulkeley (2013) assert that the principles of democracy imply that each citizen should be able to participate, as is their democratic *right*, but that barriers exist which limit this participation, such as the participation of the public in decision-making processes associated with climate change. As Young (2000) highlights, institutional conditions that have existed for long periods may prevent or hinder an individual's ability to participate, and as Paavola and Adger (2006) observe, equal participation across decision-making platforms may be prevented by

obstacles such as a lack of capacity to participate. Pursuits of a fair and just process, of procedural justice, are concerned with such realities and the mitigation of such obstacles or barriers wherever possible. Also, Jenkins *et al.* (2016) note that procedural justice is often envisaged as a call for "equitable procedures that engage all stakeholders in a non-discriminatory way" (p. 178; also see Bullard, 2005; Walker, 2009).

In the context of procedural justice concerning energy infrastructure, Yanetti and Day (2015) explore and discuss procedural injustices surrounding the implementation of the Charanka Solar Park in Gujarat, India. The authors found that during the development of this infrastructural project, there was a lack of information sharing between stakeholders and that local public stakeholder knowledge was not adequately acknowledged or utilised. Utilising a framework for procedural justice, they find that local communities were presented with inadequate opportunities to participate and that enfranchisement of these affected communities was lacking, leading to unnecessary impacts on the livelihoods of local public stakeholders, and further marginalisation of rural citizens of the lowest status. The authors conclude by asserting that recognition and meaningful public participation are required for the voices of the socially excluded and least advantaged to be heard, in addition to commonly-heard higher status and more affluent stakeholders, and for 'environmentally good' and procedurally just projects to be achieved. Such studies reinforce the need for procedural justice considerations within energy research, particularly when considering marginalised and rural communities, and large-scale energy infrastructure that can have widespread social and cultural impacts.

For the purposes of this research, the work of Siegrist, Connor and Keller (2012) on procedural fairness and the acceptance of GM field experiments, and of Visschers and Siegrist (2012) on procedural and outcome fairness and the acceptance to rebuild nuclear power stations is of particular value due to their exploration of procedural fairness in the context of contentious subjects, of which the latter is clearly relevant. I also consider procedural justice in the wider context of 'energy justice', which, as Eames and Hunt (2013) note, as is sustainable development, is "an inherently political and contested concept" (p. 48). The concept of energy justice is discussed further below.

2.2.2 Energy Justice

'Energy justice' is a concept that has garnered growing interests from a variety of researchers, and as Jenkins *et al.* (2016) suggest, it represents "a new crosscutting social science research agenda" (p. 174). The energy literature has seen greater examination of the subject of energy justice, with several comprehensive publications in this regard published in recent years (Bickerstaff, Walker and Bulkeley, 2013; Sovacool, 2013; Sovacool and Dworkin, 2014; Sovacool, Sidortsov and Jones, 2014). The work of Jenkins *et al.* (2016) represents one of the most recent studies on this subject, reviewing the conceptual construction of energy justice in the

literature. Energy justice refers to various justice-related considerations, be these procedural or distributional justice (or fairness) to use common examples, of energy systems and production (Heffron and McCauley, 2014), energy consumption (Hall, 2013), energy security (Sovacool, Sidortsov and Jones, 2014) and energy policy (McCauley et al., 2013) among other facets. In work that reviews 15 years of energy-focussed research, Sovacool (2014b) recognises that energy justice is an important area of research given the central role that energy plays in realising fair and just societies:

"…how we distribute the benefits and burdens of energy systems is pre-eminently a concern for any society that aspires to be fair" (p. 15).

The energy literature also states the importance of energy justice research in consideration of energy systems being deemed as sustainable and just. Bickerstaff *et al.* (2013) argue that whilst being an underdeveloped concept associated with low-carbon transitions, energy justice is one of the most critical, and "must underpin a sustainable energy future" (p. 2). Their work builds upon 'just sustainabilities' research, which examines the relationship between sustainable and just societies (*see* Agyeman et al., 2003; Agyeman, 2013), arguing that energy justice is a vital component for a society to be truly sustainable and just. In regards to what energy justice relates to and considers, Jenkins *et al*. (2016) detail this as identifying where injustices exist, the sections of society which are affected and ignored, and the processes to enable this to be remediated, so that such injustices may be revealed and reduced. As the authors state:

"Energy justice offers…an opportunity to develop new crosscutting social science agendas on exploring where injustices occur, developing new processes of avoidance and remediation, and recognizing new sections of society" (p. 176)

Energy justice is an emerging area of research in the energy and social science literature, some of the reasons for which are detailed above. Therefore, the concept of energy justice, particularly the component of procedural justice, are areas of interest in this thesis and areas of knowledge to which I look to contribute. As MacCoun (2005) states, it is the belief of the public that ''fair procedures produce fair outcomes'' (p. 182). Nationally significant infrastructure projects (NSIPs), which describe large-scale developments relating to energy, transport, water and waste which require 'development consent' (HCL, 2016), often produce multiple and often unknown outcomes and multiple impacts on the environment and society. Examples may include power stations that contribute electricity to the national grid, or long distance rail infrastructure that connects various counties. Therefore, notions of procedural justice and procedural fairness associated with decision-making for these developments are important considerations. The concepts of procedural justice and fairness aim to balance cost-benefit distributions, such as

those resulting from large-scale developments. Should such balancing negotiations not occur, so that they are not deemed sufficiently legitimate, or if presented information is revealed as flawed or incorrect, local opposition and conflict between industry or governmental figures and wider society may follow (Banerjee, 2013; Flyvberg, 2007; Hacking and Flynn, 2014; Walker, 2009). There are also generational elements to such justice considerations; Taebi et al. (2012) argues that, in consideration of egalitarian justice principles, which propose that the way people are treated should not depend on or be justified by their fortune and placement in time or space (Barry, 1999), future generations should be involved in current decision-making processes. Procedural justice, discussed further below, has been found to be a key factor in the success of projects, and for project developers, mitigating conflict with local populations. Gross (2007) finds that with fair, open, indeed transparent decision-making, acceptance of outcomes by project opponents increases, despite whether these outcomes fully satisfy opponent desires, such is the value of fair procedure. Where local acceptance is not achieved, local opposition is commonly experienced, which has been found to be economically and socially costly, both to developers and local communities, as it can result in social conflict, planning delays and a loss of trust which is difficult to regain (Cotton and Devine-Wright, 2011). In the context of local community opposition to and conflict surrounding energy infrastructures, Batel and Devine-Wright (2015) have studied what they term the 'national-local gap', in that whilst low-carbon energy infrastructures may be supported at a national level, their siting at the local scale are commonly opposed for various reasons (*also see* Aitken, 2010; Bell, Gray, and Haggett, 2005; Ellis, Barry, and Robinson, 2007; Wustenhagen, Wolsink, and Burer, 2007; Zoellner, Schweizer-Ries, and Wemheuer, 2008).

Trust is found to be grounded in various perceptions, which reflect either *values* or *competence*, a "dichotomization" supported by the empirical research (Greenberg, 2014). Both Siegrist *et al.* (2003) in their study of public concern towards electromagnetic fields, and Poortinga and Pidgeon (2003) in their study on trust in the context of a variety of hazards have found this association with the two concepts. Peters *et al.* (1997) note that such perceptions include expertise, knowledge, honesty, openness, and care. Earle and Cvetkovich (1998) highlight issues of agreement, rather than attempts to remedy disagreement, should be pursued by those people seeking change and progress with public positions that are oppositional, leading to inter-actor trust building. Trust is one of several factors, albeit a very important one, used in decision-making processes, particularly in the context of energy (Greenberg, 2014; Sidorstov, 2014; Sovacool, 2014a; Stern, 2014). As stated by Pellizzone *et al.* (2015), trust is a key concept in the STS literature, and is something not easily acquired or maintained, requiring "strong and continuous efforts in communication" (p. 3). Trust has also been highlighted in the field of energy research alongside growing public concern about risks in society, particularly those risks resulting human activity and decisions; Greenberg, Popper and Truelove (2012) have termed a group of these, which include nuclear power and waste management facilities and oil refineries, as 'enduringly objectionable land uses', with nuclear power and waste sites and oil refinery sites occupying first

and second place respectively in their list (Greenberg, 2014). In respect to similar land uses and developed infrastructures, Rootes (2006) has also described how a deficit of procedural justice can reveal how local power structures and relations between agents at the local level may be imbalanced, with ethical implications for decision and policy making in regards to NSIPs.

This research is concerned with decision-making, but particularly that of a strategic nature. Therefore, it is important to discuss briefly how this is defined and considered. Referring to the strategic decision-making literature, the definition of a strategic decision-making process provided by Shepherd and Rudd (2014) is "a set of different characteristics" (p. 340), including rational or political characteristics, or as a process involving firstly the gathering of information, followed by the development of alternative options, and then undergoing a process of selection amongst these alternatives (Wally and Baum, 1994).

To provide some context, strategic decisions are different to those people make on a daily basis, such that they have been described by Hickson *et al.* (1986) as being at one end of a spectrum of decision-making, at the opposite end to "trivial everyday questions" (p. 27, *cited in* Shepherd and Rudd, 2014). As noted in Section 1.4, Shepherd and Rudd (2014) discuss strategic decision-making in organisational terms, with the goal of organisational success. In the current research, I consider strategic decision-making outside of these purely organisational parameters. Instead, I seek to explore how both engagement process and decision-making can be conducted strategically for the benefit of both organisations, be these industrial or governmental, and of local stakeholders, including local communities, sharing similar aims to those described in the study of Esteves and Vanclay (2009), where business and community needs are reconciled within a sustainable development framework. However, I do acknowledge and respond to the research recommendations of Shepherd and Rudd (*ibid*) who following their review of the strategic decision-making literature, conclude that methodologically, future research should "complement quantitative studies with qualitative research" (p. 362). Although the current study does not utilise the qualitative methods recommended by the authors, such as cognitive task analysis for example, the mixed-method approach of the current study (*see* Chapter 4) reflects the complementary methodology recommended for strategically related research. I now focus on an aspect of infrastructural decision-making that is well documented in the literature and is closely related to the subject of new nuclear power developments, which is that of facility siting.

2.2.3 Facility siting: moral and social decision-making, and local participation

"How to ensure fair processes and just outcomes for local communities, and how to enhance the acceptability of energy generation facilities amongst local populations remain important areas of human-energy research."

(Walker, Wiersma and Bailey, 2014: 46)

Large-scale energy developments, such as energy-from-waste facilities and nuclear power stations, are examples of technological developments which generate significant debate in modern societies as to their social, economic and environmental impacts, and are commonly sources of social contestation, opposition, and in some cases conflict. Owens (2004) observes that it is not uncommon for decisions on major developments which possess substantial risk or impact characteristics to take many years and even decades. She also argues that due to the complexity of siting conflicts, resolution between competing parties, such as a development company and a local community, is unlikely without addressing matters outside of those procedural in nature, such as social or environmental impacts for example. Even the rhetoric of 'sustainability' over the years has done little to remedy siting conflicts, with its promise to reconcile multiple objectives often failing to deliver (Owens and Cowell, 2002). The authors progress this argument in suggesting that an improved model of siting controversies is required, one that is more complex and dynamic in nature, such that "land use conflicts are seen as formative in a gradual process of policy learning and change" (Owens and Cowell, 2002: 102). Such progressive framing of the facility siting process and the controversies which can arise from them looks to amend and remedy an area of societal conflict which has long been endured by communities, industries and authoritative bodies. The assertion that such a process of change should be 'gradual' is reflective of a process based upon a goal of sustainability and not one based upon short-term gain; as mentioned previously, this is something often heralded but rarely realised in practice.

Central to the development of large-scale infrastructural projects, particularly nuclear-related infrastructure, are their geographical location and their siting. Facility siting and siting controversies can teach researchers a great deal about the considerations and challenges encountered, whether they be ethical, moral, social, environmental, practical etc. when developing large-scale infrastructure or, commonly, 'stigmatized' facilities (Edelstein, 2004). A broad examination of various cases of both facility and infrastructure siting can inform the current research by identifying key factors which have caused decision-making to experience delay, undermining or challenge, and highlighting several areas relating to public engagement and societal priority which can inform future infrastructure-related decision-making for strategic means. Edelstein (*ibid*) asserts that the siting of controversial or 'stigmatized' facilities, where conflicting views and positions struggle to be brought together harmoniously, is a central

challenge to the development of new sustainable technologies. The author notes the negative connotations associated with facility siting, stating that, from a local perspective, siting is often considered "an act of violence to place and community" (p. 233), with waste facilities in particular seen as threatening "the identity of places and people associated with it" (p. 234). The following quote from Edelstein's (2004) study, of siting dilemmas and the exploration of qualifications for 'good' sustainable projects, succinctly summarizes the social consequences of facility sitings which are perceived to produce negative local impacts:

"The more a proposed facility threatens local degradation, devaluation and diminished quality of life, the less those most impacted are likely to be supportive and the more likely they are to be downright opposed" (p. 234).

In their enquiry into the application of rights-based theories to siting controversies, Peterson and Hansson (2004) point out that such controversies are commonly expressed as challenges to moral rights, in that a company may have a moral right to build a facility which causes some environmental detriment for example, whilst people living near to the site of development also express their right to live in an area without the risk of environmental damage. The authors use an example of an incineration plant siting to demonstrate this, with the moral right of the company to cause air pollution through the emission of toxic gases to an agreed legal level, in conflict with the moral rights of local residents to breathe unpolluted air. They demonstrate that the legal allowance to emit a specified level of toxic gases sacrifices the *prima facie* right of residents to breathe clean air for "the demands of economic development" (p. 269) and the right for the facility to operate. This raises significant questions about the moral arguments surrounding facility or infrastructure siting (FIS), and whether in developed, capitalist economies, such as the UK, priority is increasingly given to economic and technological 'growth' rights over the social and environmental. Peterson and Hansson (2004) also make the observation that seemingly incompatible rights appear to coexist with siting controversies in a paradoxical fashion, in that all parties concerned have the *prima facie* right not to have risks imposed upon them against their will, coinciding with the inability of the social system of moral and legal rights to be exercised without imposing risks on others. They suggest that although the moral rights of people living near to a proposed unwanted facility are commonly incompatible with those of the company or organisation behind the siting proposal, the notion of 'residual obligations' may prove valuable in addressing such moral dilemmas. This refers to philosophical discussions of moral dilemmas, and originates from the work of Williams (1973) who introduced the term to describe the "remaining moral force of obligations that one does not have to comply with" (p. 175), or as Peterson and Hansson (2004) note in referring to the work of Ross (1930) on *prima facie* obligations, the overriding of an obligation without it losing its force. According to Williams (1973), when obligations are overridden there remains a 'moral residue' – the more general term for 'residual obligation' – which should be addressed; the moral residue is what remains as a replacement when the primary (*prima facie*) obligation is overridden. In an earlier study, Hansson

and Peterson (2001) categorise these residual obligations as:

- *Obligations to compensate* – resulting from a justified and unjustified breach of a primary obligation or wrongdoings
- *Obligations to communicate* – include various socially conventional means of expressing feelings or attitudes in order to apologise or express regret, such as obligations to inform, to listen, to engage in a dialogue, or to perform speech acts (e.g. issue an apology).
- *Obligations to improve* – may occur when non-compliance with primary obligations was not directly the agent's fault, but improvements are warranted and sought nevertheless.
- *Obligations to search for knowledge* – of instrumental value, this serves as a vehicle for the exercise of other residual obligations (e.g. compensation, communication, improvement), where knowledge is acquired to inform practical actions.
- *Attitudinal obligations* – refers to the attitudes of individuals who have violated the primary obligation, demonstrating moral competency.

The fulfilment of these moral obligations plays a key role in the resolution of a dilemma, and therefore, Peterson and Hansson (2004) propose, must be considered in pre-decision deliberations on the justification to develop the facility. What do such proposals mean for the current research? Although not concerned specifically with siting proposals, but with new nuclear developments where siting decisions are ongoing at the present time in the case study area, the research can integrate such moral considerations into its examination into development sustainability, particularly the social dimensions of its sustainability.

In a recent study, Batel and Devine-Wright (2015) promote gaining a deeper understanding of how groups and individuals in different places perceive particular developments and facility 'sitings'. To do this, the authors suggest that a place-based, 'emplacement' perspective, as opposed to a siting perspective to understand local perceptions of large-scale energy infrastructures, "referring not only to specific sites where developments are proposed, but also wider 'energy landscapes' that might be cumulatively affected by several low carbon infrastructure proposals" (2015: 4; *also see* Buhr and Wibeck, 2014). The authors also note the importance of understanding the characteristics of localities and the nature of the residents within these places to better understand response patterns to infrastructural developments, for example in regards to expected local impacts (*see* Irvin and Stansbury, 2004). They state that their research highlights the possibility of "more in-depth and context-sensitive information about people's beliefs regarding energy infrastructures" (Batel and Devine-Wright, 2015: 13) when examining individuals' responses based on "communities of locality at the local level" (*ibid*). I concur that such a place-based approach is necessary if we as energy researchers are to develop a more detailed understanding of how and why local communities and stakeholders perceive energy developments and infrastructures. Also, I argue that a place-based approach could assist in more effectively conceptualising social sustainability within spaces of energy transition and 'energy landscapes', where several low carbon energy infrastructures may occupy and impact a specific

area (Bridge et al., 2013), and understanding how energy infrastructures may impact upon different social groups within these localities.

As Peterson and Hansson (2004) argue, the moral rights of companies, operators, or governmental organisations behind facility siting proposals are often incompatible with those of local people, stating that "decisions or proposals to site locally unwanted plants or activities often give rise to precarious moral situations" (p. 275). Understanding the social priorities of local stakeholders can provide an indication of potential moral conflicts with developers or officials involved in decision-making processes. This occurs where areas of 'residual obligation' (Brummer, 1996) may arise should moral rights be overridden, and where moral residue unaddressed may lead to rights-based conflict which threatens the sustainability of developments (Peterson and Hansson, 2004; *also see* Hansson and Peterson, 2001). In short, understanding stakeholder priorities can highlight moral and sustainability conflicts associated with proposed facilities.

Devine-Wright, Devine-Wright and Sherry-Brennan (2010) have suggested that less opportunity for public participation increases the likelihood of public opposition and delays to developments. Such developments include nuclear waste repository siting (Krütli et al., 2010a), electricity transmission and infrastructure planning (Cotton and Devine-Wright, 2012a, 2012b), wind energy developments (Cowell, Bristow and Munday, 2011); tidal energy developments (Devine-Wright, 2011); small hydropower projects (Rojanamon, Chaisomphob and Bureekul, 2012) and rural renewable energy implementation (Shamsuzzoha, Grant and Clarke, 2012). However, in policy-making and techno-scientific scenarios, technical 'experts' and specialists commonly raise concerns that the quality of decision-making is adversely affected when 'non-expert' lay people are involved in techno-scientific policy-making. This is due to their lack of technical competence (Webler, 1995), resulting in a fear that decisions will be heavily informed by 'public sentiment' rather than robust scientific evidence (Rowe and Frewer, 2000). In the nuclear context, Johnstone (2014) explores stakeholder engagement in the UK from the 1980s to the present, and the impacts of planning reform. Based on the empirically-based views and experiences of NGO and oppositional actors involved in the Hinkley C public inquiry process (1988-89), also known as 'the forgotten inquiry' (Johnstone 2013), he explores the shift in common public engagement formats from the more national-scale public inquiry to the more recent localised public consultations. Johnstone (2014) contests that the implementation of The Planning Act 2008 in the UK impacted participation by 're-scaling' public stakeholder engagement from a national to a local scale, and that this reduced the 'political opportunities' available to non-governmental actors, and indeed public stakeholders, to provide and deliberate evidence, ask questions of other stakeholders and influence nuclear policymaking.

Regarding models to facilitate collaborative decision-making, the work of Raven *et al.* (2009a,b), on sustainable decision-making for new energy projects, has informed this research. The authors' ESTEEM model employs vision building techniques and identifies conflicting issues with stakeholders. The value of incorporating the views of local stakeholders is shown to be significant in managing social acceptance for new energy projects, by anticipating and avoiding potential

issues in the future. Raven *et al.* (2009a) note that for new energy technologies, whereas they often possess a favourable global public image, their implementation locally often raises several social questions and oppositions, resulting in a lack of societal acceptance from neighbours and consumers. The authors make the important point that mitigating potential instances of societal resistance requires "a constant reflective and learning attitude of a project manager and other partners in a new energy project" (p. 976), an approach sharing aspects with Action Research (e.g. reflection and learning), which may require questions to be asked which might receive difficult or unwanted responses. The response of managers who are in receipt of such societal opposition has on many occasions been to dismiss concerns and objections as irrational, or understandable but futile (Bauer, 1995). However, scholars of Science and Technology Studies (e.g. Irwin, 1995; Irwin and Wynne, 1996) and Technology Assessment (e.g. Schot, 2001; Schot and Rip, 1997; van Eijndhoven, 1997; van Merkerk and Smits, 2008) have historically criticized this form of technological development management. Instead, such scholars have argued that enabling stakeholders and society to provide feedback to project managers 'upstream' at the design stage is beneficial in the long term, and that:

> *"…allowing feedback enables technology actors (science, industry) to learn about societal wishes and interests as early as possible, when there is still room for design adaptations, while societal actors (policy, users, NGO community) can learn about unknown needs or required regulatory, infrastructural or other systemic changes"*
>
> (Raven et al., 2009b: 964)

Raven *et al.* (2009b) note that if such collaborative approaches to decision-making are undertaken, whilst they can lead to positive results in the long-term when conducted correctly and with appropriate intentions, the effect of stakeholder engagement efforts *not* being taken seriously or conducted ineffectively may be to cause stakeholders to leave the process. This may potentially be due to project staff seeking to avoid significant change to the project. In the worst case, this may cause social resistance to the project, which may lead to delays and potential project abandonment should societal opposition become sufficiently serious.

The advantages of greater public participation are documented in the literature, such as the participatory process adopted for nuclear waste management decisions in Sweden (Dawson and Darst, 2006). Failure to sufficiently consider and involve the public can have negative consequences for similar projects, as has been the case in the Czech Republic (*ibid*) and in the UK (Lidskog and Sundqvist, 2004), where a lack of trust has been shown to be a key factor in public uncertainty towards plans for a national nuclear waste repository (WCMRWS, 2012). As Whitton (2010) has stated in regards to the involvement of stakeholders in decision-making at the strategic level, it is a challenge which is a "particularly poignant issue for the UK government and the nuclear industry" (p. 20).

Verbruggen *et al.* (2014) proposes that in political terms, nuclear power decision-making is generally characterized by "private and/or governmental technocracy, in which democratic steering and control take up a subordinate position" (p. 26). In response to this perceived quandary, the authors suggest a need for an independent agency of global scale to undertake a review of nuclear power in the context of "society's best interests" (*ibid*), which can serve to combat the manipulation of deliberative forums and public engagement. They observe this as resulting from the technocratic nature of decision-making, and the endorsement of incumbent policy as opposed to policy concerned with sustainable development. Such manipulation flies in the face of public interest to be involved in decision-making; Whitton (2010) notes that citizens in both the UK and US are willing to become involved in government consultations, due to the perceived possibility that they will "be able to obtain knowledge and perhaps influence the decision that is to be made on their behalf" (p. 20). Decision-making based solely upon technical criteria is inevitably technocratic, prioritising the not only technical evidence but the values of technical experts. This challenges the rights of affected citizens to be involved in environmental decision-making (e.g. under the Aarhus Convention), and has been shown, on numerous occasions, to result in unsuccessful nuclear policy decisions (Atherton and Poole, 2001; Blowers and Sundqvist, 2010; Whitton, 2010). This technocratic approach has been shown to lack *social sustainability* (*see* Section 2.6) in the face of "a clear public interest" (Whitton et al., 2015: 129; *also see* Lidskog, 2008).

At this point, the experience of the nuclear industry regarding public participation and dialogue is considered. Specifically, the literature on radioactive waste management (RWM) decision-making will be explored to examine approaches, challenges and lessons in the context of public participation and dialogue in the nuclear industry.

2.2.4 Radioactive Waste Management: decision-making, participation and dialogue

Radioactive waste has accumulated in the UK for several decades since the mid-twentieth century, the origins of which were nuclear weapon development in the first instance and nuclear power generation in the second. This waste came in various forms, and could be broadly categorised as low, intermediate or high level waste. In order to manage the accumulation of solid low and intermediate level radioactive waste, the Nuclear Industry Radioactive Waste Management Executive (Nirex) was established in 1982, with Sellafield in Cumbria selected in 1991 by Nirex as the preferred site for the disposal of radioactive waste within a deep repository, following several years of site evaluations and a period of public debate (Kemp, 1992). However, such efforts were challenged in 1997 by the Secretary of State for the Environment, with the refusal of planning permission regarding the proposal by Nirex to construct an underground rock laboratory (Rock Characterisation Facility – RCF), which aimed to conduct investigations into the geological viability and groundwater implications for the proposed deep repository.

The underground disposal of radioactive wastes was questioned, in particular the aspects of scientific justification and public acceptability of such infrastructure, leading to a government review of radioactive waste management policy (Kemp, Bennett and White, 2006). The enquiry into the management of radioactive waste between 1997 and 1999, conducted by the House of Lords Select Committee on Science and Technology, and the report produced by the Committee (HoL, 2001) highlighted the need for public acceptance of such policy decisions, within a "phased approach" where decisions could be taken "in a considered way as technical confidence and experience develop", and achieved with the central employment of widespread public consultation (*ibid*). This reflects the basic understanding of officials at this time of the necessity of public consultation to derive 'public acceptability' or a degree of legitimisation of nuclear-related decision-making, particularly when significant 'unknowns' form their focus. The UK Government responded to the recommendations of the Committee with a detailed plan for radioactive waste management in 2001, publishing the 'Managing Radioactive Waste Safely (MRWS)' report (DEFRA, 2001) and detailing plans for widespread consultation as had been suggested. As Kemp *et al.* (2006) assert, it is now broadly accepted that the values and opinions of stakeholders, including those of local citizens, should be reflected by radioactive waste management decisions, which facilitate "good governance and sustainable futures" (p. 1022). In their examination of various practices and techniques adopted as part of 'stakeholder dialogue' at the Dounrey nuclear site, the location of the UK's reprocessing technology research on the north coast of Scotland, the authors emphasise the importance of fully engaging with stakeholder and community groups and the local level (Kemp et al., 2006).

The literature highlights a community desire to become more involved in decision-making processes, particularly regarding large-scale developments which can potentially impact upon the social, environmental and economic fabric of society (Bronfman et al., 2012; Doukas et al., 2011; Glasson, 2005; Rogers et al., 2008; Shamsuzzoha, Grant and Clarke, 2012). Devine-Wright (2005a) has previously argued that for large energy developments, notably on-shore wind, a locally embedded approach by public and private sector stakeholders is likely to receive much greater local support. Cited in the study, Fielden (2000) suggests that there is a need for local people to participate in decision-making for local energy developments:

> *"…local energy end-users could and should participate in energy planning and their grasp of energy issues as end-users—coupled with their knowledge of local conditions—needs to be fully integrated into the decision making process" (p. 45).*

Kemp *et al.* (2006) suggested that citizens are fully capable of engaging with complex information and technical issues, and therefore should not be excluded due to a false understanding of public capacity. Rather, the key issues in this regard appear to be the effective communication of appropriate technical information to citizens, and deliberative dialogue to enable multi-way discussion of technical, procedural and local information, and any questions

generated, with all stakeholders.

Understanding the local impacts of large-scale energy developments, particularly social impacts, is an area of the literature that requires further development. It is known that communities undergo significant changes during large-scale energy developments (Brasier et al., 2011), which led to the development of the label 'boomtowns' by authors in the 1970's (e.g. Gilmore, 1976, Gilmore and Duff, 1975). Such large-scale developments often cause dramatic changes locally, especially when communities, often rural, become dependent on specific industries (Brown et al., 2005). As Brasier et al. (2014) detail, boomtowns describe areas which undergo significant and rapid population growth and economic activity, often but not always due to natural resource development (England and Albrecht, 1984; Krannich, 2012). These sites are of interest to social scientists, due to "the ways in which such rapid change creates new opportunities as well as new and often unanticipated stresses for people and communities" (Brasier et al., 2014: 8; *also see* Brasier et al., 2011; Freudenburg and Wilson, 2002; Gramling and Freudenburg, 1990). However, these gain periods can be relatively short lived and result in unsustainable growth when the development ceases operation, although it is important to note that such negative impacts from energy developments are not inevitable (Krannich and Greider, 1984). In a similar context, Sovacool (2014c) provides one of the very few evaluations, and is the most extensive (100 articles over the past 10 years), considering the broad costs and benefits of shale gas hydraulic fracturing, considering the environmental, economic, social and technical aspects. The study finds that a significant number of the negative social impacts mentioned are felt at the local level, with positive factors of job creation and economic investment not being fully available to or appreciated by those living near to shale gas extraction sites. As are many nuclear energy sites, these are located in remote and rural spaces. In a nuclear context, Whitton (2011) has highlighted a lack of social research into the societal impacts of nuclear decommissioning, and suggests systematic social research to inform communities and institutions to adequately respond to these processes.

Decision-making and engagement for new and emergent energy technologies are areas that have been highlighted as critical for their success and sustainability. Cotton (2014) asserts that support for these technologies, from established elected members and shareholders to locally affected communities and public interest groups, is seen as increasingly important by governments and technology development organisations in the face of social and ethical challenges. He states that public support is considered necessary both "as a process of justifying technological policy openly in civil society" and for "defusing the types of public opposition that can result in development failure and wasted public sector and industry resources" (*ibid*: 1). Cotton also stresses that debates about the impacts of technological development and implementation cannot continue to follow the traditional format of expert-led technocracy, or, as Cotton writes, be based on "a purely objective and factual discussion, bounded by the rationality of techno-scientific analysis" (*ibid*: 161). He explains why this is both insufficient and inappropriate:

Summary

- Public participation and capacity building provide opportunities to contribute to social and economic well-being of communities, increase social capital, demonstrate procedural justice and enable for the voices of interested and commonly excluded stakeholders to be heard

- Many energy scholars agree that the concept of energy justice, which involves procedural justice, is of great the importance when considering and pursuing energy systems that are sustainable and just, and that it must underpin future energy systems to ensure that societies are in turn sustainable and just. Procedural justice is noted as being key for societal support of projects and building public trust

- From a local perspective, facility siting can be perceived as an assault to place and community, and the more it is viewed as threatening local environments, culture or quality of life, the less support a project will likely receive. Public support is considered necessary to justify technological policy in civil society, and debates on the impacts of technological development and implementation must move away from expert-led technocracy to more inclusive and participatory approaches

"Neither quantitative risk assessments alone, nor finding ways to encourage better public understanding of scientific and technical issues will facilitate consensus building or public acceptance [of] SECT[s] in the public realm, because the nature of risk debates implicitly involves complex ethical issues, numerous and conflicting relationships, trust and social capital" (p. 161).

2.3 Stakeholder/public engagement and participation

Interest in stakeholder participation has increased significantly in recent decades, particularly towards public participation (Dunn et al., 2007). Gwaba (2003) details that, in one of the Zambian languages, participation translates to being part of or giving yourself "to what is going on" (p. 88). According to Rowe and Frewer (2004), public participation is defined as "the practice of consultation and involving members of the public in the agenda-setting, decision-making, and policy forming activities of organisations or institutions responsible for policy development" (p. 512).

At this point, it is important to make the distinction between *participation, engagement and deliberation*, which are sometimes used interchangeably. Unlike the broad notion of participation, deliberation reflects a more focussed approach to participation that is dialogue-based, involving "time to discuss information provided and explore key issues" (Stagl, 2006: 57). Similarly, Cass (2006) states that, in the context of decision-making, deliberation refers to methods that are primarily dialogic, "involving information exchange, discussion, sometimes argumentation or

persuasion" (p. 5), and the weighing up of different views amongst a group of people. Burchardt (2013) argues that the purpose of deliberation, unlike consultation, is to "uncover the public's informed, considered and collective view on a normative question" (p. 353). Based upon these definitions, the term 'deliberative' in this research describes formats or methods of communication that reflect multi-directional, dialogue-based interactions between two or more individuals to uncover their views on a specific issues. I concur with Petts (2001), who states that deliberative processes should be 'representative of interests', as a minimum, "if the purpose is to understand the range of views that may exist and if the community is to influence the decision" (p. 213). I also agree that deliberative processes should significantly influence decision-making culture, and not simply decisions themselves (Petts, 2001).

Engagement shares similarities with participation in regards to its broad meaning, describing the various ways in which information, views or opinions flow multi-directionally between the public and decision-makers (Cass, 2006). To clarify, whereas members of the public can be engaged on a subject or decision, this does not necessarily mean that they will participate in the relevant decision-making process in an influential capacity, unless the outcomes of engagement are fed into and inform the process. In short, in regards to decision-making, engagement can *lead to* participation, whereas participation *involves* engagement.

In the governance literature, various stakeholder and public participation concepts are identified by Renn (2008). The six concepts – *neo-liberalism, emancipatory, deliberative, post-modern, functionalism* and *anthropological* - involve differing participation models and instruments in their employment. They hold different objectives, which are, respectively, proportional stakeholder representation, empowering the underprivileged in society, promoting truthfulness, acknowledging the legitimacy of dissent, enhancing the quality of decision-making, and the utilisation of common sense. Other scholars such as Krütli *et al.* (2010a), who examine public participation in technical decision-making, propose that it may be required to utilize several participation methods consecutively in decision-making processes, and that the appropriateness of a method or technique is dependent on the circumstances (Jami and Walsh, 2017).

In regards to 'stakeholders', these are people who either can impact or are impacted by something, whether this be a project or a significant social change of some description, and so they have a stake in it. Sjoberg (2003) describes stakeholders as people or actors with special interests and concerns in an issue, on the basis of 'self-report' or 'observed activities'. As Whitton (2010: 19) states, "the most common definitions of the term "stakeholder" view these as any group or individual who can affect or is affected by a proposal or project".

The literature contains a multitude of examples on how public participation can lead to improved political decision-making. However, a generalised assertion that public participation leads to better outcomes is insufficient in that the definition of 'good outcomes' can depend on individual perspectives (Beierle, 1998; Tuler & Webler, 2010). Public participation is undertaken for various reasons; one perspective is to see it as a core element to democracy, and another is to use it as a

means to achieve a specific goal, such as a concrete decision outcome or to reduce the blame for a difficult decision (Abelson & Gauvin, 2006; Beierle & Cayford, 2001; Fiorino, 1990; Rowe & Frewer, 2000). There is nonetheless a more universal dimension to the good outcome of public participation. Instead of considering to which extent interests of discrete stakeholder groups have been met, Beierle (1998) proposes to consider five so-called "social goals" (p. 3); namely:

- Educating and informing the public,
- Incorporating public values into decision-making,
- Improving the substantive quality of decisions,
- Increasing trust in institutions,
- Reducing conflict

These goals do not only affect the decision at hand but exceed to a more societal level with the achievements impacting "the regulatory system as a whole" (Beierle, 1998: 5).

Building on the early engagement and participation categorisation work of authors such as Arnstein (1969) who proposed various 'rungs' of participation, Rowe and Frewer (2005) propose a categorisation scheme for defining various levels of engagement which are differentiated by the flow of information between parties and the impact upon decision-making: *communication, consultation and participation*. These involve the following:

- *Communication* - one-way information flow, from sponsor to the public, and no feedback is sought.
- *Consultation* - two-way information flow, where the information flows back, but with little or no dialogue.
- *Participation* - two-way exchange of information, between sponsor and public, where there is the potential for opinion transformation in either party.

As Rowe and Frewer (2004) state, there is pragmatic reasoning to including the public in decision-making processes, namely that a public that has not been consulted can become angry quite easily. Implementation of unpopular decisions can result in widespread protest in combination with a further loss of trust (Rowe & Frewer, 2000). Denying citizens a right to participate often means that rather than being dealt with appropriately, problems are 'relocated', and can result in conflict escalation or increased legal activity (Beierle & Konisky, 2000), leading to a high cost to society whilst failing to resolve issues and problems. Meanwhile, Beierle & Cayford (2001) suggest that conflicts that can be addressed and eliminated at an early stage are in the long term likely to lead to more satisfying and sustainable decisions. Fiorino (1990) provides three arguments for the involvement of citizens in risk-associated decision-making, which oppose the purely technocratic approach to decision-making; the *substantive* argument, which states that 'lay' judgments about risk are *as sound or more so* than the judgements of 'experts'; the *normative* argument, which

states that a technocracy is incompatible with democratic ideals.; and *the instrumental* argument, which states that effective lay participation makes risk decisions more legitimate and produces better results. Similar arguments for public participation have been discussed by Beierle and Cayford (2002). Stirling (2005) summarizes such distinctions for the justification of participation by stating that:

> *"…under a normative view, participation is just the right thing to do. From an instrumental perspective, it is a better way to achieve particular ends. In substantive terms, it leads to better ends" (p. 220).*

Authors such as Webler and Renn (1995) have similarly argued that public participation often increases the likelihood that a decision will be more appropriate than without such involvement, whilst also noting that participation does not and cannot guarantee conflict mitigation. They also suggest that the body that has undertaken the decision-making process is most likely to receive any criticism should such a decision result in negative impacts in the future, despite the involvement of the public in the decision-making process. This is one of a number of criticisms and questions posed to advocates of public participation.

Whilst many promote public participation, there are scholars who suggest that participation, rather than facilitating legitimate, democratic and sustainable decision-making, can lead to exercises of power which are unjust and illegitimate and unsustainable, short-term solutions (*see* Cooke and Kothari, 2001). This can be seen particularly in international and participatory development scenarios, whereby the agendas of more powerful outsider agents and bodies utilise participatory processes to pursue agendas which do not place the needs and sustainability of the 'host', less powerful communities at their centre, resulting in new forms of 'tyranny' under the guise of development and empowerment (ibid). Stirling (2008) observes that participatory exercises can suffer from a "widening of social agency" (p. 269), whereby extending inclusion beyond traditional actors can be, as Stirling states, "problematic for incumbent interests" (*ibid*). Pimbert and Wakeford (2002) and Renn, Webler and Wiedemann (1995) detail the limitations sometimes encountered during participatory exercises, with either sponors ignoring the outcomes of participatory exercises, or researchers and practitioners finding participatory exercises not significantly influencing policymaking respectively. Participation can be regarded as a process with the potential for good, but also, when employed inappropriately or unjustly, one which can also result in arguably negative or illegitimate long-term outcomes, particularly when participation is 'done to' people (Cooke and Kothari, 2001) as opposed to it being 'done with' them.

Others argue against or question the value of participation for reasons of sufficiency; of ability, capacity or knowledge. Participation of the 'lay public' may be opposed based on arguments that they do not possess sufficient knowledge or understanding of technical or scientific subject matter, which has been proposed by some to influence or explain the attitudes of the public

towards science (Wynne, 1991; Ziman, 1991), whilst others reject such simplistic arguments and argue such attitudes are indeed affected by knowledge but as part of an interface which is 'complex and interacting' in nature (Sturgis and Allum, 2004). For example, the 'deficit model' describes and is underpinned by an assumption that the general public's lack of understanding and/or knowledge of science contributes broadly to public scepticism towards science (Wynne, 1991; Ziman, 1991); this is based upon perceptions of 'the public' as knowledge 'deficient' and ignorant towards science, which is deemed as 'sufficient' (Gross, 1994). However, Slovic (2000) presents empirical research that demonstrates that lay people understand risk in ways that involve ethical considerations and have a broader understanding of risk than experts. Taebi *et al.* (2012) suggest that this may be due to the involvement of emotions in these ethical considerations, which scholars have suggested are forms of cognition and knowledge, particularly for value judgements (Solomon, 1993; Nussbaum, 2001), and furthermore are appraisals (Frijda, 1987) which reveal what 'matters' and is valuable to people. As part of this thesis, I argue that the potential for members of the public to contribute to either science and technology-based discussions or to science and technology- related decision-making should not be underestimated or precluded due to preconceptions of lay capacity or understanding of 'complex' or 'technical' issues, particularly where value judgements play a role and where local experience and knowledge may contribute an alternative perspective. As the research of Slovic (2000) implies, the views of 'experts' are valuable but should not be wholly relied upon in scenarios where ethical or risk-based criteria exist, as is common with large- scale infrastructural developments.

Degrees of engagement can influence levels of support; for example, particularly in regards to engagement with 'the public', perceptions of marginalisation and being excluded from decision-making processes can have significant impacts on public support. Barnett *et al.* (2012) note that when members of the public feel marginalised or perceive their concerns and priorities to be ignored, negative emotions can result, which can contribute to negative assessments of projects, which in turn can lead to their active opposition. Concurrently, the authors detail the findings of scholars who have found that positive public perceptions are associated with the active involvement of local citizens (Devine-Wright, 2005b; Loring, 2007), whilst Wolsink (2007) asserts that local support may turn to opposition if the concerns of local stakeholders are not considered and incorporated into decision-making process.

However, as I express elsewhere, participation and participatory approaches are not without their limitations and challenges (Whitton et al., 2015; *also see* Buhr and Wibeck, 2014; Irvin and Stansbury, 2004; Reed, 2008) which can result in participation becoming problematic, and potentially unsustainable; these include:

- a dearth in participant's interest and time;
- limitations in being able to sufficiently engage with, discuss and/or debate technical issues or concepts;
- potentially high costs associated with conducting stakeholder workshops;

- consultation fatigue;
- causing public mistrust if processes are perceived as 'box-ticking' exercises for pre-determined decisions, with no opportunity to influence decision-making outcomes;
- lack of finances, resources and/or time available to organisations/companies/bodies who would engage with stakeholders.

However, Funtowicz and Ravetz (1993a) state that collective production of knowledge, and therefore participation of stakeholders, is appropriate when "facts are uncertain, values in dispute, stakes high and decisions urgent" (p. 744, *cited in* Buhr and Wibeck, 2014), such as is the case with modern energy-related developments. Whitton (2010) observes that technocratic approaches to decision-making which avoid stakeholder participation have failed when decisions have come under public scrutiny, and as Whitton and I argue elsewhere, such approaches fail to be socially sustainable "where there is a clear public interest" (Whitton et al., 2015: 129). Public involvement in large-scale technological projects, particularly for energy projects, tends to be similar across different technologies and follow an informative and consultative format. Jami and Walsh (2017) detail that in general, information is presented in an open forum, such as community hall, to allow local residents to learn about the project and respond with comments and feedback. However, they critique this standardised approach and call for more participative community engagement, citing studies that show this traditional approach to result in one-directional dialogue and local dissatisfaction with engagement which can contribute towards lengthier project implementation and increased project costs (*see* Coleby and Miller, 2009; O'Faircheallaigh, 2010; Hunsberger and Gibson, 2005; Jami and Walsh, 2014; Webler and Tuler, 2006).

Sander (2011) suggests that effective public participation for highly controversial projects is important due to its ability to both reduce potential conflict and increase legitimacy and acceptance (Zschiesche et al., 2009). However, Sander also highlights that public participation processes of poor quality can lead to frustration and a loss of trust in process convenors and public authorities (*see* Arbter, 2008). Rowe & Frewer (2004) suggest that public engagement by policy makers for the sole purpose of increasing perceived legitimacy can be realised in time and potentially lead to the rejection of decisions, should the views of the public not be recognised and the information gathered not utilised. This is important, because understanding the views and values of the public is a central part of public participation; as Sander (2011) notes, participation should assist in identifying shared norms and values. Despite significant attention being paid to processes of interaction within stakeholder engagement and project management literature, Cuppen *et al.* (2016) observe that the "empirical identification of stakeholders and their perspectives" (p. 4; *also see* Cuppen et al., 2010) is an area of the literature which has received far less attention. The current research seeks to contribute towards filling this gap, with empirical data of social priorities and perspectives from Anglesey stakeholders.

Beetham *et al.* (2008) state that public participation can in a broad social context contribute towards "greater social justice, more effective public services and a society of self-confident citizens" (p. 11, *cited in* Brodie et al., 2009). Within a governance context, there are several reasons for the increasing interest in public participation in recent times; Brodie *et al.* (2009) note several reasons for this increasing interest:

1. Participation has the potential to strengthen the legitimacy and accountability of democratic institutions, by involving people more directly in decisions that affect their lives (Creasy, 2007; also see Beetham et al., 2008; Cornwall, 2008). Participation can benefit individual participants, in the form of greater political efficacy, personal satisfaction in contributing towards change, or personal development and greater self-esteem (Barnes and Shardlow, 1997; Popay et al., 2007).
2. Participation in local decision-making processes and bringing people together around a common cause or interest can empower communities and help build social cohesion (Blake et al., 2008; Foot, 2009).
3. Participation facilitates the reformation of public services and is a tool for providing better suited and more efficient services, according to people's needs (Leadbeater, 2004; Parker, 2007).

One of the earliest examples of innovative participative decision-making is detailed by Cass (2006), who notes that 'engagement' in the first instance is used to refer to the formal processes used to include members of the public in decision-making processes, and to facilitate the collection or integration of their views, to a greater or lesser extent. The author details that in 1975, the Berger Commission in Canada active sought of the views of indigenous North Americans on the MacKenzie Valley oil pipeline project, and also on developments affecting native people in general. This was labelled as a ground breaking approach where the views and opinions of specific groups were sought and considered, differing from more traditional process of consultation where proposals are put forward and responses and comments are invited on them.

Petts (2001) discusses stakeholder participation in the context of UK government policy, noting that a clear political commitment was made by the UK Government at the beginning of the 21st century to engage citizens more widely. Although representative democracy is still considered the cornerstone of the UK constitution, citizen participation is now seen as a necessary mechanism by which to support this representation (Ministry of Justice, 2008). The Government wants to address this challenge by increasing opportunities for people to participate in the decision-making process between elections and in ways that encourage participation by those whose voices are not often heard. As Whitton (2011) observes, support for more dialogue-based engagement from UK central and local government has increased in recent years, to encourage greater public involvement in decision-making processes, for the purpose of informing and influencing various issues and policies (Whitton et al., 2015). In regards to planning, and from a legal perspective,

Boyle and Chinkin (2007) assert that public participation is important because it increases the legitimacy of decisions, and in a procedural sense, limits the arbitrary power of the government or law-making institution. The requirement for departmental and non-departmental government bodies to be open and transparent is a logical extension of more inclusive policies and legislation that have attempted to change the way that these governmental bodies operate and make decisions, such as the 2011 Localism Act which promoted devolved decision-making powers. However, in the UK at present, a change in direction appears to be occurring, particularly in regards to infrastructural and energy policy.

As I and others state elsewhere (Whitton et al., 2015), opportunities for stakeholder and public involvement are becoming less frequent where these concern infrastructural and planning decision-making in the UK. The 'deliberative turn' occurring in the late twentieth century (*see* Rawls, 1999; Dryzek, 2000) is now seemingly reversing to reflect a 'deliberative U-turn' as more decision-making powers return to the Secretary of State. This is partly reflected by the Planning Act 2008, which saw the introduction of National Policy Statements, which as Heffron and Haynes (2014) note are able to effectively "over-ride local concerns" (p. 239). They suggest that this reflects that the UK planning system is following continental Europe in its focus on national interest. Also in the UK, amendments to the 2014–2015 Infrastructure Bill are currently under review in the House of Lords, with the Infrastructure Bill appearing to suggest greater decision-making powers being returned to the Secretary of State to assist in the realisation of large-scale developments, particularly in the low-carbon energy sector (Whitton et al., 2015). Concurrently, Heffron and Haynes (2014) highlight the current tension in the UK between UK government policy and EU planning strategy (as outlined by the Aarhus Convention) in regards to energy infrastructure planning, which it is suggested, threatens effective public participation. Whitton *et al.* (2015) suggest that such a 'deliberative U-turn' in the UK represents a threat to opportunities for greater local democracy.

The importance of public and stakeholder engagement has been acknowledged among varied disciplines, as demonstrated by Mathur, Price and Austin (2008) in their paper on the sustainability of construction projects. In the study the authors promote engagement, observing that "meaningful stakeholder engagement can be seen to enhance inclusive decision-making, promote equity, enhance local decision-making and build social capital" (p. 601). They also proposed that stakeholder engagement represented "a social process where diverse stakeholders share a common forum, learn about each other's values, reflect upon their own values and create a shared vision and shared objectives" (p. 601). Public engagement is seen as an opportunity to build social capital and for social learning, which, as previously noted, Meppem and Gill (1998) suggested should be the focus of sustainable development. More recently, Wright (2012) has stated that not only is participation able to remove opposition to, or influence, a decision or proposal, but it is indeed a democratic right for local communities, echoing the *normative* argument of Fiorino (1990).

According to a recent study on stakeholder perspectives of the socio-economic impacts of Marine Protected Areas (MPAs) in the UK and France, more evidence-based, targeted communication from those involved in the planning, designation and management of MPAs is required to help to improve the perceptions of interest groups and assist in developing more realistic social expectations (Rodríguez-Rodríguez et al., 2015). The authors suggest that the specific data regarding individual organisations, generated by the survey methods used, can be utilised by planners, managers and decision-makers to help to ensure the effectiveness of engagement, education and outreach, and/or negotiation with key stakeholders. Such research conclusions align closely with the strategic proposals of the current research, as detailed in the Introduction (Chapter 1), in that greater understanding of social impacts as perceived by local stakeholders can be valuable in improving and working towards more effective engagement and decision-making processes, and achieve both strategic and sustainable objectives.

Within the context of nuclear waste management, Whitton (2009, 2011) and Lawless, Whitton and Poppeliers (2008) have critically analysed the nature and effectiveness of stakeholder dialogue during nuclear decommissioning, focusing on the perception of stakeholders regarding the nature of the dialogue used to engage them, and their perceived influence on decision-making. Lawless *et al*. (2008) present case studies of stakeholder decision-making on radioactive waste management from both the UK and the US, from which Whitton (2009, 2011) details the UK case studies in his later work. Whitton (2009) highlights that the nature of the dialogue during the stakeholder engagement process for the Legacy Ponds and Legacy Silos (LP&LS) facility at Sellafield, Cumbria in 2005, which was intended to inform decision-making, was unclear. The study was conducted to categorise the engagement against definitions of the term 'deliberation'. Whitton observes that the form of engagement and degree of deliberation with stakeholders varied at different levels of the engagement process, with the role of deliberation decreasing throughout the various stages of the process, and the influence of technical decision-making increasing. Consultation, not deliberation, was observed to be the dominant form of engagement. The concepts of consultation and deliberation are discussed further in Section 2.4.

Whitton (2011) highlights the confusion of stakeholders regarding the nature of the dialogue carried out during Nuclear Decommissioning Authority (NDA) stakeholder engagement regarding plans for nuclear site decommissioning activities, and confusion of how the process would influence the decision-making process. The author suggests that such findings represent a lack of institutionalized engagement by the NDA. A recent report from the UK Government's Energy and Climate Change Committee (HoC-ECCC, 2013) has also commented on the adequacy and effectiveness of the nuclear decision-making process and the approach of nuclear decision-makers in regards to public engagement and dialogue. Similar to the potential for improvements in stakeholder engagement proposed by Whitton (2009, 2011), the ECCC report suggests that there is scope to improve public engagement for nuclear decision-making. Such improvements include better public engagement coordination between the ONR, Environment Agency and

developers, and, due to project permissions being granted by the Secretary of State, establishing an "independent advice service for communities" living near to NSIPs to provide support to local communities in "interpreting complex planning documents and improving understanding of the process for obtaining planning permission" (HoC-ECCC, 2013: 3-4).

Such work links closely to early social sustainability research, and Fiorino's (1990) arguments for public engagement and involvement inform the philosophical aspect of the current research. Public engagement and stakeholder participation are considered components of social sustainability. In social theory literature Habermas proposes quality of discourse and quantity of participation as factors of a healthy society (Jenks, 2004), a notion which I posit relates to one which is also sustainable. For example, Habermas (1984, 1989) suggests that the optimum conditions for dialogue between stakeholders include equal distribution of information and power, respect for every perspective, and arguments that are honest, accurate and legitimate. Habermas discusses the conditions which are required to achieve an 'ideal speech situation' (Habermas, 1989), whereby an environment is created in which people are enabled to participate, deliberate, discuss and debate in a constructive way, where each participant in those activities is considered equal. Towards these concepts, this thesis seeks to contribute by identifying conditions and strategies for stakeholder engagement, whereby participants and convenors of these processes co-develop knowledge. Such knowledge relates to priorities and the social issues best reflect social sustainability for citizens. This is set at the local scale and from the position of 'affected' citizens, in the context of large-scale energy developments and the impacts they may have on communities.

As the social dimension of sustainable development received greater acknowledgement in the late 20th century, Meppem and Gill (1998) suggested that social learning, not future outcomes and projections, should drive sustainable development, and that stakeholder interests should be central to such learning. Beierle (2002) later observed that greater public and stakeholder participation often improves the quality of decision-making by contributing new ideas, knowledge, information and analysis, and proving greater access to technical and scientific resources. The author suggests that it is intensive participation processes with greater stakeholder involvement which have the most positive impact upon the quality of decision-making, and that the value and relevance of local knowledge to decision-making has long been acknowledged (*see* Fiorino, 1990; Perhac, 1996; Wynne, 1996). Innes and Booher (2004) promote societal representation through participation, claiming that public participation promotes equity and fairness, and that groups' needs and preferences are less likely to be addressed or met if excluded from decision-making processes. The authors also highlight that those commonly excluded from decision-making often disproportionately bear the negative impacts and do not experience the positive impacts of projects; other authors have suggested that those bearing the impacts should play a central role in decision-making (Meppem and Gill, 1998).

Kemp *et al.* (2006) suggest that employing greater upstream, early public participation, and demonstrating to participants that their views and input have influenced outcomes, are vital. This is vital for participants to be confident in the system, for decision-makers to demonstrate goodwill, and for trust and legitimacy to be retained. In her study of indicator systems and community interests, Holden (2009) furthers such notions of local participation and provides a succinct argument for the importance of community participation to ensure that the most effective solutions are achieved. She suggests that "the most reliable route to defensible and implementable solutions is through the pathways of deliberative democracy, explicitly engaging a multiplicity of communities on terms that make sense to them" (*ibid*: p. 444 – 445).

Whilst it is important to consider the academic literature, it is also necessary and appropriate to review the grey literature on the theme of public and stakeholder engagement to provide industrial context to these discussions, which is done at this point.

2.3.1 Nuclear Industry and Grey Literature

It is also important to consider other literary sources at this point, such as those of industry and government. The nuclear and governmental literature demonstrates an acknowledgement and awareness of what is 'needed' in respects to communication and engagement with public stakeholders. However, the nuclear industry has for some time suffered from a persistent public perception that they are insufficiently informed about matters regarding nuclear power (Castell et al., 2014); in this context, there is a need and requirement for the UK nuclear industry, and indeed science and technology sector, to address matters of effective communication and engagement with wider society.

2.3.1.1 Social Sciences and Engagement in the Nuclear Industry

In recently published reports from the Nuclear Innovation and Research Advisory Board (NIRAB, 2016), it is stated that there is a need for greater social science-and humanities-based research, in conjunction with the nuclear community, which explores public attitudes and perceptions towards nuclear power and what influences these, in addition to research on effective communication and public engagement:

> *"Research is needed that draws together the nuclear community with social sciences and humanities to understand the underlying reasons for public attitudes to nuclear energy, how these attitudes are shaped by events and the underlying perceptions that have developed over time. Research should also address how communications on nuclear matters can become more effective, what industry can learn from others and what communication channels and tools can help address current and emerging issues in the public eye to enhance public acceptance" (p. 17).*

In a UK-based Sciencewise report published several years ago (Sciencewise, 2009) on the topic of public dialogue on science and technology, it was highlighted that for too long the scientific, political and public sector communities believed that an approach to public communication and engagement which relied upon strong communication of the science and little more was sufficient. The authors of the report proposed that in fact an approach of public dialogue, where listening and open two-way communication played a central role, was appropriate and required. In a report on managing the impacts of nuclear decommissioning published a year prior, the IAEA (2008) suggested that in addition to planning and investment, communications and consultation are important factors. It was stated that "a realistic and constructive dialogue between plant owners and government agencies, and between these organizations and those affected, will be beneficial" (p. 22) for interventions in mitigating negative socioeconomic impacts or promoting the "exploitation of positive impacts" (*ibid*) of nuclear decommissioning. This reflected an awareness by the nuclear industry of what was required and what should be implemented in regards to public communication and engagement, but also a lack of progress in regards to industry awareness and its general implementation into industry practice.

Recent reports from the NIC (2014, 2015) represent progress in discussing and understanding effective stakeholder engagement, particularly in recognizing the value of dialogue. In addition to commitments to engagement with the public detailed previously in the Nuclear Industrial Strategy of 2013 (BIS, 2013), a more *strategic* approach to nuclear energy-related public engagement has been outlined by the NIC (2014), which entails the following:

- The development of a 'nuclear narrative', connecting energy policy objectives to the role of nuclear energy in low-carbon electricity and employment delivery, addressing 'underlying risks to public support'
- The provision of mechanisms, detailed by the Concordat on public engagement, in which UK and Welsh Government, and industry engage with the public, whilst reflecting communicative best practice: *providing clarity, building trust, valuing dialogue, facilitating consultation.*
- Harnessing existing activities and resources to increase the effectiveness of the 'currently fragmented' approach to public engagement, by aligning with planned timetables, reflecting nuclear R&D, and effective response to unexpected events
- Strategic flexibility; the strategy is informed by the latest research on public attitudes and engagement

These reports, which detail and reflect the current direction the nuclear industry in the UK is planning towards in relation to stakeholder engagement, are discussed further below.

2.3.1.2 Nuclear Industry Council: 'In the Public Eye' report (2014)

In a report published over five years later by the Nuclear Industry Council (NIC, 2014), reflecting the high level strategy for Central and Welsh Government for communication and engagement, a review of the grey literature is reported on. The report states that the sector must be *clear* in its communications with the public, and that particular parts of society should be engaged by utilising a range of approaches which are "appropriately targeted" (p. 5). This report by the NIC resulted from the 2013 Nuclear Industrial Strategy (BIS, 2013), in which public engagement with local stakeholders is acknowledged as important for several reasons including improving understanding of the nuclear industry and addressing barriers to local employment. As a result of the NIC report 'In the Public Eye' (NIC, 2014), the NIC Concordat for public engagement was developed (NIC, 2015) detailing the commitment of the nuclear industry to engaging with society on nuclear energy matters and the main principles which organisations should utilise within their communication strategies.

The NIC (2014) report also states that mutual respect must be built by the sector in order for public *trust* in communications to be developed and realised. This requires the use of individuals who are trusted by society for public engagement purposes, including individuals such as the nuclear workforce, who are engaged in the 'front line in the sector', independent academic experts, and scientists working at academic and government laboratories (*also see* EC, 2010). The importance of trust in the context of nuclear-related communications and engagement processes has long been known as being of significant importance; indeed, a House of Lords report published over fifteen years ago (HoL, 2000) states that developing trust between science and technology communicators and members of the public who are recipients of this information is of key importance.

The NIC acknowledges a need to focus on *dialogue*, which reflects issues of greatest importance to the public, and to "respond to these more effectively" (NIC, 2014: 5). As reflected by the Sciencewise (2009) report some years previous, dialogue has long been identified as a critical element of any public engagement approach for nuclear. However, public engagement in the nuclear sector has been found to still be insufficient and in need of improvement even in recent times. For example, a House of Commons Energy and Climate Change Committee report (HoC-ECCC, 2013) stated that despite the Office for Nuclear Regulation (ONR) being involved in public engagement on risk issues for new developments, it was conducted separate to the planning process (where most of the public tend to engage with a new development), and was 'one way' in nature from the ONR (e.g. provision of information). The report suggested not only that this engagement should be two-way dialogue (i.e. engaging in conversation and listening to the public), but that risk communication should reflect better coordination between the ONR and other bodies such as the Environment Agency and nuclear developers in the context of public engagement. Two-way dialogue is particularly important in order to engage with, understand and respond to complex views and priorities, particularly at the local scale, which the report

acknowledges. It is stated in the report that during a committee visit to Bridgwater in Somerset, near to the current and proposed nuclear power stations Hinkley Point B and Hinkley Point C respectively, local stakeholders were less concerned about the risk from a nuclear accident and more concerned about "the disruption that would be caused by the construction process" (*ibid*: 3).

It is highlighted by the NIC (2014) report's literary review that this dialogue should be part of ongoing *consultation* with the public, and that this consultation is of particular value in order to enable "society to participate in the practical outworking of government policy with respect to nuclear, e.g. in the context of local stakeholder groups based near nuclear facilities, where consultation can positively influence how a facility might be developed, operated or decommissioned" (p. 5). As the report rightly states, this notion of the need for consultation is again not a new proposition, and that there is a 'growing recognition' of this; it was proposed by the Aarhus Convention in the late twentieth century (UNECE, 1998) that consultation and dialogue are requirements for effective engagement, and that the public should play a role in influencing and shaping both policy and practice.

2.3.1.3 Nuclear Industry Council: Concordat document (2015)

Following on from the 2014 NIC report, the NIC published their Concordat document in late 2015 (NIC, 2015). Within this short document, the themes highlighted in the 2014 report – *clarity, trust, dialogue* and *consultation* – characterise the industry's approach to public engagement. The approach states that two-way communication is valued and that the public are listened to, that public trust be developed through demonstration of respect and being open and transparent in regards to challenges faced and actions taken, that engagement utilises clear, consistent and concise information, and that local communities be listened to and actively engaged. The Concordat for Public Engagement (*ibid*) represents the nuclear industry's commitment to engaging with society on nuclear energy matters, based upon principles which have been developed by industry but which are to be discussed with public stakeholders to understand their relevance and legitimacy from a lay perspective.

2.3.1.4 Energy-related Grey Literature: Citizen Engagement and Participation

In a recent report produced by Green Alliance (Mount, 2015), work supported by organisations such as Shell, Siemens and National Grid, it is argued that better public engagement is required in regards to infrastructure planning. The report identifies several existing problems with infrastructure decision-making, including the insufficiency of 'conventional politics' to secure a public mandate for new infrastructure, the insufficient involvement of the public in defining the need for infrastructure development, and the lack of opportunity for the public to be involved in strategic, place-based discussions around planning decisions, at both local and national levels. Out of the report's discussion of these challenges, Mount proposes several actionable solutions to address such challenges:

- **A strategic approach to infrastructure planning at national level, with a civil society advisory council** – this needs to be long-term focussed and underpinned by an evidence-based assessment of needs.
- **Spatial planning at combined authority level, informed by local infrastructure dialogues** – suggested that combined authorities develop infrastructure plans as part of their devolution settlement, using local public dialogue to inform and test their priorities.
- **A new body to act as an impartial facilitator of public engagement** – 'Citizen Voice' would act as an impartial facilitator and a well-resourced source of engagement expertise.

As the report details, a "more strategic, effective and democratic planning system with greater public support for the resulting infrastructure projects" (*ibid*: 3) is expected to result from the implementation of these solutions. However, the solutions remain focussed on business and investor gain, with public engagement being discussed in terms of a facilitative tool for developer-based means:

"Developers would be offered clearer indications as to which types of infrastructure are needed and the most appropriate locations. This process would reduce the risk of protracted wrangling at the project stage, thus providing more certainty for businesses and investors" (ibid: 3).

As has been highlighted above, several of these recommendations are not new in the nuclear literature. In addition to new nuclear energy developments, the character of the decision-making process and the conduct of people and institutions, in regards to the implementation of a programme for geological disposal for radioactive waste, are posited as important factors by the International Atomic Energy Agency (IAEA, 2007). This report on the factors affecting public and political acceptance for such programmes note public participation and the openness, transparency and fairness of interactions as being relevant considerations. NEA reports (NEA-OECD, 2003; NEA-RWM, 2004) note the move away from the technically-focussed traditional DAD (Decide-Announce-Defend) model in radioactive waste management, towards an approach more focussed on technical content *and* quality of process, of 'engage, interact and co-operate'. The reports describe the shift of organisations placing greater importance on communicating and learning, citing international examples from countries such as Belgium, Sweden and the United Kingdom.

More recent reports (NEA/OECD, 2012) suggest that significant changes have occurred over the past decade in respect to citizen participation in this field, including a move from information and consultation (i.e. tokenistic involvement) towards partnership (i.e. citizen influence and power); a move from the passive role (i.e. resigned acceptance) of local communities to one which is active (i.e. collaboration, volunteering and veto); development of various administrative collaborative formats; a recognition of the need for both socio-economic benefits

and community empowerment measures, and that these are legitimate needs; and finally the emergence of new ideals for collaboration (e.g. mutual learning, adding local value, sustainable development). These occurred at the same time that organisations such as the Environment Agency made efforts to move from a traditional DAD approach to a more inclusive EDD approach (Engage-Deliberate-Decide). As part of these efforts trust was aimed to be built from the start of projects, solutions could be agreed sooner, conflict and opposition would be minimised, and agreed solutions would be less costly overall, an approach piloted by the Shaldon risk project with notable success (Theaker and Yaxley, 2013). However, despite its adoption by the Environment Agency, a review of the nuclear grey literature reveals that this approach has not been explicitly adopted by the nuclear industry or community in the UK, despite recent reports (NIC, 2014, 2015) demonstrating a shift towards more inclusive approaches.

This demonstrates an intention of greater coherence and structure to public engagement efforts for new nuclear developments, which whilst remaining at the level of engagement undertaken by the industry for many years (i.e. consultation), re-prioritises public dialogue which is open, transparent, and understandable to public stakeholders. Additionally, public stakeholders are acknowledged as reflecting a great diversity of individuals at the local level with different needs and preferences, both towards engagement methods and also more generally (NIC, 2014). The publication of a report by facilitation company 3 Key Questions (3KQ, 2015) on the recently completed GDA Public Dialogue Pilot process for the ABWR further demonstrates an industry focus on public engagement through dialogue-based approaches. The report details engagement with public stakeholders on nuclear and dialogue-based matters, and highlights the preferences of members of the public in regards to public engagement and communication for future GDA public dialogue processes; this perspective and dimension to the nuclear literature is lacking and therefore the process and report represent an important contribution. I was involved in this project as part of the Project Management Team, and has since co-authored a paper reviewing the dialogue process (*see* Whitton et al., 2016).

I argue that the grey literature reflects an insufficient progression during the last decade in regards to a conceptualisation of effective public engagement. In addition, the nuclear industry appears to have not actively sought to move beyond 'consultation' into more collaborative engagement, as with radioactive waste management (*see* NEA/OECD, 2012). Thus, recent recommendations within this body of literature, particularly those recently published by the NIC (2014, 2015) which promote dialogue-based engagement and greater openness, transparency, mutual learning and trust building, are a positive contribution to industrial understanding and conceptualisation of engagement. I argue that more industry-based and industry-focussed research is required which aims to understand how to improve and enhance public stakeholder engagement processes, in addition to further research on exploring public perceptions of nuclear power and their origins.

Summary

- It is argued that public participation, which describes involving members of the public in the agenda-setting, decision-making, and policy forming activities, should enable the representation of diverse interests and views among communities to inform decision-making. However, it may be appropriate to employ different methods of engagement at different stages of decision-making, depending on circumstance and context

- There has been a shift in the narrative of the nuclear industry towards more effective engagement with stakeholders, and for this engagement to be give more attention to dialogue, transparency and trust building

- More strategic and democratic approaches to planning are being promoted in the grey literature to gain greater public support for infrastructure projects, with public participation and the openness, transparency and fairness of interactions being recognised as important to project success

- The grey literature demonstrates that insufficient progress has been made over the last decade to develop a conceptualisation of effective public engagement for new nuclear energy developments, despite engagement and dialogue being recently recognised as important to gaining public support and avoiding opposition-related delays. More industry-based research is required exploring how to improve public stakeholder engagement processes.

However, it is also argued that such research must retain the 'affected public' and public stakeholders at its centre, and that public and stakeholder engagement should cease to be seen solely as a facilitative tool for development legitimisation and public acceptance, but rather as a necessity for legitimate, appropriate, democratic, and sustainable decision-making.

The themes of deliberation and democracy are now explored in greater detail, to understand their importance in the context of the participation and decision-making.

2.4 Deliberation: going beyond consultation

Democracy is a critical foundational component of 'developed' societies. Within these 'developed' or 'advanced' democratic systems, it is also important that decision-making processes are reflective of basic democratic characteristics, such as fairness and representation. Deliberative democracy reflects a shift away from decision-making which is concerned with the 'what', and towards questions which ask 'why' (Flynn, 2011). As Dryzek (2000) observes, it acknowledges the criticality of process, whereby "individuals are amenable to changing their judgements, preferences and views during the course of their interactions, which involve persuasion rather than coercion, manipulation or deception" (p. 1). The practical implementation of methods remains a source of debate in the literature. However, many policy makers, regulators, experts and public advocacy groups agree on the necessity of involving citizens in decisions which

affect them (Abelson et al., 2003; *also see* Rowe and Frewer, 2000; Beierle and Konisky, 2000; Leroux, Hirtle and Fortin, 1998). This promoted by some for pragmatic or ideological reasons (Fiorino, 1990; Rowe and Frewer, 2000; Abelson et al., 2002) and by others because of a belief that past methods have become outdated and inappropriate for a more educated and less differential modern public (Inglehart, 1995; O'Hara, 1998).

Deliberation is a way in which members of the public may become involved, by openly sharing knowledge and information, in forums where all contributions are considered equal and valid, with collective conclusions or solutions emerging as a result. These are borne from a consideration of all information provided (Beierle and Konisky, 2001) and facilitated by a multi-stakeholder and multi-directional dialogue (Booher and Innes, 2002; Innes and Booher, 2004; Robertson and Choi, 2012). Deliberation goes beyond consultation in communicative and dialogic terms, and the distinction between consultation and deliberation has been made in the literature. On the governance of science and technology projects (STPs), Papaioannou (2012) asserts that whereas public consultation is concerned with "enhancing the quality of decisions" (p. 235) by improving public understanding of the STP, democratic deliberation is concerned with "taking quality decisions through communicative action and free argumentation" (p. 235) between STP officials and members of the affected public. Rowe and Frewer (2005) make the distinction between 'public consultation' and 'public participation', the latter of which shares elements of the democratic deliberation which Papaioannou (2012) discusses. Public consultation is described as information being conveyed "from members of the public to the sponsors of the initiative, following a process *initiated* [italic in original] by the sponsor" (Rowe and Frewer, 2005: 255), where formal dialogue is commonly absent and the opinions of the involved public are taken as representative of currently held opinions of the wider public on the focal topic. Importantly, Rowe and Frewer (2005) make a distinction between 'consultation' and 'participation', the latter of which commonly involves deliberation, such that there is the opportunity for the opinions of either party to be transformed as a result of a multi-directional exchange of information, whereas there is traditionally less opportunity for this during periods of consultation. The authors describe public participation as the exchange of information between project sponsors and members of the public in the form of a *dialogue*, often taking place in a group setting with representatives from both parties. Reflecting the notion of deliberation, the authors state that "the act of *dialogue and negotiation* [italic added] serves to transform opinions in the members of both parties" (*ibid*: 255-256), rather than the opinions of the public simply being communicated to project sponsors. The latter is common of public consultations, particularly those associated with STPs.

Robertson and Choi (2012) detail that collaborative governance, which is inherently a deliberative process (Booher and Innes, 2002; Bouwen and Taillieu, 2004; Dryzek, 2000), utilises participatory and deliberative methods in order to increase decision satisfaction and acceptability among stakeholders, particularly among minorities or those stakeholders whose interests and

preferences have historically experienced poor representation. Various definitions of deliberation are proposed in the literature; for the sake of the current study, two definitions of deliberation, detailed in previous work (Whitton et al., 2015), are presented here also due to their perceived value in deliberative discussion:

"A process that "presumes and promotes reciprocity which requires people to find mutually acceptable ways of resolving moral disagreements whilst maintaining mutual respect".

(Shapiro, 1999)

"…deliberation is expected to lead to empathy with the other and a broadened sense of people's own interests through an egalitarian, open-minded and reciprocal process of reasoned argumentation"

(Mendelberg, 2002)

In order to understand deliberation as a concept beyond its definition and value in a practical sense, it is important to briefly explore its recent theoretical history and discuss some of the key scholars in recent decades who have contributed to our understanding of deliberation and deliberative democracy.

2.4.1 Deliberation: theoretical background

Since the late 1980s, democratic theory has experienced what Dryzek (2000) has termed the 'deliberative turn', whereby the democratic focus shifts to a mode of greater public reasoning between citizens, and moves away from the traditions of decisions based upon votes and the authority of political representatives (Parkinson, 2006). John Dryzek represents one of a number of second generation deliberative democrats, which also include authors such as Young (1999) and Gutmann and Thompson (1996, 2004), who have attempted to look beyond the restrictions of consensus and further consider the effects of deep disagreement, alternative communication and private preferences (Flynn, 2011). Such thinkers promote the value of contestation and see legitimacy in dialogue that explores the range of concerns priorities of various actors and stakeholders, and their foundations.

Conversely, first generation deliberative democrats include authors such as Habermas (1984, 1987, 1991, 1996) and Rawls (1971, 1993), who, despite incorporating different emphases to their work, shared a common vision of idealised deliberation processes which resulted in a 'superior' collective decision and, commonly, consensus (Flynn, 2011). Finally, third generation deliberative democrats seek to understand how second generation deliberative models, as Flynn (2011) describes, "might be institutionalised into large modern societies" (p. 13), and include

authors such as Fishkin (1995; also see Ackermann and Fishkin, 2002, 2005), Hendriks (2006), and Parkinson (2003, 2006). The key theoretical differences between these generations is not discussed extensively here, but such discourse can be found in the work of Flynn (2011). The works and philosophies of several of the authors mentioned above contribute valuably to the current study, and are discussed further in proceeding chapters. By considering notions of deliberative democracy and the critical elements that constitute such notions, we can understand what criteria decision-making processes should encompass in order to demonstrate legitimacy and validity within modern democratic systems such as the UK, particularly those associated with infrastructural developments such as SECTs and NSIPs.

2.4.2 Deliberation and infrastructural development

Since the late twentieth century, deliberation has become an increasingly utilised form of engagement between decision-makers, stakeholders and society, particularly for large infrastructural developments in the UK. Deliberative methods have been employed by a number of local authorities in the UK to assess and test the potential role of public participation in siting processes, such as for waste facilities and waste policy and strategy development (Petts, 2004). These include citizen juries, community advisory groups/committees and consensus panels (*see* Petts, 1995, 1997, 2001). Drivers for such actions include a dependency in the UK on public support and involvement for the successful and sustainable implementation of national waste management strategies (Petts, 2004). The evaluation of deliberative decision processes, and indeed outcomes, has been enabled through the development and utilisation of effectiveness criteria, which are based upon principles of publicity and accountability (Gutman and Thompson, 1996) and fairness and competence (Webler, 1995), principles which are Habermasian in nature (Petts, 2004). For example, criteria have been developed by Petts (2001) to evaluate waste management deliberative processes, criteria which are based in principles of Habermasian notions of discursive democracy (Habermas, 1984), including inclusivity and transparency, challenging science, multi-party dialogue, an aim of consensus on potential decisions and direct influence unto the final decision (Petts, 2004).

In his study of public involvement in Swedish nuclear waste management, Sundqvist (2004) concludes that there has been somewhat of a deliberative deficit in Swedish nuclear waste discussions over recent decades, broad deliberation which could address the "strong demarcation between science and democracy" (*ibid*: 33). The author asserts that deliberation of all issues is critical in developing sustainable relations between different actors. This is so that equity can be experienced by all in regards to the right to contribute to decisions, thereby mitigating "unnecessary confusions, false expectations and fragile interfaces between involved parties" (*ibid*: 33), and cultivate *deliberative* and *collaborative* governance, which I argue is necessary for the achievement of more substantial and sustainable success. Whitton *et al*. (2015) propose that the UK is currently experiencing a 'deliberative U-turn' at present, whereby despite greater

dialogue being promoted for large-scale infrastructure planning processes, infrastructural planning legislation has been passed which sees greater decision-making powers being returned to the Secretary of State, leading to greater centralised control of the progression of NSIPs by Government. I argue that this demonstrates a shift away from collaborative governance as opposed to progression towards it in the UK.

Robertson and Choi (2012) observe that collaborative governance allows a greater number of stakeholders to have further opportunities to influence the decision process, participating on a relatively equal footing (Fung and Wright, 2003). However, as Robertson and Choi (2012) also note, significant resource expenditure, in the form of time, effort and capital, associated with coming to collectively acceptable solutions to often complex problems, are commonly highlighted as procedural and practical challenges for such deliberative and collaborative processes (Bouwen and Taillieu, 2004; Connick and Innes, 2003). Collaborative governance involves a multitude of multi-stakeholder arrangements to address a range of policy issues, and represents a move away from more technocratic and bureaucratic politics. It is argued by several scholars in the literature that deliberative and collaborative processes have the potential to develop solutions (e.g. policy solutions) which are more responsive to the needs and interests of a wide range of stakeholders than more traditional 'top down', bureaucratically-focussed approaches (Robertson and Choi, 2012; *also see* Beierle and Konisky, 2001; Booher, 2004; Healey, 1996). Difficulties with integrating participatory processes into existing institutional and decision-making structures in practice, beyond their theoretical origin, have also been acknowledged as a barrier to their success (Petts, 2004). Practical limitations have been highlighted in the literature. For example, Papaioannou (2012) notes the limitations associated with implementing democratic deliberation into the development process for the UK Biobank. These include a lack of consensus on specific values and interests and the marginalisation of less well-informed groups of citizens, reflecting a democratic deficit, producing barriers to a shift from public consultation to democratic deliberation and achieving effective deliberative upstream engagement.

Analytical-deliberative (AD) processes are an example of integrated methods which have been proposed to address the quandary of socially contested and unacceptable decision-making; AD processes have been suggested as potential tools to "increase the likelihood of achieving sound and acceptable decisions" (Stern and Fineberg, 1996: 1), as has been suggested by the US National Research Council (Petts, 2004). AD processes are integrated in the sense that they represent a shift away from traditional 'top down' methods, bringing together different knowledge sources and integrating 'expert' technical analysis with 'lay' stakeholder deliberation to facilitate fundamental public influence, on data generation, deriving policy options, and deliberating acceptable solutions and decisions for example (*ibid*; Jasanoff, 1999). In contemporary society, decision-making that involves the consideration of complex social issues, such as those associated with large-scale, technical and contentious developments and multiple stakeholder groups, also warrants the employment of deliberative and collaborative approaches, as Robertson and Choi (2012) observe:

"…the complexity of many contemporary social issues have motivated greater use of collaborative approaches through which diverse stakeholders aim to develop policy solutions that will address their interests and concerns" (p. 84).

Summary

- Many policy makers, regulators, experts and public advocacy groups agree on the importance of involving citizens in decisions which affect them, for ideological or practical reasons, or due to a belief that past methods are outdated for modern contexts.
- Deliberative methods have been employed by several local authorities to assess and understand the potential role of public participation in siting processes, whereas the development and utilisation of effectiveness criteria has enabled the evaluation of deliberative decision processes. Deliberation is critical for developing sustainable relations between different actors and stakeholders.
- Collaborative governance allows a greater number of stakeholders opportunity to influence decision-making processes, but difficulties with integrating participatory processes into existing institutional and decision-making structures are identified by some scholars, suggesting it act as a barrier to their success. Others argue that for large-scale, technical and contentious developments with multiple stakeholder groups, involving the consideration of complex social issues, warrants deliberative and collaborative approaches to decision-making.

2.5 Communities and local participation

"A community is a group of people who have come together, and they work and they live to try and improve the standard of living and quality of life - and I don't mean money".

(William Baldwin, date unknown)

2.5.1 Understanding 'community'

Jenks (2004) states that communities are representative of social systems in which members are able to participate formally and informally in decision-making; such systems are locally manageable and are able to respond most effectively to members' needs. The author also states that communities represent social systems with the ability to take into account values and preferences of members, something not always possible at larger scales. Within social systems, variability exists between members. It is due to such variability that decision-making processes

should not imagine and approach communities as a single entity, but a conglomerate of social groups with numerous priorities, viewpoints and preferences (Tiani, 2001). This concurs with the work of Chambers (1983) and Li (1996) who describe indigenous communities as sites of *pluralism* and heterogeneity, formed of numerous ideologies and perspectives, and composed of various "subgroups with different and often contradictory interests" rather than "homogenous entities" (Natcher and Hickey, 2002: 351). Within communities there are a number of different social groups, with differing priorities, values and opinions, such distinctions being a key research consideration of this study. Morris and Gilchrist (2011) have said of communities that they are "complex, dynamic and diverse" (p. 7). In their study of local resource management, Natcher and Hickey (2002) explain that community 'sub-groups' may be independent and autonomous, yet all have valid objectives and interests, and their collective priorities form the wider community 'needs'. The authors describe this pluralism as a collective of "individual or communal factions, with different values, perceptions and objectives" (p. 351).

Similarly, Young (1990) asserts that within democratic publics, heterogeneity must be recognised and acknowledged, and that this should be reflected during democratic decision-making processes. Concurrently, Renn (2006) notes that 'the public' is reflective of heterogeneity and that there are indeed multiple publics. Guidry and Sawyer (2003) acknowledge this plurality in society, or more specifically, the public sphere, describing it as:

> *"…a pluralist domain of interacting groups. Its actors have different claims, interests, and capacities in politics and force us to recognize that there is no one, unified public in a democracy. Along with dominant, powerful groups that often claim to be "the public," there are also marginalized, relatively disempowered publics" (p. 276).*

Understanding what 'community' means and what 'communities' are can be a complex task, as they can be constituted of a plethora of individual and groups of citizens or residents, with groups forming to represent particular shared interests within a community (Crane, Matten and Moon, 2004), which can differ significantly from other individuals or groups residing within the same community. For some scholars, the term 'community' is founded in notions of a sense of belonging amongst inhabitants (Mallan and Greenway, 2011), whereas others perceive it more of an exclusionary term (*see* Ristock and Pennell, 1996), in which communities resemble spaces of rejection or marginalisation (Mallan and Greenway, 2011). Several authors distinguish 'communities' by three factors; identity, interaction and geography (*see* Lee and Newby, 1983). Bowen *et al.* (2010) note that these describe groups that either, as Mallan and Greenway (2011) conceive them, share a sense of belonging built upon values, beliefs and experiences (*identity*), or social relations between people (*interaction*), or people living in a designated geographic space (*geography*). Mallan and Greenway (2011) also note that communities are spaces distinguished by boundaries, whether geographical, political or cultural, which contributes to notions of communities as possessing 'inclusive-exclusive' elements which are "part of the

paradoxical nature of utopianism" (p. 375). These communities may exist as an escape, from the world outside that designated space, a notion countered by those who consider the community as a place of reconstruction or change, of people working to make 'a good place' or 'a better place' (*ibid*: 375).

For some, communities are thought of more as 'habitats' (Mazzoleni, 1993), spaces in which live a mass of bodies, organic spaces that embody people, language, time and objects. Mallan and Greenway (2011) note that in a world increasing in technological advancements and integration into these spaces, there is opportunity to break down some of these containment-related characteristics of communities, whether this be the inside/outside or the local/global concepts. However, they also propose that whilst technology may break some of these down, the impact of technology may also serve to reinforce them in these spaces.

Different conceptualisations of community are found in different bodies of literature. Bowen *et al.* (2010) finds that in the strategy-focussed literature there is particular emphasis on definitions of 'community' which are group-based, with much research (64% of the literature reviewed by the authors) considering "firm's interaction with specific social or community organizations" (p. 303) (*also see* Argenti, 2004; Austin, 2000). Bowen *et al.* (2010) also find that in the public policy-focussed literature, studies are more concerned with definitions of communities of individual citizens (70%). Whereas the authors argue that group-focussed engagement does not represent the public or 'broad-based social engagement' which is discussed in the theoretical literature, referring to the work of McCaffrey *et al.* (1995), I argue that a social-group approach to engagement presents an appropriate and effective form of engagement. This is important when the nature of engagement is highly technical, complex, controversial or dealing with sensitive issues, such as nuclear power. In these cases, group-based engagement allows for more dialogue and deliberation-based engagement to occur, and also provides greater opportunity for group members to share experiences whilst gaining new information from non-group members (e.g. learning about the nuclear power process and gaining answers to questions). In addition to this group-based strategy, I argue that engagement should occur in community spaces that are familiar to those social groups participating in engagement processes. Such arguments are based on work in the community literature which recognises that the "familiar places of community life", such as schools or places of worship, represent opportune spaces for residents to "connect to more formal governance structures" (Morris and Gilchrist, 2011: 6). The authors also note that such "community hubs" represent spaces for personal interaction and networking, and that bringing together "the dimensions of governance of social capital" (*ibid:* 6) is central to developing policy effectively in the future. Supporting this, the authors cite the work of Skidmore, Bound and Lownsbrough (2006) for the Joseph Rowntree Foundation on community participation, who propose that these 'informal spaces of community life' should be further utilised for governance and participation means:

'Rather than expect everyone to participate equally in formal governance, we should try to make more people's everyday civic engagement count by designing the formal governance in a way that taps into the informal spaces of community life that they routinely inhabit' (p. xi – xii) .

In regards to such community spaces, Lingard, Nixon and Ranson (2008) suggest that by understanding the link between "belonging in such spaces and the exercise of voice", they can act as "a bridge to more formal structures of democratic participation" and the people that occupy these spaces can be "engaged in governance" (p. 96). I argue that such familiar surroundings for community members represent important spaces for engagement, whereby the familiarity of community hubs for different social groups facilitates a comfortable environment for openness and dialogue. In reference to the work of Lingard, Nixon and Ranson (2008), these spaces where groups feel comfortable and open to express and exercise their views can act as bridges to both engagement and participation in local decision-making. In the context of the current research, the decision-making processes of particular interest are those associated with large-scale energy developments such as nuclear energy infrastructure, which may affect the social sustainability of the local area.

2.5.2 Community, Infrastructure and Sustainability

The notion of communities as sites of pluralism and heterogeneity is relevant to social settings where development-related decision-making affects diverse community members. In the context of large infrastructure project development, Dore and Lebel (2010) have argued that the public involvement process must be aware of, sensitive to, and address different values and beliefs within social bodies, and public participation and community involvement has also been promoted and highlighted as important elsewhere, such as in the literature on natural resource management (e.g. Rodela, 2012) and environmental decision-making (e.g. Beierle and Cayford, 2002; Beierle and Konisky, 2001).

To suggest that different social groups will not have identical values and priorities is to make an obvious claim. The existence of such different priorities between social groups has definitive implications for various local developments and issues of sustainability. Turcu (2013) already highlights that there are "multiple pathways to urban sustainability, as areas and communities have different circumstances and priorities" (p. 713), and that "area specific and 'hidden' conditions" (*ibid*: 712) are present within communities. Her study reflects a growing realisation that differential local processes are important when studying social sustainability, and that different levels of importance are given to different factors or sustainability components depending on local geography; that social sustainability is geographically specific. Therefore, investigating intra-community, social group priorities, and the importance they allocate to specific factors of sustainability, are areas of interest for the current research and important factors in progressing this approach to understand social sustainability and its differential pathways.

Involving members of local communities in decision-making for local large-scale developments can impact their realisation, and is discussed in the energy literature. Community engagement is acknowledged, and has been for many years, as important for realising renewable energy projects (Jami and Walsh, 2017). In a UK study, Gormally *et al.* (2012) argues that acceptance of renewable projects can be enhanced at both the local and regional levels by more inclusive and active community engagement during various stages of the development process. Similarly, Hall, Ashworth and Devine-Wright (2013) find that for wind projects in Australia, community engagement processes that demonstrated transparency, knowledge transfer, and promoted procedural justice during the planning and approval stages were found to contribute towards project support and acceptance.

An example of the importance of involving and engaging with particular local social groups is also provided by Wynne (1996) in the context of nuclear power. Studying the effects of post-Chernobyl fallout on sheep farming in Cumbria, UK, Wynne states the importance of 'lay knowledges' in decision-making process, and in particular in this case, inclusion of the knowledge of local farmers. This work follows on from an academic paper by Wynne (1992), utilising this Cumbrian case study to explore public perceptions of scientific knowledge and how this impacts the 'public uptake of science'. Wynne (1996) observes that official recommendations were different to those of farmers with experiential knowledge of the behaviour and well-being of sheep. He argues that the questions being asked regarding the issue, such as which questions to ask and the development of criteria to assess courses of action, were in fact social and moral questions, and so required these decisions to be opened up to lay knowledge. Wynne (1995) has previously argued that it is often impossible to define which issues are technical or scientific and which are social or cultural, highlighting the complexity with issues such as nuclear that encompass many technical and social aspects; indeed, more recently, Cotton (2014) recognises the social and cultural contentiousness of nuclear as a technology.

Regarding knowledge and hazards, McLachlan and Mander (2013) assert that it is important to realise that "risks are assessed, presented, interpreted and experienced in different contexts and assessed against different values and priorities" (p. 85). In the field of STS, Reason *et al.* (2009) observe that technology development is a complex affair, and that a number of feedbacks emerge which are influenced by numerous social groups that view themselves as potential winners or losers. Such observations hold particular relevance for the development of technologies such as nuclear energy generation, and emphasise the existence of various social groups with differing perspectives, whose needs, concerns and priorities, and whether these are suitably are equitably addressed, may impact upon the sustainability of decisions and perceptions of social justice and fairness which fuel such 'winner/loser' distinctions. One of these groups, often overlooked in such research, is that of young people, those in society approaching the age of independence and adulthood who are developing their own perspectives and opinions on matters, which affect their immediate and wider society. We now briefly consider the literature on young people and their participation societal matters and decision-making.

2.5.3 Young people and participation

"Children and young people under the age of 18 make up around one in five of the UK population. They are one of the largest user groups of public services…"

(Ward and Hearn, 2010: 6)

The importance of including people in decisions which impact upon their lives means also the inclusion of those who represent 'the next generation', of adults, residents and affected society, that of young people. There are numerous arguments for the participation of young people in societal decisions; Matthews (2003) presents three of these arguments:

- education for citizenship;
- fitting young people into society;
- strengthening young people's status in relation to adults.

Sinclair and Franklin (2000) also identify the value of involving young people in societal decision-making, in that it to upholds children's rights, fulfils the state's legal responsibilities, helps to improve both services and decision-making, plays a role in enhancing democracy, can promote child protection, and can also enhance children's skills and self-esteem (*in* Sinclair, 2004). Matthews (2003) echoes similar societal benefits of the participation of young people, asserting that:

"…participation is an essential and moral ingredient of any democratic society - enhancing quality of life; enabling empowerment; encouraging psycho-social well-being; and providing a sense of inclusiveness" (p. 270).

De Winter (1997) proposes more broadly the different positive benefits of participation, from 'a sense of fitting and belonging', to 'feelings of empowerment and social worth', and 'consciousness of democratic citizenship' (Matthews, 2003). This notion of citizenship is discussed by Larkins (2014), who asserts that if citizenship is considered a practice, young people are certainly citizens in that they are social actors, "negotiating and contributing to relationships of social interdependence" (p. 1). However, Cohen (2005) describes children as possessing 'semi-citizenship', in the sense that they are "citizens by some standards but not by others" (p. 222); this is expanded upon by Cockburn (1998) who notes that controls are placed upon children which are not imposed on adults, such as limitations in rights and restricted access to certain places and spaces.

Acknowledging the increasingly-recognised value of young people, Frank (2006) points out that

there are growing calls to involve youth in planning processes as researchers have come to recognise them as "an important stakeholder group" (p. 351). Historically, young people have commonly felt detached or isolated from their communities, unable to contribute effectively to issues and matters surrounding and affecting them; indeed, Spencer, Wooley and Dunn (2000) reported British youth reporting feeling ignored, whilst Chawla (2002a) found that Western-nation youth felt alienated from their local community. Frank (2006) notes that two compelling arguments for their greater consideration and inclusion include the size of the youth population and such reported feelings of social isolation. Also, due to the rapid development of the youth population, in a social, physical and psychological context, public decisions on issues such as city design, social services and economic development significantly impact this social group, the effects of which can continue into their adult lives (*ibid;* Chawla, 2002; Lennard and Lennard, 2000). Considering this, the benefits of youth participation appear numerous, both for the capacity and inclusion of these citizens, resulting in citizens who are not disillusioned by decision-making processes which ignore them, and who do not begin their adult lives with a damaged view of their place within and potential to contribute to their society. The continuation of young people being ignored and undervalued serves only to restrict positive sustainable growth in those societies in which they reside; indeed, to continue to exclude young people from decision-making that impacts their lives, often more so than older members of the adult population, is socially unsustainable.

However, adults – politicians, officials, authorities, decision-makers – commonly place little value on the ideas or potential contributions of young people. Historically, young people have been perceived as lacking maturity and possessing insufficient cognitive capacity to participate as citizens (Goldstein et al., 1979). As Mallan and Greenway (2011) state:

> *"…adults have more social capital than children, and so their imaginings have a greater chance of coming to fruition, whereas adults consider children's daydreams as the stuff of childhood, an amusing folly" (p. 375)*

Such perceptions of youth are a persistent barrier to their further inclusion in planning or decision-making. Hart (2009) notes that age-related discrimination by the UK Government through their citizenship agenda, whereby young people feel disrespected and discriminated against, serve to exclude them from "a citizenship based on normative values", where they are "denied any equality of voice in articulating what is important to them and how they may wish to participate" (p. 654), leading to young people finding it difficult to develop any sense of themselves as citizens. Within this context of denial, Larkins (2014) notes the partial denial of rights, responsibilities and opportunities for participation to young people, whilst others are permitted and given, contributing to young people having an "unsettled relationship with the status of citizenship" (p. 1). Within a 'cultural citizenship approach', Hart (2009) suggests replacing normative

assumptions of citizenship with serious acknowledgement and understanding of their subjective concerns as citizens, and enabling the input of young people into a modernised definition of the citizenship term. Frank (2006) finds that youth participation increases not only individual civic capacity, but community well-being, that the involvement of young people benefits communities by identifying and raising awareness of issues, addressing youth concerns, and improves overall liveability. The author also suggests that youth participation was *positively reinforcing*, improving both youth and adult capacities, and even institutional and civic capacities, for further engagement. In discussing how participation practices should change, Cockburn (2007) asserts that surroundings (i.e. political spaces) must change to accommodate young people, as well as children and other neglected adults, as opposed to young people changing to suit their surroundings; indeed, that a "radically pluralistic public arena" (p. 454) is required.

Such recommendations contest and look to resist what McCulloch (1997) referred to as the growth in *clientalisation*, where the public sphere is being recolonised by the production of "universalistic statements, charters, bundles of services and customers" by managers and politicians, as opposed to citizens having "mutual membership of these services" (Cockburn, 2007: 454). In addition to this, Larkins (2014) proposes that challenges to the meaning of citizenship, and the value of everyday practices of young people, are also required, due to the dismissal of children's actions as non-political, and their calls for justice therefore being are ignored. However, this sets a negative precedent for when these young people become adults and recall such experiences of dismissal and injustice.

Summary

- Communities are representative of complex and dynamic social systems, in which members are able to participate both formally and informally in decision-making processes. They are sites of pluralism and heterogeneity, formed of numerous ideologies and perspectives, and composed of various groups with different interests. Within democratic publics, heterogeneity must be recognised and acknowledged, and should be reflected during democratic decision-making processes. The public involvement process must be aware of and sensitive to different values and beliefs within social collectives.

- Different levels of importance are given to different factors or components of sustainability, depending on local geography and context. Scholars identify that there exists multiple sustainability pathways, due to the different circumstances and priorities of different communities.

- Community engagement processes that demonstrate transparency, knowledge transfer, and promoted procedural justice during the planning and approval stages are found to contribute towards project support and acceptance

- The benefits of including young people in decision-making are argued to be numerous; providing a sense of inclusiveness, improving quality of life, upholding children's rights, fulfilling the legal responsibilities of the state, improvements to both services and decision-making, enhancing democracy, and can also enhancing children's skills and self-esteem. There have been growing calls in recent years to involve young people in planning processes as they are increasingly recognised as an important stakeholder group, and representatives of 'the next generation'.

The notion of sustainability is an important and central concept to this research for several reasons and in several contexts. The literature on this broad and popular concept is now explored and discussed, with particular attention given to the social aspect of this concept.

2.6 Sustainable Development and Social Sustainability

"Sustainability is not an end in itself, but a process of dynamic balance and a means to achieve other goals for society in terms of human happiness or prosperity, fulfilment of human capacity or the advancement of civilization…"

(Dahl, 2012: 18)

Sustainable development has become a topic of increasing importance over recent decades, for a growing number of nations and sectors. It is been noted that literature concerned with sustainable development is 'abundant and expanding' (Quental et al., 2011). This growing interest is reflected by government initiatives and also as part of legislation and policy making across multiple scales; indeed, Azapagic (2004) stated over a decade ago that "it is increasingly clear

that national and international legislation is being tailored towards promoting sustainable development" (p. 640) More recently, in the UK context, sustainable development was promoted by the Coalition Government between 2010 and 2015. Demonstrating this, government commitment to sustainable development was asserted in a policy paper published by the Department of Environment, Food and Rural Affairs (DEFRA, 2015):

> *"The government is committed to sustainable development. This means making the necessary decisions now to realise our vision of stimulating economic growth and tackling the deficit, maximising wellbeing and protecting our environment, without affecting the ability of future generations to do the same" [online].*

Interest in sustainable development, particularly as a research topic, has grown considerably since its acknowledgement by the World Commission on Environment and Development (WCED, 1987) and within the 'Brundtland' report, entitled *'Our Common Future'*. Here, three central themes of sustainable development - environmental, economic and social – are highlighted, and indirectly referenced in the now widely recited definition of sustainable development from the WCED report:

> *"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs"*
>
> (WCED, 1987: 43).

Kreibich (1996) state that there are over 70 definitions of sustainability, whereas Parris and Kates (2003) state the existence of over 500 concepts for its measurement. Hempel (1999) perceives sustainability as an evolving concept - a 'moving target' - causing difficulty for efforts to define the sustainability concept. Renn *et al.* (2007) have categorised the multiple conceptions of sustainability according to the *number and quality of dimensions* that they incorporate. *Single pillar concepts* are historically the oldest, for which impacts on ecology is their primary concern, and whereby long-term ecological compatibility represents sustainability. These consider social and economic factors as secondary and whilst being considered during decision-making, they should not take priority over ecological conservation (Voß et al., 2005). *Three pillar concepts* have become more common in recent decades and are now used most extensively, acknowledging how the three themes of ecological, economic and social compatibility interact and influence one another and combine to define sustainability (Jörissen et al., 1999). However, whilst the popularity of sustainability has grown, and various concepts have become popularised, some authors have questioned the efficacy of the sustainability concept itself given the trajectory of society in modern times. For example, Benson and Craig (2014) argue that researchers should discount the concept and "move past our current state of denial" in consideration of "the realities

of the Anthropocene" (p, 777; *also see* Biermann et al., 2012), whilst suggesting that the 'Declaration' resulting from the Rio+20 UN Conference on Sustainable Development in June 2012 "is generally considered a failed document" (p. 777). Such concerns concur with the predictions of authors such as Barnosky *et al.* (2012) who warn of rapid and non-linear regime changes in respects to both society and our natural environment, and of Fox (2007) who predicts a 'no-analog future' for society, leading authors such as Griggs *et al.* (2013) to recommend development and utilisation of new governance approaches and tools to address the emerging challenges and dynamics of social-ecological systems (SESs) (Benson and Craig, 2014). Whilst I concur with several of these concerns, the overall premise that the sustainability concept itself is redundant is questioned. I argue that whilst such challenges are particularly resonant at the international and global scale, sustainability efforts at a local or community scale remain relevant given the greater manageability of factors at this scale. This is particularly the case within democratic societies, where opportunities and the ability to 'act and impact' are greater. This reflects the approach of authors such as Laurian and Crawford (2016). Their recent sustainability-orientated study on the local scale is based upon the notion of 'think global, act local', arguing this to be the most appropriate "level of intervention to enact sustainable practice" (p. 1; *also see* Brown, 2008; Devine-Wright, 2013; Darier and Schüle, 1999; Francis and Feiock, 2011).

The concept of sustainability has become a subject of growing interest for governments and researchers alike. As Benson and Craig (2014) observe, the concept evolved from UN conferences during the 1970s, and whilst different, the concepts of sustainable development and sustainability are closely intertwined. The authors detail that whereas *sustainable development* is goal-orientated, reflecting "how economic and social development should proceed" (p. 778) with sufficient environmental and ecological considerations, *sustainability* is ability-orientated, referring to being able to "engage in a particular activity, process, or use of natural resource" (p. 778) over the long-term.

Almost 30 years on from the publishing of the Brundtland report, the issues which sustainability research aims to address remain and have evolved; however, the recent report from the Intergovernmental Panel on Climate Change (IPCC, 2014), whilst predicting significant and numerous challenges ahead, declares a capacity for society to change and deal with the "potentially devastating consequences of the present development paradigm" (Kauffman and Arico, 2014: 413). Sustainability now represents an important driver for various sectors, including industry; as Buys *et al.* (2014) states, it is a central consideration "for decisions in the management and future development of industries" (p. 184). The authors also highlight the increasing political desire to not only consider sustainability but to measure it also (Böhringer and Jochem, 2007), often achieved through the utilisation of sustainability indicators (as discussed in Section 2.6.2) or through the use of scoring systems and tools. However, as Kauffman and Arico (2014) note,

there remain 'hurdles' to addressing these development paradigm-related challenges; these include insufficient engagement with stakeholder groups, and "enhanced qualitative and quantitative meta-studies" (p. 413) to more effectively utilise sustainability science-based experiences and evidence from various research streams (Wiek et al., 2012).

2.6.1 Social sustainability

Of the three 'pillars' of sustainability, the social construct – social sustainability – is the least researched of the three, with priority having historically been given to economic and environmental sustainability (Dillard, Dujon and King, 2009). Yiftachel and Hedgcock (1993) and Jones and Tonts (1995) provide early examples of attempts to understand the concept of social sustainability. Their studies are centred on an almost identical framework, but are based within urban and rural contexts respectively. In their study of urban planning in Perth, Western Australia, Yiftachel and Hedgcocks' (1993) identify a conceptual framework compromising three social components; *equity, community and urbanity*, compared to *equity, community and rurality* as proposed by Jones and Tonts (1995). Comparing their studies to more recent research demonstrates how our understanding of social sustainability has progressed in the literature. However, these frameworks, which identify that environmental, economic and social components influence 'sustainability' independently, do not provide necessary detail of the factors, and indeed processes, of social sustainability.

One of the earliest and most pioneering sustainability projects was 'Sustainable Seattle', a citizen-led initiative in the US in the late 1990s when engagement with the people of Seattle led to the development of a series of indicators measuring and monitoring the city's sustainability (AtKisson, 1996). The 'sustainability' concept was in its infancy at this point and the initiative represented early recognition of social dimensions of sustainability. However, Brugman (1997) criticised projects such as 'Sustainable Seattle' for placing too much emphasis on indicators reflecting local values and amenities, and taking a simplistic approach to ensuring participation over a more complex approach to indicator development which would enable a deeper understanding of long-term city development.

During this period, Local Agenda 21 (LA21), an outcome of the 1992 Earth Summit in Rio, represented an attempt to initiate municipal-level sustainable development (Selman, 1998) which involved framework and indicator development (Turcu, 2013). Such was the impact of LA21, it is reported that by 1997, more than 6000 cities globally had adopted LA21 frameworks to identify and address local sustainability issues (Ooi, 2005). Outcomes from both the 1987 WCED (The 'Brundtland' Report) and the 1992 Rio Earth Summit (Local Agenda 21) have influenced significantly both international attention on and action towards sustainable development and played a significant role in their incorporation into national and international policy agendas (Keirstead, 2007). I discuss this literature in earlier work, where it has informed early-stage development of a conceptual framework for establishing social sustainability

criteria at the community level (*see* Whitton, Parry and Howe, 2014).

During the late 20th century, some scholars questioned how urban environments could ever be 'sustainable' when so reliant on their consumption of resources, and as sites of intense economic and social activity, indeed that the urban sustainability concept was a contradiction (Owens, 1992). This reflects a period when social and environmental sustainability were very much intertwined. However, the social dimension then started to be understood more independently. Within the early social sustainability literature, Sachs (1999) questioned whether the social sustainability concept represents social requirements for sustainable development, or working to sustain specific social infrastructure at various scales, an issue which has continued into more recent debates (Colantonio, 2008). This notion of understanding what constitutes 'social sustainability' provides a basis for the current research, which it will approach at the community level, investigating a community perspective. Within this community and sustainability perspective, I seek to explore how decisions impactful over the long-term may impact upon different parts of a society. Indeed, Hersh (1999) states that sustainability-related issues not only impact upon societies, but that these impacts are not uniform for the local populace:

"Sustainable decision problems generally affect a range of different groups and individuals, often in very different ways" (p. 395)

There is no single and agreed definition of social sustainability in the academic literature, similar to that proposed by the WCED for sustainable development. Meaning of this term differs according to discipline. Colantonio (2007) commented that finding a generalised definition of social sustainability is difficult, as scholars and policy makers have different perspectives and discipline- specific criteria and commonly develop their own definitions. For example, from an urban environment standpoint, Polèse and Stren (2000: 15 – 16) defined social sustainability as follows:

"*Development (and/or growth) that is compatible with harmonious evolution of civil society, fostering an environment conducive to the compatible cohabitation of culturally and socially diverse groups while at the same time encouraging social integration, with improvements in the quality of life for all segments of the population".*

From the sociological tradition, Littig and Grießler (2005: 72) define it as "…a quality of societies. It signifies the nature-society relationships, mediated by work, as well as relationships within the society". Finally, The Young Foundation (Woodcraft et al., 2011), provide a comprehensive description of social sustainability from an urban design perspective:

"A process for creating sustainable, successful places that promote wellbeing, by understanding what people need from the places they live and work. Social sustainability combines design of

the physical realm with design of the social world – infrastructure to support social and cultural life, social amenities, systems for citizen engagement and space for people and places to evolve" (p. 16).

Polèse and Stren's (2000) publication *'The Social Sustainability of Cities'* represents one of the earlier key texts on the concept, which studied sustainability in urban environments as do the majority of modern social sustainability texts (e.g. Dempsey et al., 2011; Turcu, 2013). This text reflected growing recognition of the social dimension of sustainable development. The authors emphasised the trade-offs necessary for sustainable development, and the importance of the physical urban environment to social sustainability. However, the OECD (2001) observed that during this time, social sustainability was still not considered an equal sustainable development component, but rather as a sub-set when considering the impacts on society of environmental decisions. They also note the specificity of social sustainability indicators as a factor in their applicability and replicability in different localities:

"Social indicators are validly chosen on the basis of the political and ethical preferences of particular communities. Their comparability across communities will always be limited by the nature of those choices" (p. 7).

Omann and Spangenberg (2002) suggested that this inequality should be addressed, and that environmental and social criteria must be considered during the earliest stages of planning, or "scenario design" (p. 1), for sustainable development to be achieved without bias. Littig and Grießler (2005) later emphasised that society-environmental relationships needed to be analysed with greater attention paid to the social processes that influence such interactions, and questioned whether it would be possible to move beyond the dominating ecological dimension and examine social or economic processes independently. The authors proposed that social sustainability be recognised as a normative and analytical concept, which was based on the concepts of needs and work; this reflects the move in the literature during this time to conceptual independence for social sustainability. This is also reflected by reports at this time such as The Egan Review (ODPM, 2004), a report commissioned by the UK government that sought to establish what constituted a 'sustainable community', and how such sustainability within these communities could be measured. The report identified a series of components and developed a number of indicators for this purpose.

In 2005, the city of Vancouver, Canada, developed what is now recognised as a pioneering social sustainability framework (Colantonio, 2009). This was termed the Social Development Plan (SDP) and in 2005 a Social Sustainability Framework was developed in conjunction to be practically applied at the city level. The SDP stated the main components of social sustainability as basic needs, individual capacity (linked to education, skills, health, values and leadership), and

social capacity (collective action facilitated by relationships, networks and norms). The framework for social sustainability assessment was based upon four criteria and principles: equity; inclusion; adaptability; and security. The framework incorporated urban and regional sustainability indicators from expert and citizen sources to monitor interrelationships between principles and themes, and the approach utilised by Vancouver demonstrated the importance of a structure that enabled the assessment of social sustainability performance in partnership with city inhabitants (Colantonio, 2009). The UK study by McAlpine and Birnie (2006) followed this, which further demonstrated social sustainability was being considered as an independent theme. The authors established sustainability indicators in Guernsey, UK, which focussed on four key themes: *economy, environment, social,* and *well-being*. The study also detailed an integrated approach to indicator development that was neither wholly expert nor citizen-led, and highlighted issues with generating local interest at the earliest stages of the process. Literature during this period reflects a significant progression of the concept of social sustainability and its understanding.

Colantonio (2007, 2008) became a prominent author in the social sustainability literature with a number of studies concerned with examining and reviewing the literature, the evolution of the concept, the proposed themes and suggested definitions, and assessing the methods by which social sustainability was being measured. In his work, Colantonio (2007, 2008) provides one of the most comprehensive overviews of the social sustainability concept and its evolution, and suggested where the concept should orientate. In a similar vein, the publication *'Understanding the Social Dimension of Sustainability'* (Dillard, Dujon and King, 2009) outlines the progression of the social sustainability concept and its establishment as a key, independent component of sustainable development. Similar to Colantonio (2007, 2008), Magis and Shinn (2009) detail within this publication the evolution of the definitions, components and themes of social sustainability, and the emerging incorporation of more subjective, as opposed to objective, themes which are suggested to be central to social sustainability, also highlighted by Colantonio (2008). Magis and Shinn (2009) also promote the independence of the concept, stating that:

> *"…to adequately identify and employ the contributions of social sustainability, it needs be understood as a phenomenon distinct from – albeit interrelated with – ecological and economic sustainability" (p. 15).*

Social sustainability literature in recent years has continued to contribute definitions of the concept in order gain clarity on a developing concept. Vallance, Perkins and Dixon (2011) have sought to clarify what they considered "a concept in chaos" (p. 342), proposing three dimensions to social sustainability: development, bridge and maintenance sustainability, considering basic needs, changes in behaviour to achieve bio-physical goals, and preservation of socio-cultural

characteristics during change respectively. This reflects the evolution of the concept further, as this paper is almost independent in proposing such a thematic structure to the concept, as opposed to a concept encompassing numerous central factors that a society should achieve. Similarly, Dempsey *et al.* (2011) proposed two key dimensions to social sustainability, in an urban, local context: social equity, and sustainability of community. Within each dimension, a number of aspects were identified; for example, for social equity, distribution of resources and access are highlighted, and for community sustainability, social networks, participation in networks, community stability, sense of place and safety were acknowledged. In other literature, a report commissioned by The Berkeley Group, titled *"Putting the 'S-word' back into sustainability: Can we be more 'social'?"* (Dixon, 2011), provided an overview of the concept, detailing its importance and how it could be measured, but, it could be argued, presented in a form which was more accessible. Dixon (2011) also provides a simple and direct justification for social sustainability research, stating that "social sustainability matters because people, places and the economy matter as much as environmental issues" (p. 16). This report, and others such as that by the Young Foundation (Woodcraft et al., 2011), reflect the acknowledgement of, and engagement with, the concept outside traditional academia.

The study conducted by Eames and Egmose (2011) in Islington, North London, demonstrated a different approach to understanding sustainability, identifying local priorities and criteria in order to enable greater urban sustainability, named the 'SuScit' project. They employed a community-based, 'bottom-up' process of community foresight through 'backcasting', where long term sustainability goals were identified, preceded by workshops and discussions with various stakeholders to identify and establish what was required to achieve these goals. However, scholars have continued to attempt to identify the key factors for general social sustainability. Rogers *et al.* (2012) emphasised the importance of two commonly proposed factors, namely equity and well-being, if society was to make the transition to a state of social sustainability. They acknowledged the importance of both objective and subjective components of well-being in monitoring the success of this transition, a recommendation in line with the majority of recent literature. Rogers *et al.* (2012) asserted that any definition of sustainability must incorporate "meeting human physical, emotional and social needs" (p. 61), again reflecting a requirement for social specifics. They also suggest that greater emphasis should be placed on "objective and subjective components of well-being to monitor our progress" (p. 61), components which are included in modern sets of social sustainability themes in the literature.

Sustainability has also become a subject of greater consideration for industries which have historically been absent in their consideration of the subject. Similar to other large-scale industries, Azapagic (2004) notes that both legislation and stakeholders' pressure have acted to become a key driver in a growing interest in sustainability for the mineral and mining industry, but so too have lower labour and health costs associated with safe and healthy working environments, and market advantages by creating a socially responsible approach to business for example. In a nuclear context, uranium mining and milling has been studied by authors such

as Mudd and Diesendorf (2008) in regards to its sustainability, concluding that "significant gaps remain in complete sustainability reporting and accounting" (p. 2624), and that the extent of economically recoverable uranium is, among other factors "inextricably linked" to "broad social issues" (p. 2630). Cases such as these highlight the increasing recognition of social criteria as influencing sustainability in industrial scenarios and environments and of industrial processes.

Whether the formulation of a single definition is appropriate, for sustainability regarding all social scenarios, is yet to be agreed and may never be. However, there is consensus in the literature that the emerging concept is as important as economic and environmental factors, and that understanding its various dimensions and complexities is of growing importance.

2.6.1.1 Social sustainability themes

Numerous themes, and subsequent criteria and indicators, are recorded in the literature as being central to social sustainability. Early studies proposed themes such as 'livelihood', 'safety nets' and the 'ability to withstand external pressures' (Chambers and Conway, 1992), and 'democracy', 'human rights' and 'employment' (Sachs, 1999). These themes are often broad, lack clarity and applicability, and are mainly objective and easily measurable. As social sustainability research progressed into the 21st century, objective themes such as 'participation' and 'health' were proposed alongside more subjective themes, such as personal freedom and social integration (e.g. Littig, 2001). However, objective themes remained dominant, as Omann and Spangenbergs' (2002) proposed themes, including 'education', 'skills', 'employment', and 'consumption and income', demonstrates. The theme of social capital, which bridges between an objective and subjective concept, has been included in literary discussions since late 20th century and continues to be proposed as a central component of any sustainable society; Robert Putnam (1995, 2000) is the key author in the progression of this concept. The incorporation of more subjective measures became common in proceeding studies, including themes such as 'empowerment for participation in development and decision-making' and 'personal and social responsibility' (Baines and Morgan, 2004; Sinner et al., 2004), 'pride and sense of place', 'interactions in the community/social networks' and 'community stability' (Bramley et al., 2006), and 'happiness', 'quality of life', well-being' and 'social capital' (Colantonio, 2007).

More recently, suggested key themes for social sustainability combine both 'traditional' objective themes and 'emerging' subjective themes. Modern studies propose both very detailed lists of themes and more simplistic sets with few themes to consider. Examples of the former include studies by Dempsey *et al.* (2011) and Weingaertner and Moberg (2011), both based in an urban development context, whilst the latter include those of Cuthill (2010) and Turcu (2013), which detail framework and indicator development with local involvement. It is evident that what constitutes social sustainability and which themes should be considered when working towards or measuring social sustainability remains contested and seems to be context and discipline dependent. Indeed, Weingaertner and Moberg (2011: 1) state that "context-specific information

is still necessary in practical applications". I argue that such context-specific information can be discovered locally by conducting research within specific communities, by working with local stakeholders to understand sustainability from their perspective and develop social sustainability indicators which reflect *their* social priorities and social determinants of sustainability at the community level.

2.6.2 Sustainability Indicators

In order to measure and assess sustainable development, and progress towards 'sustainability, it is necessary, and often the case, that 'indicators' are developed and utilised to enable trends and issues, at various scales (i.e. local, regional, national), to be identified; they are effectively employed to indicate circumstances within given parameters. In defining social indicators, Bauer (1966) views them as ''statistics, statistical series and all other forms of evidence that enable us to assess where we stand and are going with respect to our values and goals'' (p. 1, *cited in* Carrera and Mack, 2010). This echoes similar notions detailed in the study of Valentin and Spangenberg (2000) on community sustainability indicators, of visions of sustainable societies being used as compasses to direct people towards an intended scenario. Broadly speaking, indicators are tools (Dahl, 2012), tools which enable progress relating to specific issues to be measured, at various geographical and temporal scales, for decision-making purposes. Indeed, Dahl (*ibid*) concludes that indicators "can be powerful tools for making important dimensions of the environment and society visible and enabling their management" (p. 18). The author asserts that the most significant effects of indicators can be making issues visible, particularly in their early adoption whilst also acknowledging the potential impact of these indicators in highlighting issues to both decision makers and public alike, and thereby "expanding the basis for decision making" (p. 15).

Acknowledging their function to simplify, Dryzek (1990: 156) suggests that indicators are measures which allow insight to complex situations and ''provide access to phenomena for which explanation is sought''. In a similar tone, Holden (2009) notes that indicator systems are often presented as objective instruments that enable people to "mediate the messy terrain of social and political decision-making" (p. 430). Other such as Rydin (2007) view indicators as a form of 'governmentality technology', in the sense that they are utilised to bring notions of performance to the fore, and publish indictor trends so as to allow comparisons, influence behaviour (reflecting a 'name and shame' strategy), and ultimately improve performance in different domains of interest. Holden (2009) suggests that despite appearing as tools of neutral objectivity for governance, indicator systems in fact reflect normative measures which promote a message of "the need for 'improvement' in clear and specific domains" (p. 431). Parris and Kates (2003) also acknowledge the normative dimension of indicators, defining them as quantitative measures, which are selected in order to assess progress toward or away from a stated goal. Providing an alternate and more nuanced perspective, Garrelts and Flitner (2007) have emphasised the information function of social indicators, suggesting that they should be selected

for the utility of communicating broad topics with select statistics so as to mitigate the communication of vast amounts of information. The information function is also highlighted in the definition of indicators provided by the OECD (2003), defining indicators as:

"a parameter, or a value derived from parameters, which points to, provides information about, describes the state of a phenomenon/ environment/ area, with a significance extending beyond that directly associated with a parameter value" (p. 5).

Sustainable development and 'sustainability' has been measured at a multitude of levels, and sustainability indicator sets/frameworks have been developed at regional, national, local government and even household scale (Bell and Morse, 2004); as Dahl (2012: 15) states, "sustainability cannot be addressed solely at the national level". Scerri and James (2010) make a similar observation, noting that "indicators-based projects are currently central to many local, city-wide, national and international sustainability initiatives" (p. 41). The authors note that in a broad sense, indicators-based projects have grown in popularity and value as they enable measurement of where a community 'is at' in the context of 'sustainable development'. Indeed, Morel-Journel *et al.* (2003: 582) pose that the "growth in the use of sustainability indicators is nothing short of phenomenal".

As sustainability becomes further prioritised, its deconstruction, analysis and measurement is inevitable. However, attempts to measure sustainability have been questioned in the literature. Hempel (1999) perceives sustainability as an evolving concept, and a 'moving target', arguing that measurements and assessments of sustainability do not hold long-term value. Others have critiqued sustainability-related inquiries due to uncertainty surrounding the value decision-makers place on them. Innes and Booher (2000) have questioned how much notice politicians and officials actually take of sustainability-related measurements and findings. Such contestations reflect the difficulties surrounding the utilisation of sustainability indicators, and the factors that may affect their efficacy. I argue that to address such critiques, the efficacy of sustainability assessments that include social components are dependent on their relevance to those who they relate to, and that this is more attainable at the local level where specific needs and priorities can be better articulated

In earlier sustainability literature, Bell and Morse (1999) propose that indicator development could be used to promote public participation with sustainable development and used as a vehicle for engaging community learning (*also see* McAlpine and Birnie, 2006). This challenges other writers such as O'Riordan and Voisey (1998) who argue that indicator development primarily reflects the social and political ideologies of their developers. As a result of their comparative study of sustainability indicator identification projects, Fraser *et al.* (2006) conclude that identification and selection of indicators provides both valuable databases and an opportunity for community empowerment and education, and that it is imperative for decision-making forums to involve multiple stakeholders so as to be relevant to both stakeholders and policy makers. The authors

note that the past failings of top-down approaches had promoted and driven the increase in community-based projects, and that further analysis was required of the benefits achieved in case studies where top-down and bottom-up approaches are integrated. Such integration has also been suggested by Reed, Fraser and Dougill (2006), advising that this may resolve tensions and prove highly effective. Concurrently, McAlpine and Birnie (2006) promote the utilisation of integrated sustainability indicators, expressing a "need to bring together experts and community members in order to develop indicators that measure progress towards sustainability" (p. 91). The study details a case study from Guernsey, UK, which demonstrated that a top-down instigated process, which later incorporated a bottom-up approach, created a platform that empowered and educated local citizens and a forum where concerns could be expressed. The authors observe that "the process of engaging people to select key indicators provides a valuable opportunity for community empowerment and education" (p. 91 – 92). However, they also highlight limited public interest in the indicator development as a key limitation to indicator development, and that a top-down approach may be required initially, with public interest increasing when key stakeholders demonstrate interest and indicators become operational (McAlpine and Birnie, 2006).

More recently, Turcu (2013: 714) states that indicators are only appropriate when they are flexible, "accounting for local priorities and needs", but that lack of "local accuracy" and the incorporation of "local values and priorities" (*ibid*: 19) are common during sustainability indicator development (Reed and Dougill, 2002; Turcu, 2013). This refers to the traditional, 'top-down' or 'expert-led' approach commonly employed by governments and organisations, which lack public participation or engagement, and reflects a move towards more participatory approach that draws on local expertise and knowledge. Recent studies that employ integrated approaches include those by Magee, Scerri and James (2012) and Magee *et al.* (2013). Magee, Scerri and James (2012) employ a community-centred approach to develop indicators to measure social sustainability, and Magee *et al.* (2013) detail the development of sustainability assessment methodology using both top-down and bottom-up approaches and indicators. Software systems are also being developed as part of this study that can be used in communities and assist in structuring community forum outcomes into locally relevant indicators.

The effectiveness of more localised indicators has been acknowledged for some time in the literature. Innes and Booher (2000) suggested that indicator system development should be community/ region specific to address their specific circumstances and needs; examples of such include Seattle, U.S. (AtKisson, 1996) and Guernsey, U.K. (McAlpine and Birnie, 2006). As noted by Natcher and Hickey (2002), analysis at the local level allows for greater accuracy and more precise measurement, commonly enabled through the development of sets of sustainability criteria or indicators (*see* Bell and Morse, 2004; Fraser et al., 2006). However, this view is not held by all. On measuring sustainability at the local scale, Morel Journel *et al.* (2003)

suggest that indicators do little more than reflect a view of sustainability for that particular locality, and do little to progress wider sustainable development. Critiquing indicator-based projects themselves, Scerri and James (2010) warn that despite the value of indicator projects in measuring and assessing sustainability criteria such as 'well-being' and 'cohesion' at the local level, they may distract us from local realities and present us with a relatively abstract view of local circumstances, and thus impede development by displacing concerns with "understanding community as a lived condition of negotiated outcomes" (p. 42). The development of such indicators should involve open communication, not be purely a scientific or technical exercise as has been found by research to often be the case (Scerri and James, 2010), and should be both simple and understandable, and directionally clear (Valentin and Spangenberg, 2000). Such criteria have been lacking in indictor development projects of the past, and it has been argued that "the size, scope and sheer number of indicators included within many such projects means that they are often unwieldy and resist effective implementation" (Scerri and James, 2010: 41).

In the UK, quality of life indicators have been utilised since 1999, with a core set of 147 indicators (revised to 68 indicators in 2005 from 127 indicator measures), 15 of which were selected as headline indicators and reported on annually (Dahl, 2012). Interest and concern with 'quality of life' developed towards the end of the 1960s, as people became dissatisfied with the pursuit of economic growth and well-being based upon material goods and gains (Grasso and Canova, 2008). However, there are difficulties involved with attempting to measure quality of life due to the dependency on an individual's values and beliefs (Zidanšek, 2007), resulting in indicators which are more subjective than those for measures of economic or environmental sustainability for example. An example of such subjective indicators is that of 'happiness', which represents "an average answer to a question related to quality of life" (*ibid*: 891) and how much they enjoy their life as a whole. Quality of life measurements are greatly informed by *social* criteria and indicators, as for the study of quality of life in the EU by Grasso and Canova (2008). What the national experience of indicators of several nations over the past two decades demonstrates is that in order to be effective, indicators must be adapted to their target audience and should be developed by consulting with indicator users (Dahl, 2012).

According to Local Agenda 21, visions of a sustainable society should be developed and utilised not as a definitive roadmap of blueprint for locales, but as a compass, indicating what to aim for and how development towards such leitbilds are progressing across temporal scales, facilitated by indicators to help measure such progress, whilst also highlighting the implementation of plans or their failures, and the remaining distance from these developed visions (Valentin and Spangenberg, 2000). In short, in order to measure sustainability, criteria and indicators are formulated in order to generate sustainability metrics. Sustainability analysis has been identified as an important requirement "to implement and monitor the development of sustainable development policies" (Morimoto, 2013: 646) as dictated by Agenda 21, an agreement made in 1992 at the UN Conference on Environment and Development (Dalal-Clayton, 1992), and sustainability indicators are identified as particularly important tools to facilitate such analysis

(Morimoto, 2013).

However, it has been proposed by Scerri and James (2010) that indicators-centred research can do more than is often experienced; that it can make a significant contribution to sustainability and developments efforts not only by measuring and assessing changes in sustainability criteria over time, but by being part of a broader approach in understanding how people engage with one another and the terms on which this engagement takes place. Critiquing the practical value of indicator projects, Bell and Morse (2004) comment that the common practical experience of indicator development projects is that they are based on "short-term goals and the denial of failure" instead of being based on learning, and that projects are often "theoretically circular but practically linear" (p. 13). The authors propose that to avoid the public passively utilising sustainability indicators developed by others (MacGillivray and Zadek, 1995), the local community should have greater ownership of the project (Bell and Morse, 2004). Bell and Morse (2003) have also suggested that indicator development can serve to assist in increasing understanding of sustainability within communities, as part of a learning process. They have emphasised, as have others (e.g. Rydin, Holman and Wolff, 2003), that participation of the target audience in local indicator formulation will more likely result in their use and appreciation by that target audience (Bell and Morse, 2001). Dryzek (1990: 122) has previously argued that "there is little hope of reasoned resolution of the clash of inevitably partial ideologies or rationalities" without the acknowledgement and inclusion of different perspectives. It is also argued that research that explores the circumstances and reality of diverse communities – "a plurality of voices…working together in the public sphere" (Holden, 2009: 431) – can lead to "better policy solutions in contemporary democracies" (Dryzek, 1990: 122). Such arguments suggest that more traditional, expert-led methods of indicator development are inadequate if they are to be democratically legitimate, and that more socially representative approaches are required.

In their study of community sustainability indicator development in the City of Iserlohn in Germany, Valentin and Spangenberg (2000) detail an innovative procedure that involves both conceptual and procedural features. These are, respectively, that balance without oversimplification is achieved by combining the various dimensions of sustainability (social, environmental, institutional and economic) into a single indicator set, and that "broad and systematic participation" of multiple societal groups assists in strengthening local identity, by "providing the means for all citizens to better identify with their community and its development" (*ibid*: 391). The authors also note that each community is different, and therefore, although there may be similarities in indicator sets between communities, differences are an inevitability, and every Local Agenda 21 are expected to reflect such differences (Valentin and Spangenberg, 2000). At all scales, however, more is required to achieve or aim for 'sustainability'. Indicators themselves will not alter sustainability-related decision-making at official and governmental levels, in the same way that social behaviour has not been sufficiently impacted thus far by education on global issues and the criticality of sustainability, a sentiment echoed by Dahl (2012):

"…it is increasingly apparent that education about the environmental, social and economic problems behind present unsustainability, and the scientific and technological options available, is not sufficient to change public behaviour, just as indicators themselves are not sufficient to change government decision-making" (p. 18).

The development of indicators which better reflect human and societal values may prove more effective in moving towards development which is sustainable, particularly in a social context. However, as Dahl (2012) points out, many societies must reassess their priorities if they are to begin to move towards sustainability, as the values which may facilitate a shift towards sustainability would also facilitate a shift away from the dominant values of many modern, particularly capitalist, societies:

"The values required to move society towards sustainability, such as justice, moderation, solidarity and respect for the environment and its limits, contradict the dominant materialistic and self-centred values of the economic system and the consumer society. Sustainability is thus fundamentally an ethical challenge, and must also be addressed at the levels of people's values, and of the ethical principles to which the institutions of society must be held…" (p. 18).

I now discuss the development of sustainability indicators in the context of industrial and energy-related studies and projects, as this literature is highly relevant to the nuclear focus of this study.

2.6.3 Sustainability Indicator Projects: industry and energy

Sustainability indicator projects have been utilised in a diverse range of circumstances and to analyse a great number of industries, including the energy industry. Sustainability is becoming of greater concern for industry decision makers, particularly as social, economic and environmental factors are shown to impact upon corporate progress over time (Buys et al., 2014). Not only is sustainability becoming more important to industry, but the social impacts which have commonly been studied on to a lesser extent are being highlighted as important by researchers. Carrera and Mack (2010) assert that when assessing the sustainability of energy technologies, merely focussing on the economic and ecological dimensions, as is commonly the case, is insufficient, and that the social effects of energy technologies must also be considered. Such assessments should not only be guided by short-term economic gains, but should also consider the repercussions of energy technologies on inter and intra-generational equity. They propose that holistic technological impact assessment is only possible once this long-term perspective is implemented, thus reflecting an intrinsic link to the concept of sustainability.

The minerals and mining industry faces some of the most difficult sustainability challenges of

any industry, particularly when considering its 'social license to operate'. In consideration of this industry, Azapagic (2004) develops a framework for sustainable development indicators, comprising environmental, social, economic and integrated indicators to identify 'hot spots' (internal use) and for sustainability reporting and stakeholder engagement (external use) purposes. The indicators are developed to allow comparative analysis, with the framework being developed to be compatible with Global Reporting Initiative-proposed general indicators, whilst some also reflect industry-specific characteristics; this reflects an *integrated* approach. Other authors have studied the sustainability of mining industries and processes, such as uranium mining (Mudd and Diesendorf, 2008), and have concluded that more needs to be done to develop a more complete understanding of the sustainability of such industries, i.e. of all aspects of the mining cycle. It has been proposed that due to the sustainability challenges faced by the mineral and mining industry, as is the case with other industries such as those in the energy sector for example, it is important that progress towards or away from developing sustainably, according to the various themes of sustainable development, can be measured and assessed in order to appropriately respond to various challenges (Azapagic, 2004).

Energy is another sector for which sustainability is gaining in priority and interest, particularly due to the impact of large-scale technology and infrastructure, and associated long life cycles, on society and the environment. In their study of large-scale energy projects, Morimoto (2013) illustrates the quantitative relationship between environmental, social and economic impacts of hydropower developments, in regards to Sri Lankan hydropower projects as an example that produce 9.51% of the nation's energy supply. The use of sustainability indicators enable marginal trade-offs between environmental, social and economic objectives of hydropower developments to be understood, thus providing an "overview of potential impacts of different scenarios that are designed to be implemented and present an optimum mix of hydropower generation" (*ibid*: p. 644). In Morimoto's study, electricity supply cost, the number of resettlement and the biodiversity index are used as the economic, social and environmental indicator respectively.

Carrera and Mack (2010) provide a modern social sustainability assessment across the EU of various energy technologies, rating 16 energy technologies on a set of 26 indicators, generated in a discursive process involving energy experts and stakeholder groups, and so reinforcing the utility and acceptance of the indicators. It represents a rare study of the societal impacts of energy technologies using social indicators, an area that the current research looks to contribute. Results showed that overall, large-scale technologies such as nuclear and coal power were assessed critically by the experts on associated risks and costs and acceptance by the public. Conversely, small-scale technologies such as fuel cells and photovoltaics were assessed more positively overall, particularly for ecological and societal compatibility. Their results also demonstrate that expert opinions and assessments tended to reflect the "country- specific characteristics of the energy regime" (*ibid*: 1038). For example, French experts considered nuclear power more favourably than experts from other European countries, and German experts considered public participation in decision-making as less important than those from other

nations. The authors conclude that the indicators developed by both energy experts and stakeholder groups could be further complemented by large-scale surveys reflecting the views of the general public, and hold sufficient value to "legitimately inform political decision making" (*ibid*). The study is uncommon in the literature in that it promotes an approach to energy technology sustainability assessment that not only recognizes the importance of social issues for their long-term viability, but also recognizes the value of an approach that combines expert, stakeholder and public views to produce social indicators that can inform EU energy policy.

Onat and Bayer (2010) also assess the sustainability of energy production technologies, but in contrast to the study of Carrera and Mack (2010), the authors find that in consideration of eight criteria (including land use, efficiency and CO_2 emissions), two of which are social (external costs and external benefits), wind and nuclear power rank highest in regards to overall sustainability, with coal and hydrogen fuel cells ranking lowest, out of eight energy production technologies. They suggest that the social perception, and therefore overall sustainability, of alternative energy sources would be improved by a number of measures, including raising the awareness of the public through educational means, and the establishment of tracing and evaluation mechanisms. The findings of Onat and Bayer's (2010) study echo somewhat the findings of two international studies reported in MacKay's (2009) publication, in which wind and nuclear power were also deducted as most sustainable from an analysis of a range of energy technologies, albeit considering different criteria in their sustainability assessments.

2.6.4 Sustainability assessment of nuclear power

Assessments of the sustainability of energy systems and technologies have become commonplace as part of efforts to understand their long-term impacts and suitability to societies and their needs, which are likely to change over time and the passing of generations. Sustainability indicators represent a common tool developed and utilised to enable a range measurements to be made over time, and progress towards goals to be examined in relation to various issues.

The sustainability of nuclear power has been a topic of interest over the last decade or so in the energy literature. The sustainability of nuclear power has been examined through assessments of the sustainability of multiple energy technologies (e.g. Afgan and Carvahlo, 2002; Carrera and Mack, 2010; Stamford and Azapagic, 2012) whilst others have assessed the sustainability of nuclear power specifically (e.g. Stamford and Azapagic, 2011; Verbruggen, Laes and Lemmens, 2014).

On the social sustainability of nuclear power, there have been several studies dedicated to researching this theme; these are detailed in Table 1 (pg. 108). Some have developed specific indicators within a 'life-cycle' approach and considering the whole 'energy system' (e.g. Stamford and Azapagic, 2011), whilst other studies have developed broader criteria to assess the 'actual sustainability' of nuclear power and its compatibility with notions of sustainable

development (Verbruggen et al., 2014). Stamford and Azapagic (2012) have also assessed the sustainability of nuclear power against other electricity generation technologies, which have the potential to play a significant role in the UK's energy future, utilising various indicators to assess their 'techno-economic, environmental and social sustainability' in a life-cycle approach to assessment. This study was proceeded more recently by a study of UK electricity future scenarios assessing multiple generation technologies, of which nuclear power was part (Stamford and Azapagic, 2014). The authors find that of the four technologies studied (nuclear, photovoltaics, gas and offshore wind), nuclear power technology scored highly in regards to mitigating intergenerational impacts from climate change. However, it scored poorly on life-cycle employment, radiation-related health impacts and intergenerational impact in regards to the production of radioactive waste and associated storage requirements. In an energy system perspective, this highlights a weakness in the social sustainability potential of the technology due the employment and health-based implications on current and future generations, and the need for further research into the social sustainability of nuclear power if the energy system it is part of is to be considered 'just' and itself sustainable. In a recent study, Verbruggen *et al.* (2014) consider the 'sustainable' nature of nuclear power; concerned with assessing the potential role of nuclear power (fission) in sustainable development. They develop and apply a 19 criterion framework in their study based upon the five dimensions of Environment, Economy, Risk, Society, and Governance. They question the capacity for nuclear power to legitimately contribute towards broad sustainable development, which is further impeded by an apparent lack of engagement or dialogue between nuclear proponents and opponents. The authors assert that the dominant stance of many official institutions such as the UK Government and the International Energy Agency (IEA), that nuclear power is a critical technology for a low-carbon energy mix, despite a persistent lack of definitive solutions to "intractable radiation and waste problems" (Verbruggen et al., 2014: 27), serves to silence and resist alternative perspectives and impede democratic decision-making. The current research aims to highlight these 'alternative perspectives' in the form of local stakeholder groups and challenge this documented resistence from official institutions. The lack of engagement between nuclear proponents and opponents which the authors describe is also of concern, and is not conducive to sustainable management of development-related impacts if the full context of support and opposition is unknown.

Social considerations are broadly lacking within sustainability appraisals of nuclear power in comparison to other themes such as environment and technical. For example, the sustainability appraisal of the national nuclear policy statement by DECC (2010) focuses on environmental and health sustainability criteria, with limited attention given to social criteria, considering only the impact of power station development on employment opportunities, and local community welfare (Verbruggen et al., 2014). There are also relatively few evaluations of 'nuclear sustainability' that utilise sustainability indicators specifically developed for the purpose. These studies develop indicators and criteria sets from an expert perspective, and that indicators which measure the sustainability of nuclear projects from the perspective of local or

‘affected’ communities are relatively absent from the literature. This results in the general perspective of the literature rather skewed by expert and ‘outsider’ determinations of local impacts and factors influencing project sustainability. Consequently, these indicators may be scientifically and analytically robust, however they remain developed upon expert judgements of ‘what is important’ regarding environmental, economic, technical, and social issues, and are therefore ethically questionable and insufficiently reflective of local context.

Table 1. Select studies and socially-related sustainability indicators for nuclear power assessments

Authors/Study	Theme	Criteria	Indicator
Stamford and Azapagic (2011, 2012) – Life cycle sustainability assessment of nuclear power; Stamford and Azapagic (2014) - Life cycle sustainability assessment of UK electricity scenarios	Social	Provision of employment	Direct employment
			Total employment (direct + indirect)
		Human health impacts	Worker fatalities
			Human toxicity potential (excluding radiation)
			Worker human health impacts from radiation
			Total human health impacts from radiation (workers and population)
		Large accident risk	Fatalities due to large accidents
		Local community impacts	Proportion of staff hired from local community relative to total direct employment
			Spending on local suppliers relative to total annual spending
			Direct investment in local community as proportion of total annual profits
		Human rights and corruption	Involvement of countries in the life cycle with known corruption problems (based on Transparency International Corruption Perceptions Index)
		Energy security	Amount of imported fossil fuel potentially avoided
			Diversity of fuel supply mix
			Fuel storage capabilities (energy density)
		Nuclear proliferation	Use of non-enriched uranium in a reactor capable of online re-fuelling; use of reprocessing; requirement for enriched uranium
		Intergenerational equity	Use of abiotic resources (elements)

			Use of abiotic resources (fossil fuels)
			Volume of radioactive waste to be stored
			Volume of liquid CO2 to be stored
Verbruggen, Laes and Lemmen (2014) – Assessment of actual sustainability of nuclear fission power	Social (people)	Electricity bills are affordable (match the expectations of constituencies)	
		External and future costs are allocated according to the polluter pays principle and precluding displacement of problems and risks to the poor, to developing countries, and to future generations	
		Exposure to harmful pressures/hazards is low, and proper information on safety and health impacts is available	
		Global redistribution of access to natural resources and of economic wealth growth is stimulated	
	Governance/policy (politics)	A global, independent agency studies nuclear power issues and choices in terms of their longevity, uncertainties, and irreversible impacts	
		Independent and accountable nuclear regulatory institutions and processes are established and monitored publicly	
		At national/regional levels, the public interest prevails over private profit, and democratic institutions prevail over technocracy	
		At local levels, citizens can engage in debate about energy system governance, and participate in the deployment of local energy systems	

Carrera and Mack (2010) – Sustainability assessment of energy technologies (social indicators)	Social	Security and reliability of energy provision	Flexibility to incorporate technological innovations
			Availability of waste disposal infrastructure
		Political stability and legitimacy	Potential of conflicts induced by energy systems
			Necessity of participative decision-making processes
		Social and individual risks	Subjectively expected health consequences of normal operation
			Catastrophic potential
			Familiarity with risks
		Quality of life	Functional impact of energy infrastructure on the landscape
			Aesthetic impact of energy infrastructure on the landscape

In review of the literature, I pose that the legitimacy of existing social indicators, in the context of their relevance to people who live close to and are impacted directly by nuclear power developments, is uncertain and questionable. Processes of validation whereby developed indicators are discussed with members of the public residing within communities near to nuclear power infrastructure are lacking in the literature. For sustainability assessments of nuclear power, it is often the case that sustainability criteria are determined and indicators are developed externally from those communities that experience the impacts of nuclear developments and facilities on a daily and longitudinal basis. I argue that there exists a deficit of not only public involvement but also validation in their development, similar to the cases of public engagement on and public involvement in wider nuclear decision-making mentioned previously. Here, the issues constituting the foundations of these indicators risk being technically relevant but locally irrelevant. I aim to contribute towards addressing this aspect of sustainability assessment for nuclear power, by identifying locally determined social issues for the purposes of future indictor development that reflect local circumstance and issues of local importance. As a result, indicators are primarily developed not by 'external' experts but with 'internal' community members and the locally 'affected', ensuring an *element of local legitimacy in* their existence.

Summary

- Sustainable development has become a growing topic of interest globally, and it is observed that national and international legislation is being tailored towards promoting sustainable development. Of the three pillars of sustainable development (environmental, economic and social), the social pillar has been paid the least attention, but this has begun to change in recent years. Some argue that sustainable development is a meaningless term given changing priorities and the variety of possible interpretations, whilst others argue it is a redundant term given current global challenges such as climate change and the pursuits of growth.

- In conceptualising social sustainability, several scholars suggest that key themes should include both 'traditional' objective themes and 'emerging' subjective themes. The themes that should be considered when working towards defining or measuring social sustainability remains contested and is argued to be context and discipline dependent. Sustainability indicators have been utilised in various circumstances internationally to assess and measure progress towards social sustainability, and are found by many to be important decision-making tools.

- Relatively few evaluations of 'nuclear sustainability' are found in the literature which utilise sustainability indicators developed for the purpose. Many of these studies develop indicators and criteria sets from an *expert* perspective. Indicators developed to measure the sustainability of nuclear projects from the perspective of local or 'affected' communities are relatively absent from the literature.

The proceding chapter considers a number of philosophical concepts, theories and contributors, all of which hold value for social research development.

3.0 Philosophical foundations of a social methodology

3.1 Epistemological and Ontological Considerations

Prior to the introduction and examination of the research methodology, it is important to discuss the philosophical foundations in which it is based. To do this, my *epistemological* and *ontological* considerations are detailed. To summarise the relationship, Williams and May (1996) state that "the ontological shapes the epistemological" (p. 69). As researchers, the theory of knowledge and reality that we employ constitutes our theoretical, and indeed methodological, approach. A researcher's theoretical approach is informed and influenced by their philosophical considerations and position, shaping the particular methodology employed and providing a contextual basis for their research logic.

Consideration of how information is acquired and what is classed as valid knowledge (*epistemology*), and how we are able to understand our existence and the nature of reality (*ontology*) (Holloway and Wheeler, 2002), are critical components constituting the core of social research. Whilst involving procedures of data collection and analysis, social enquiry is also based upon ideas about the nature of the world and of knowledge, and dealing with different and sometimes conflicting views about social realities (*ibid*). This thesis is concerned with understanding the social realities of local stakeholder groups in the context of NNB, and how such social realities can inform decision-making so as to make decisions more socially sustainable.

The methodology demonstrates and reflects my research design and strategy, which is employed through the use of various methods, in the form of techniques, tools and procedures. This process is presented below (Figure 2), which reflects the broad structure of this chapter.

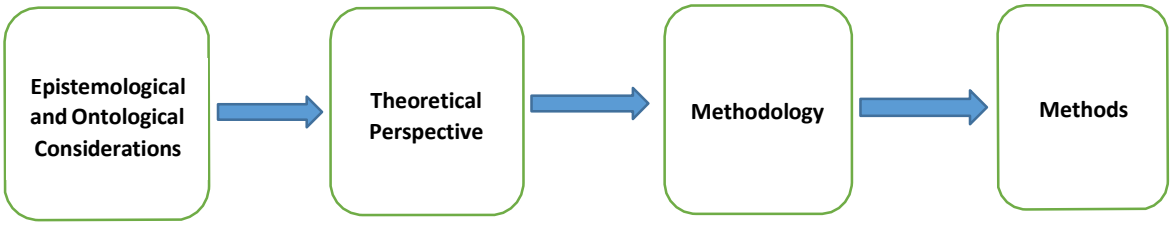

Figure 2. The broad process of social research development

At this point, the concepts of epistemology and ontology will be discussed individually, followed by a discussion of my theoretical perspective borne out of these philosophical considerations.

3.1.1 Epistemological and Ontological Considerations: Ontology

There are several contested theories of what reality is and how it is understood; these are theories of *ontology*. In simple terms, ontology can be described as the study of being (McNiff and Whitehead, 2011), and it is people's ontologies that influence how they view themselves and their relationships with other people (*ibid*). Ontology describes the 'what is' considerations of researchers, and forms the basis of their thinking about how they are positioned in the research itself. As Walliman (2006) notes, for social researchers, the way questions are formulated and research is conducted is based upon their ontological position and views.

The two most dominant positions in ontology are:

- ***Objectivism***; this implies that social phenomena are external 'truths' which are beyond social reach or influence (Bryman, 2015) and whose meanings have an existence independent of social actors (Walliman, 2006). Organisations and cultures are viewed as objects possessing an objective reality according to objectivism (Bryman, 2015).
- ***Constructivism***; this implies that social phenomena and their meanings are not static but are being influenced and are changing as a result of social interaction by social actors (Bryman, 2015). Organisations and cultures are viewed as constantly evolving and changing under social influence (*ibid*).

Each approach to research relating to these positions is different; the approach of objectivism is concerned with the formal properties of organisations and cultural systems, whereas a constructionist approach places greater importance on the way individuals formulate reality structures and consider how this relates to themselves (the researcher) (Walliman, 2006). Constructivism can be considered as a philosophical paradigm which incorporates both a relativist (reality is relative to the individual experiencing it) ontology and a subjectivist epistemology (Guba and Lincoln, 1989), whereas the paradigm of Objectivism entails a realist (there exists a particular reality which individuals are able to experience) ontology and objectivist epistemology.

Constructivism is a popular and growing trend within educational research, with several researchers observing and proposing rather than absorbing ideas provided by teachers, children actively construct their knowledge (Lunenburg, 2012; *also see* Fosnot, 2006; Phillips, 2000) in much the same way that constructivism also proposes that people actively construct their realities. However, constructivism is not a solid concept, but rather a continuum, along which there are various facets, such as *social constructionism* and *critical constructivism*. Whereas constructivism argues that cognitive processes enable individuals to mentally construct the world through experiences, social constructionism considers this process on a social scale as opposed to an individual one (Young and Collin, 2004). Alternatively, critical constructivism involves looking

at constructivism within a social and cultural environment in a critical way so that these environments can be positively reformed and improved. In the context of education and teaching, it refers to a theoretical position on developing an understanding and disposition in students about knowledge that furthers a democratic reality (Larochelle, Bednarz & Garrison, 1998). In an action research context, Steinberg (2014) notes that critical constructivism aims to involve participants in the research process to construct knowledge and understand local realities and truths:

> *"Research, in the critical constructivist process is not to transmit a body of validated truths or outcomes. Instead, a central role of research involves engaging participants in the knowledge/research production process" (p. 204).*

Whilst appreciating aspects of an objectivist philosophy, such as a necessity for scientific enquiry, my philosophical position rejects the notion that such enquiry represents the only route to accessing reality, aligning more closely with that of constructivists. In this research, I consider social realities as plural and individual, essentially unique, in that individuals will experience an individual reality. Scientific enquiry is critical to assist our understanding of reality, but it cannot reveal the 'absolute truth' of the world we are part of and interact with. On this point, della Porta and Keating (2008) note how the world is not simply 'there' to be discovered by empirical research, but that the theory and approach which the researcher adopts influences how knowledge is filtered, a notion which I support. I also agree with Becker (1982) in that "people create culture continuously" (p. 521), and that although it is important to appreciate that culture and societies have a reality that precede the participation of particular social actors, they are not inert objects existing in an objective reality, and are always in a process of formation (Bryman, 2012). This position is also based on the consideration that societies and cultures are far from static, but indeed constantly evolve and interact, more so now than ever before with the use of technology. People impact the world, changes take place, the changing world impacts upon people - our impacts *upon* the world effect our interactions *with* the world (considering here notions of adaptation, sustainability and resilience). I reject the notion that human development through learning and evolution does not influence and impact the reality and world in which we exist and are connected to, as demonstrated by our impact upon it. This in turn impacts us; the industrial and technological revolutions of the past 150 years and their impacts upon the earth's environment demonstrate such an interconnected relationship.

In consideration of the various facets of constructivism, and the importance I place on understanding social context, engaging in dialogue and reflection, and in ultimately enhancing processes of local engagement and decision-making, I work from a position of *critical constructivism* in their enquiry. In reference to the energy and social science literature, researchers have called for further recognition of approaches which go beyond "opinion poll findings" (Aitken, 2010) which commonly provide the starting point for research into public responses to large-scale

energy infrastructure (Batel and Devine-Wright, 2015). This includes "more critical constructivist and qualitative ones", to enable better understanding of these societal responses (Batel et al., 2013; Ellis et al., 2007). My research approach supports such calls.

Such a philosophical approach aims to identify ways to improve processes for which social interactions constitute a key element, and for which further democratisation could result in their enhanced sustainability. The impact that my ontological considerations have had on the research strategy and methodology utilised in the research is detailed in Chapter 4. These considerations are informed by concepts such as engagement and dialogue, with the strategy aiming to understand individual and group reflections of social realities and the important social constituents of these realities.

3.1.1.1 Ontology: Researcher Positionality

In such discussions on ontology, it is also important to engage in considerations of the self, and how their position may impact or influence upon the research process. As expressed in Action Research literature, ontology influences how the researcher positions themselves in the research, how we interact, and how we view others (McNiff, 2013).

This raises the concept of 'researcher positionality', a common area of consideration for action researchers, geographers and other social researchers. Professor of Social Geography Peter Hopkins (2007) notes how positionality can encompass the personal experiences of researchers, including their philosophical positions, as well as various aspects of identity such as race and class; indeed, Hopkins observes that critical reflection on a researcher's positionality has now become accepted practice amongst critical geographers (*ibid*). Researcher positionality raises questions as to the position of the researcher in relation to their setting and participants, one of many instances throughout the Action Research process where boundaries or borders are engaged with, and often crossed. This is linked to the fact that action researchers are often 'outsiders' or 'insiders' to a particular setting (Herr and Anderson, 2014). This refers to the position of the action researcher in relation to the researched body or organization, and in the context of the current research, the insider or outsider status of the researcher refers to their relationship to a particular community, i.e. Anglesey. This can raise issues requiring additional consideration when the researcher has or seeks to develop collaborative relationships with participants, placing the researcher's relationship to the study in a unique position. This being said, even the insider/outsider positionality is fluid, dynamic and can be multi-layered, able to change throughout the period of study (Thompson and Gunter, 2011). Why is positionality important to social research such as the current study? Its importance and potential influence centres around the notion that a researcher's framing of epistemological, methodological and ethical issues in research can be greatly influenced by the degree to which they consider their positionality, as an insider or an outsider (Herr and Anderson, 2014). Hopkins (2007) observes that a researcher's positionality is

a factor which has a significant impact upon the way in which research participants read and interpret researchers; who a researcher is can impact upon how others perceive and engage with them. In the current instance, my positionality is not a simple one; factors such as my place of residence and work (Lancashire, England) and research intentions contribute towards an 'outsider' position, whereas my ability to speak Welsh, which many people in Anglesey speak other than the English language, and my personal and historical links to Anglesey contribute towards an 'insider' positioning.

Reflective Commentary

At this point, it is helpful to provide further context to this notion of the researcher as a partial insider. I am bi-lingual (Welsh and English) and conducting research in Anglesey in North Wales, a place of significant familiarity due to the existence of extensive family on the island, a place regularly visited since birth. Historically, my family have lived on the Isle of Anglesey for many generations. Therefore, prior to undertaking the current research there existed a temporally significant, personal connection to Anglesey, to its inhabitants and to the culture which exists within its geographical borders. Due to such ontological reflections and realities, Anglesey was selected as the focal case study for this nuclear-related research at an early stage, due to the existence of the Wylfa Nuclear Power Station to the north of the island, and the proposed siting of new Wylfa Newydd Nuclear Power Station on an adjacent site for which decision-making processes are ongoing. A key influencing factor is that I am at a linguistic and communicative advantage when communicating with residents of Anglesey - an area of North Wales which still sees a considerable number of the population speak Welsh - over other researchers who are unable to converse in Welsh; however, the majority of residents could converse in English should they wish to. In my experience, there are still large proportions of the Anglesey populace who speak Welsh as their first language, and do not communicate in English unless it is necessary to do so. Therefore, the ability to speak in both Welsh and English is critical in possessing the capacity to communicate with a diverse range of Anglesey residents. My ability to speak Welsh was also utilised during my involvement in the Generic Design Assessment (GDA) Public Dialogue Pilot process, regarding the assessment of the Hitachi- GE proposed Advanced Boiling Water Reactor (ABWR), between November 2014 and August 2015; this is discussed further in Section 4.10.

On the concept of researcher positionality, and in reference to the Outsider-Insider scale proposed by Herr and Anderson (2014), I propose that my positionality is located at a mid to far right position on the Insider/Outsider scale. Alternatively, this would position between 5 and 6 on the continuum of positionality (ranging from 1 to 6), as described respectively as positionalities representing 'Outsider in collaboration with insiders' (5) and 'Outsider studies insiders' (6) by Herr and Anderson (2014: 40). I am familiar with Anglesey as a place and is extremely familiar with many residents of Anglesey through a personal social network. However, I have not been a resident of Anglesey and so remains very much a 'residential outsider'. In order to further define my positionality, as a Welsh-speaker with long-term social connections to the area under study, I frame my position as one of a *socially and culturally familiar/insider* and *residentially outsider*.

As it is important to discuss contestations of *what* reality is, so too is it key to understand *how* reality and knowledge comes to be known and understood; it is here that we discuss the concept of epistemology.

3.1.2 Epistemological and Ontological Considerations: Epistemology

The importance of epistemology - what constitutes valid knowledge and how we obtain such knowledge (i.e. how we as researchers should conduct research) - for academic research is significant and clear. As Bryman (2015) notes, "the assumptions and views about how research should be conducted influence the research process" (p. 4). There are numerous definitions of epistemology depending on variations in discipline and research aim, but there are similarities between them. Klein (2005) describes epistemology as being generally concerned with the nature, sources and limits of knowledge, and primarily concerned with propositional knowledge; knowing 'what is'. From an action-research perspective, McNiff (2013: 27) defines epistemology as 'a theory of knowledge (what is known), including a theory of knowledge acquisition and creation (how it comes to be known), considering notions of logic and how it is conducted in various ways'. Expanding upon the notion of 'the known', Bourner and Simpson (2005) suggest that there are four ways *of* 'knowing':

1. Through reason (deduction or logic)
2. Through received knowledge (written or spoken word)
3. Through empiricism (sense-based data)
4. Through introspection (from an inner source)

The current researcher, finding value in an approach which is *action-oriented* (see Chapter 4) – based upon interests to improve process and socially-based practices – acknowledges the importance of introspection or reflection in order to know how to realise improvements in practice, whether this be in the form of self-reflection to improve and develop, or reflection upon the process in order to highlight challenges and areas of potential improvement (*see* Cassell and

Johnson, 2006; Greenwood and Levin, 1998; McNiff, 2013). In this sense, I concur with Bourner and Simpson (2005) regarding the importance of knowing through introspection, or reflection, particularly if lessons are to be learnt *from* continued experience and *for* future experiences.

To provide a basis from which to discuss my epistemological considerations, the broad philosophical theories regarding how we learn and interpret the world are now briefly discussed.

3.1.2.1 Positivism

Of the numerous contested epistemological theories, they include the two major theories of Positivism and Interpretivism. *Positivism* broadly defines the theory that there is 'truth' to be discovered and revealed by scientific enquiry as 'findings', where the methods of the natural sciences are advocated to study social phenomena (Bryman, 2012). Within the position of positivism are other principles such as *phenomenalism* (that only sense-confirmed phenomena can be truly acknowledged as knowledge, excluding researcher preconceptions), *deductivism* (that theory exists to generate testable hypotheses enabling assessment of the explanations of laws), and *inductivism* (that the gathering of facts provides the basis for laws, and therefore knowledge). In short, it dictates an objective approach to test theories and establish scientific laws through cause and effect relationships (Walliman, 2006).

3.1.2.2 Interpretivism

Converse to positivism, *interpretivism* asserts that social science phenomena, such as social actors and institutions, differ distinctly from those of the natural sciences, and therefore requires a separate logic to study and research the social sciences, thus acknowledging the individuality of people against nature. Unlike positivism which seeks to explain human behaviour, interpretivism is concerned with understanding it, understanding human actions instead of those forces which impact and influence them. Such approaches to understanding motivations behind human behaviour (della Porta and Keating, 2008) were advocated by scholars such as Max Weber (1947), through approaches of *Verstehen* (German for 'understanding'); for example, Weber describes sociology as a "science which attempts the interpretive understanding of social action in order to arrive at a causal explanation of its course and effects" (*ibid*: 88), where social actions are explained through their interpretive understanding. Indeed, interpretivist approaches assert that it is impossible to understand social phenomena without examining the perceptions that people have of subjective realities (della Porta and Keating, 2008). In broad terms, it advocates the critical role of subjective

meanings in understanding social realities, by revealing interpretations and meanings (Walliman, 2006).

3.1.2.3 Alternative theories

Other popular epistemological positions include *humanistic approaches*, which emphasise more greatly the subjective, proposing in its most radical interpretations that reality does not exist beyond the conceptualisations of individuals, and *post-positivism*, which suggests that reality is objective but also that it cannot be fully known or understood, following modern scientific developments more so than traditional sciences and accept greater uncertainty than natural sciences and positivists have done so historically (Delanty, 1999). From this latter position emerges an approach of growing popularity; that of *critical realism*. This epistemology proposes that an external world exists but that our understanding of it is affected by social influence and condition, undermining its legitimacy and causing it to be susceptible to reinterpretation (della Porta and Keating, 2008). It is considered as a reconciliatory approach which recognizes the existence of a natural social order, but that such an order cannot be examined and understood through observation of traditional patterns, and may only be discovered through interpretation and in conducting theoretical and practical social science research (Walliman, 2006).

This research aims to understand the social priorities of local stakeholders, reflecting the social realities of individual and groups, in the context of *potential* local development impacts. Therefore, in the context of these developments, impacts are possible and perceived, interpreted from the historical experiences and constructed social perceptions of actors in a specific locality. Mouratiadou and Moran (2007) demonstrate value in the adoption of an interpretivist approach, utilising public perceptions in Greece to generate knowledge and inform water management policy as part of the Water Framework Directive. An analysis of several stakeholder groups' perceptions on the current state of water resources within the locality facilitated the development of a 'Social Desirable State Map'. This created an image of the current state of water resources and agriculture, and of the key impact factors. Although such maps represent a simplification of reality, they combine different subjective interpretations of reality to reveal one which is representative and depictive of a fluid reality heavily impacted by human actions.

Positivism and validity of scientific measurement is further undermined with examples of 'scientific' knowledge that have been shown to be incorrect or flawed. Such an example is provided by Wynne (1996) regarding the 'radioactive sheep' crisis which emerged in parts of Britain at the time of the Chernobyl nuclear plant disaster. For a long time, scientific expert assessment dictated low levels of risk that sheep flocks in Cumbria had been contaminated by radiation. However, their assessments proved to be incorrect and required drastic revision, with the result that the slaughter and sale of sheep was banned in the area for two years. Local farmers had been concerned from the outset, because they had direct knowledge based on personal experience of the terrain, of water run-off and of how the ground could have absorbed the radioactivity and

transferred it to plant roots, not possessed by Government scientists. This clash between the scientific positivist estimates of the experts and relativist risk perceptions of the farmers highlights a vulnerability of 'objective' scientific knowledge, which may be generated to serve the purposes and intentions of external parties, as was deemed the case by many in the farming community, regarding the intentions of UK Government to down-play the incident.

Examples such as these contribute to my epistemological philosophy placing within an interpretivist framework, which proposes that knowledge generated through the interpretations of those who experience those realities under examination is both valid and 'true'. Just as interpretivist judgements are claimed to lack scientific robustness and accuracy, I argue that the positivist position which claims the solidity of scientific claims ignore the potential for the acquisition of 'objective' knowledge to be influenced by external interests. In particular, I find epistemological value in the work of scholars such as Habermas, Weber and Dewey, who, respectively, reject positivist assumptions of research-researcher separation and objectivity (Habermas, 1971), promote the importance of interpretive understanding of social phenomena (Weber, 1947), and argue that inductive reasoning and reflection "needs to happen in community, in interaction with others" (Rodgers, 2002: 845), that enquiry borne from experience and confirmed by testing, is required in order to understand social phenomena (Dewey, 1933). Therefore, I employ an interpretivist view of social phenomena, rejecting the objective 'truth' theory of positivism and acknowledging the distinctiveness of social phenomena from the natural sciences, and the differing approaches necessary to understand and explain social actions and behaviours.

At this point, I discuss my key philosophical considerations with respect to a number of key contributors in the literature from both the sociological and political literature. The next section will detail the philosophical considerations that underpin and assist in structuring the research methodology utilised in this study and also inform discussions regarding my analysis and interpretation of the data (*see* Chapter 6).

3.2 Philosophical and Theoretical Considerations

This thesis considers a number of philosophical positions and theoretical contributions from sociological and political literature. The key contributors discussed within the context of this study are John Rawls, Jürgen Habermas and Iris Marion Young, who provide key contributions on the following themes and concepts:

- Justice and fairness; focus on social justice
- Social groups, social difference, and marginalisation
- Communication, deliberation and dialogue

We will firstly consider the work of John Rawls, an American moral and political philosopher in the liberal tradition, whose extensive and acclaimed work on developing the concept of justice provides important foundations to the context of the current study. That context encompasses large-scale technological developments within peripheral, rural environments, promoted as critical to ensuring future *national* energy security and combat *global* climate change problems through low-carbon energy sources, and the impacts of such developments on *local* rural communities. From the extensive work of Rawls, I focus on Rawls' notion of 'justice as fairness' (*see* Rawls, 1971, 1999) in which to base my arguments, but extend this beyond the distributive terms of the original notion.

Prior to our brief consideration of Rawls, the following statement by Sandel (2009) frames well, albeit in a distributional sense, my consideration of notions of justice in the local social context and their foundation of equity and ethics:

> *"To ask whether a society is just is to ask how it distributes the things we prize – income and wealth, duties and rights, powers and opportunities, offices and honours. A just society distributes these goods in the right way; it gives each person his or her due" (p. 19)*

3.2.1 John Rawls: Justice and fairness

'Justice is the first virtue of social institutions, as truth is of systems of thought' (Rawls, 1971: 3).

John Rawls' 1971 publication *A Theory of Justice* provides the central reference to our discussion of the concept of justice; in particular, Rawl's proposed theory of *'justice as fairness',* where he envisions a society in which citizens are free, possessing equal rights, and cooperating within an egalitarian system (Rawls, 1971). Rawls argues that establishing terms of fair cooperation, by which free and moral agents may be governed, forms the aim of this theory of justice. A revised version of Rawls' text has since been published (Rawls, 1999), but due to significant re-visitations in the more recent edition to concepts discussed in the original, I deem Rawls' first publication as a preferable reference. Essentially, the 1971 publication describes, among other concepts, a theory of justice for a liberal society; a fair society. His 'justice as fairness' theory considers the means by which a society is just, thus impacting upon the opportunities provided to people, wealth distribution, and the provision of basic rights. Rawls (1971) argues that the 'basic structure' of a society – describing the main political, economic, legal, and social institutions within modern societies - has profound effects on citizens' lives, and that they influence prospects, goals, attitudes, relationships, and even their characters; it is proposed that institutions possessing such pervasive influence on the lives of citizens require justification. Rawls' work is influential to the

current research, given his philosophy on notions of just societies and of justification. Whilst the current study is not concerned with notions of justification explicitly, its concern with the concept of sustainability, and specifically social sustainability of large-scale developments, leads me to deem work concerned with sources of pervasive influence on the lives of citizens as highly relevant. Indeed, new nuclear power developments in rural communities are primarily a result of energy policy decisions taken by national governments, promoting the necessity of certain technologies and their proposed geographical placement, particularly in the case of nuclear power.

I consider Rawls' (1971) conceptualisations of justice not in the context of 'just societies' as he describes, but more in regards to 'just decisions and developments' *within* societies. This reflects an *indirect* consideration of the concept of 'just societies', given that these developments, stemming from decisions which are determined as just or unjust, will exist within a given society and so will contribute to whether the society is considered 'just' overall. I argue that in order for nuclear power developments to be truly sustainable, particularly in a social capacity, they must be socially just. If the decisions underlying these developments are unjust, outcomes such as loss of trust and potential hostility will likely persist. Rawls (1971) asserts that if found to be unjust, laws and institutions should be reformed or abolished, "no matter how efficient and well-arranged" (p. 3). I argue that this should similarly apply to decisions, and their tangible outcomes, as for laws and institutions, their impact is potentially significant.

To be considered socially just, I argue that they must be perceived as such not only in the eyes of 'experts', but in the eyes of those people who are likely to be impacted, both directly and in the long-term; in short, society must consider them as just. Society in the context of this research is deemed to be that of 'local' society; of local communities on Anglesey. This argument is founded on the view that experts alone should not determine what is 'just'; as Cotton (2014) suggests, experts do not have a "special insight into right and wrong, justice and injustice" (p. 39). Similarly, Rawls (1995) argues that in moral matters, citizens and experts have equal moral authority, and that ethical experts do not have unique access to moral truths which is not granted to non-experts. As Cotton (2014) argues, the opinions of trained experts are not "qualitatively 'better' than that of non-experts" (p. 39), and an expert-centred approach to technological assessments and decision-making would be demonstrative of 'ethical technocracy', resulting in criticisms previously made of techno-science centred policy making. To address this, ethical and just decisions must result from ethical assessment which places those citizens "who are ultimately affected by SECTs" (*ibid*: p. 39) at its centre.

Such moral equality as proposed by Rawls (1995) leads me to consider Rawls's notion of *reflective equilibrium* as relevant to my constructivist position. The concept, originally proposed by Goodman (1955) and then popularised and applied more broadly to moral philosophy by Rawls (1971, 1999), describes the pursuit of "coherence among judgements, principles and theoretical considerations" (Cotton, 2014: 52). It describes a deliberative process by which an

individual reflects upon, revises and refines their beliefs on a particular moral subject, in contemplation of normative principles, moral rules, and theoretical considerations (Cotton, 2014). This leads to an effect of 'balancing up', where revision leads to coherence between them deemed to be acceptable (Cohen, 2004), revisions which may be continually made as the process progresses, modified as new realisations in thinking arise (Schroeter, 2004). As Scanlon (2002) notes, the process of deliberation may assist people to reach a conclusion on what to do, progressing from a state of uncertainty. I find particularly important the *balancing and integrative* notions of reflective equilibrium, which balances bottom-up judgements (e.g. of citizens or stakeholders) with theory-driven, top-down principles, reflecting a process which acknowledges the moral truths of real life (Cotton, 2014). However, critics have argued that intuitions of morality submitted to the reflective process by citizens lack initial credibility (*see* Hare, 1973; Brandt, 1979), and that intuitions such as these are fallible and, due to their subjective nature, unreliable (Cotton, 2014). Rather, Brandt (1990) argues for processes of moral judgement formation which are based on objective logic as opposed to subjective intuitions and values. I reject this argument, and suggest that this is the basis of a technocratic approach which ultimately undemocratic and excludes members of society without the necessary scientific 'facts' or 'knowledge', which itself may be found to be inaccurate or flawed. I argue that these subjective values and intuitions are valid and necessary in scenarios where ethical questions and moral considerations exist, and within democratic settings, but does agree with Brandt (*ibid*) in his assertion that we need "input from experience" (p. 260). I also argue that both professional *and* lived experience are necessary in scenarios where the decision subject possesses moral or ethical dimensions, such as NSIPs or SECTs. This position also takes from post-normal science theorists (e.g. Funtowicz and Ravetz, 1993a; Ravetz, 2004, 2006) in that reliance on the experiences and knowledge of scientific experts alone is insufficient when decisions are urgent but questions exist on facts and values, and from scholars such as Fiorino (1990) who suggests that there are substantive, normative and instrumental reasons for the inclusion of 'lay' persons or citizens in decision-making processes involving various risk-based factors.

I argue that the utilisation of both expert and citizen knowledge, experiences and judgements through deliberative processes is crucial for decision-making if it is to be sustainable and just. Therefore, the concept of reflective equilibrium, whilst not explicitly conducted as part of this research, contributes informatively and provides me with a broad procedural and conceptual goal. Whereas this research specifically seeks the views and judgements of citizens, I argue that the opportunity for deliberation of these judgements in conjunction with 'expert' judgements, with opportunities for learning and revision of judgements to take place which may result in moral discovery (Daniels, 1996), would contribute towards more informed and sustainable decision-making in the context of new nuclear power developments, and of large-scale energy developments more generally.

New nuclear power proposals are primarily developed, as has been mentioned previously, as a result of *macro-scale issues and priorities*, such as national energy security and global climate

change. However, the developments themselves are commonly sited in areas of low density population and are often rural in nature and character; this is distinctly different in character from large-scale industrial infrastructure such as nuclear power stations. However, at an early point in his publication, Rawls (1971) argues that situations which result in sacrifice by the few for the advantage of the many is in opposition to a concept of justice:

'…justice denies that the loss of freedom for some is made right by a greater good shared by others. It does not allow that the sacrifices imposed on a few are outweighed by the larger sum of the advantages enjoyed by many' (p. 3-4).

I propose that the development of nuclear power stations is potentially reflective of such a scenario, where local communities may experience the direct impacts of such developments whilst the predominant benefits are felt across a wider scale. Therefore, it is important to consider the impacts of such developments on those who live their lives within close proximity to these developments and attempt to determine the degree to which they may demonstrate that they are 'socially just', where decisions supporting their development are deemed fair. But to who do these determinations apply? Who dictates whether such developments are considered 'just' and supporting decision-making is 'fair'? These are complex questions, requiring extensive consideration of all associated stakeholders if they to be answered *in plenum*.

In order to achieve some degree of appropriate analysis, the current study considers such notions of social justice and fairness in regards to local residents and communities, and specifically different social groups. In studies of a similar nature, it is common to consider notions such as justice and fairness in a distributive context when discussing the impacts of large- scale developments. The current study seeks to understand the elements of both *procedural* and *distributive justice* relating to new nuclear developments and participating groups, echoing Rawls' (1971) assertion that we cannot consider the distributive role of justice alone, "however useful this role may be" (p. 6). I consider procedural notions of justice within the proposal of a social strategy for stakeholder engagement, as discussed in Chapter 6.

In addition to the concept of procedural justice, energy justice and 'just' energy technologies are important concepts and areas of interest for this research. The study looks to contribute towards notions of energy justice as social justice and just energy for just, sustainable societies. This is a response in part to the assertion of Butler and Simmons (2013) who state that:

"The ways in which concerns about energy policy problems, and of particular energy technologies such as nuclear power, can be seen therefore as highly significant for thinking about the development of 'just' energy systems" (p. 140)

At this point, the work of Iris Marion Young is introduced and discussed, which is of particular relevance due to her work on social justice, and also on the importance of social groups.

3.2.2 Iris Marion Young: Social groups and marginalisation

The work of Young (1990) is also valuable when considering notions of social justice. Young's work is also relevant to the current study, particularly her writing on social groups in the context of justice, and also of their importance as social institutions. Highlighting their social importance, Young (1990) notes the significance of groups, particularly in relation to people's social identity:

> *"A person's particular sense of history, affinity, and seperatedness, even the person's mode of reasoning, evaluating, and expressing feeling, are constituted partly by her or his group affinities" (p. 45).*

On this point, I agree with the assertion made by Young that whilst individuals may establish and constitute associations, 'groups…constitute individuals' (1990: 45). In regards to social justice, Young proposes that differences which exist between groups is something to be both welcomed and protected. Young suggests that for social justice to be realised, group differences should not be 'melted away' or resisted, but rather they should be recognized and respected, that what should exist is 'institutions that promote reproduction of and respect for group differences without oppression' (1990: 47). Such assertions support the development of the current research approach, which argues for engaging with diverse societal collectives through a 'social group strategy'. To say that differences between groups exist is obvious and factual; indeed, Young (1990) states that to deny the reality of groups is foolish. Social groups are a social reality, however I agree with Young (1990) that they do not preclude a person's individuality or identity, or the ability for a person to possess characteristics and opinions outside the group norm should such a thing exist. In her later work, Young (2000) reaffirms this point, stating that the relation of an individual to a group is not one of identity, which is influenced by various social structures and experiences over a lifetime. Indeed, Young (*ibid*) agrees with people's resistance to suggestions of personal identity being the result of social group membership. I find the definition of identity provided by Epstein (1987) to be helpful, in that it highlights the importance of social categories:

> *'…a socialized sense of individuality, an internal organization of self-perception concerning one's relationship to social categories, that also incorporates views of the self-perceived to be held by others. Identity is constituted relationally, through involvement with – and incorporation of – significant others and integration into communities' (p. 29).*

I argue that to understand any notion of social justice in the context of community-level technological impacts, existing social collectives should be identified, engaged and understood

as to their differences, experiences, preferences and priorities. Should differences between or within groups be identified, this presents an opportunity to develop knowledge which is of potential *strategic value*, both for social impact management and public engagement efforts associated with large-scale energy, or industrial, developments.

A further argument put forward by Young is that of participatory democracy being both an element and requirement of social justice (Young 2000). Young asserts that for social justice to be realised in democratic societies, the voices of these oppressed or disadvantaged groups must be heard, and that "mechanisms for the effective recognition and representation of the distinct and perspectives" of these groups must be provided by such a 'democratic public' (Young, 2000: 184). I argue that not only should the voices and priorities of these disadvantaged groups be heard and understood, but that the *differences* between them must also be understood by engaging in dialogue which explores group experiences. Young similarly argues that group difference can often be best articulated by groups themselves, and that democratic decision-making should facilitate such expression:

"While different groups may share many needs, moreover, their difference usually entails some special needs which the individual groups themselves can best express. If we consider just democratic decisionmaking as a politics of need interpretation….then democratic institutions should facilitate the public expression of the needs of those who tend to be socially marginalized or silenced by cultural imperialism" (p. 185).

Of particular interest to this study due to the geographical and cultural context of the study area, is a concept linked to, and incorporative of, justice; that of *marginalization.* Deemed as "perhaps the most dangerous form of oppression" (Young, 1990: 53), Young points out that marginalization is not solely an issue faced by radically marked groups, and that there are numerous groups which could be considered 'marginal', such as the elderly, ethnic minorities and young people.

Such social distancing can result from the pre-determined positioning of social agents, which can have the impact of benefitting or restricting people depending on the social environment into which they are positioned. In her later work, Young (2000) describes the pre-determined nature of social 'positioning' and experience of similarly positioned individuals in society:

"Agents who are similarly positioned experience similar constraints or enablements, particular modes of expression and affinity, in social relations. Persons are thrown into a world with a given history of sedimented meanings and material landscape, and interaction with others in the social field locates us in terms of the given meanings, expected activities, institutional rules, and their consequences. We find ourselves positioned in relations of class, gender, race, nationality, religion, and so on, which are sources of both possibilities of action and constraint" (p. 100).

Marginalisation describes the material deprivation and even extermination that some groups are

subjected to when they are "expelled from useful participation in social life" (Young, 1990: 53). For example, Anglesey may be considered to share characteristics with sites known as 'nuclear oases', the term developed by Blowers *et al*. (1991; *also see* Blowers, 2003) to describe locations and communities where nuclear wastes are managed, commonly peripheral in their geography and characterized by powerlessness, marginality and remoteness; Blowers also labels them as 'landscapes of risk' (Blowers, 1999). In this context, Anglesey is located off the northern coast of north-west Wales, and is the location of proposed new nuclear power infrastructure in the Wylfa Newydd Nuclear Power Station, which is proposed for development on an adjacent site to the recently shutdown Wylfa Nuclear Power Station. The extent of marginalization, beyond the material and distributive dimension, and highlighting its significance for social studies such as this, is detailed by Young:

> *"Thus, while marginalization definitely entails serious issues of distributive justice, it also involves the deprivation of cultural, practical, and institutionalized conditions for exercising capacities in a context of recognition and interaction" (1990: 55)*

Returning briefly to the work of Rawls (1971) on the concept of 'justice as fairness', whilst remaining with notions of marginalization, themes such as respect and rights are central to social justice within such marginal societies, particularly in the context of decision-making. When considering technologies such as nuclear power, which has historical links with nuclear weapons development, nuclear accidents, and nuclear testing, and has been associated with 'cover-ups' and misinformation[1234], issues of trust are prevalent. Rawls *(ibid)* asserts that a lack of trust can have serious repercussions in achieving any sense of social justice, partly due to the barriers which a lack of trust creates. He states that "distrust and resentment corrode the ties of civility, and suspicion and hostility tempt men to act in ways they would otherwise avoid" (1971: 6). Trust is another key theme considered in this research, due to its importance for conflict mitigation and the support of the public in decision-making and associated processes, and its underpinning of social justice.

On the subject of justice, Young (1990) argues that the representation of specific, oppressed or disadvantaged groups in "the decisionmaking procedures of a democratic public" results in realising more effective justice than is possible in "a homogenous public" (p. 184), based on a number of reasons (*in* Young, 1990: 184-186), many of which relate to the procedural justice issues considered in this thesis:

1. Better assures procedural fairness in setting the public agenda and hearing opinions about its items
2. Due to assuring a voice for the oppressed as well as the privileged, group representation better assures that all needs and interests in the public will be recognised in democratic deliberations

3. Group representation encourages expression of individual and group needs and interests in terms that appeal to justice, bringing about a shift from demands of desire to demands of entitlement.
4. Group representation promotes just outcomes due to the maximisation of social knowledge expressed in discussion, which therefore enhances practical wisdom.

Thus, the work of Young (1990, 2000) provides a philosophical base to my social group approach to research, particularly within a marginalised area of the UK such as Anglesey. At this point, the third philosophical contributor to my approach will be discussed, particularly on the subjects of communication and engagement.

3.2.3 Jürgen Habermas: communication and deliberation

The third philosophical contributor to be discussed in this section is that of Jürgen Habermas; specifically his work on notions of communication, democracy and deliberation (Habermas, 1984, 1989, 1991). His 'theory of communicative action' proposes that society members seek to reach common understanding and coordinate their actions by reasoned argument, cooperation and consensus, as opposed to strategic action strictly in pursuit of their own goals (Habermas, 1984). Communicative action describes action which is designed to promote cooperation and common understanding in a group, as opposed to achieving goals on an individual basis (*ibid*). The emphasis on communication and communicative action also reflects the importance that Habermas places on language as part of communication. Indeed, Habermas emphasised the role of language in conflict borne of communication, stating:

"I am of the opinion that social pathologies can be understood as forms of manifestation of systematically distorted communication …." (1991: 226).

Despite representing only one component of communication, language, and its cultural significance, is a key consideration for the current study, given the prominence of the Welsh language as both a social and methodological factor; the importance of Welsh language is discussed in the literature by Day (2002) and Nguyen *et al.* (2013). As will be detailed in proceeding chapters, my bi-lingual abilities were critical during this research, both for direct communication

[1] Ahmed, N. 2013. 'How the World Health Organization Covered Up Iraq's Nuclear Nightmare'. *The Guardian, 13th October* [online]
[2] Aldhous, P. & Iovino, Z. 2011. 'Japan's record of nuclear cover-ups and accidents'. *New Scientist, 18th March* [online]
[3] Simm, B. 2014. 'Leukaemia sleuths accuse state of nuclear cover-up'. Nature; 432 (194 - 11th November) [online]
[4] Weiss, L. 2011. Israel's 1979 Nuclear Test and the US Cover-up. *Middle East Policy Journal*; 18 (4): 83 – 95.

and interpretation, which also demonstrates the significance of researcher positionality (*see* Section 4.4.3).

Towards effective planning and decision-making, Habermas promotes broad public participation, information sharing, consensus through public dialogue, the mitigation of expert and bureaucratic privileging, and the promotion of reflective planning (Bolton, 2005). Concurrently, democratic legitimacy depends on "the discursive quality of the full processes of deliberation leading up to such a result" (White, 1995: 12) in conjunction with the enactment of laws. Both democratic legitimacy and procedural justice and legitimacy are concepts which are revisited in Chapter 6 when discussing the findings of the study, and during the eventual conceptualisation of strategies for effective engagement.

Habermas has been highly influential in the theory and practice of *deliberative democracy* (Cotton, 2014; *also see* Dryzek, 2000; Habermas, 1993, 2002), proposing that democracy is truly realised and the validity of norms are justified through "inter-subjective argumentation between individuals as part of an interactive public deliberation or dialectic" (Cotton, 2014: 44), rather than the validity of moral norms being justified by the reflections of isolated individuals. In short, deliberation is proposed by Habermas as crucial for democracy.

As part of his theory of communicative action, the concept of *communicative rationality* is also proposed by Habermas (1984); it describes the process of argumentative speech to enable moral action, decided upon by individuals as a result of deliberation and consensus-building. This is distinguished from *strategic rationality* by Habermas (*ibid*). Johnson (1991) has noted that whereas *communicative* rationality represents action orientated toward *mutual understanding*, *strategic* rationality represents action orientated toward *success*. Schaefer *et al*. (2013) observe that "social action can be either success oriented strategic action or understanding-oriented communicative action" (p. 1), and that Habermas (1984) poses that whereas communicative action is inherent, "strategic rationality is parasitic" (Schaefer et al., 2013: 4), where people are in pursuit of their own goals. As Cotton (2014) details, whereas communicative rationality reflects acceptance of 'the better argument' through a collaborative discourse, strategic rationality reflects the ability to 'manipulate discourse' through the deployment of strategic action to "influence the actions and understanding of other communicative actors" (p. 45). The distinction which Habermas makes between communicative and strategic rationality has been challenged; Foucault (2002) has argued that discourse will always contain strategic elements and cannot be defined as solely communicative, and that attempts to remove strategic elements cannot succeed. These theoretical argumentation towards deliberative dialogue, whereby questions and debate are encouraged in the name of democratic process, reaffirms the relevance of the Habermasian philosophy to the current research. Of this philosophical body, the concept of communicative rationality, focussing on *discourse* and *understanding*, aligns with my epistemological position, and to which this research looks to contribute towards theoretically. Whilst the current research is interested in strategic action towards stakeholder engagement and decision-making, this differs

greatly from the coercive nature of strategic rationality as detailed above. It is my assertion that, coercive and highly strategic behaviours in processes involving public stakeholders ultimately hinder the realisation of socially sustainable outcomes.

Habermas (1984) distinguishes between four types of action in society by individuals:

- teleological;
- normatively regulated;
- dramaturgical, and;
- communicative.

Given the present study's attention on social groups, the model put forward by Habermas (*ibid*) on normatively regulated action, which explains how actors in a social group pursue common values and norms and refers to activities which are facilitated by a shared sense of 'socially determined rightness' (Holmqvist et al., 1996), holds relevance. Due to my epistemological position, Habermas's model on communicative action, describing how issues are deliberated and information is shared by actors, forming a relationship, and whereby they "seek to reach an understanding about the action situation and their plans of action in order to coordinate their actions by way of agreement" (Habermas, 1984: 86) is also highly relevant. Habermas's promotion of public participation, dialogue and information-sharing reflect key aspects of the methodology of the current study. Habermas's theory of communicative action promotes information sharing (experiences), reflection and deliberation between actors, and requires that participation be *fair and competent* in order for it to be regarded as positive. As a result, I find this aspect of Habermas's philosophy to be methodologically informative, and as such, these principles are reflected in the current research methodology.

Habermas's work on Communicative Reason (1987) also reflects my own position on dialogue, in that actors should respect and consider the views of others participating in communicative engagement so that, Habermas proposes, democratic consensus may be reached. This applies not only to the conduct of participants and myself in this study, but also to the wider communications during nuclear-related engagement decision-making processes. For Habermas, rational argumentation is a central component of communication, and asserts that all *moral* actors possess *communicative rationality*, which allows "moral action to be decided upon" (Cotton, 2014: 44). Such morally-based communication, according to Habermas, occurs in the public sphere, "a discursive arena that is home to citizen debate, deliberation, agreement and action" (Villa, 1992), within which Habermas (1987) seeks to promote a language-based *ideal speech situation* (*also see* Habermas, 1989), where five conditions are required:

1) Every subject with the competence to speak and act is allowed to take part in a discourse,
2a) Everyone is allowed to question any assertion whatever,

2b) Everyone is allowed to introduce any assertion into the discourse,

2c) Everyone is allowed to express his/her attitudes, desires and needs,

3) No speaker may be prevented by internal or external coercion from exercising his/her rights as laid down in 1 and 2.

Expanding upon these, Habermas (1987) details each in turn, explaining that:

- the first condition dictates the right to universal access, and defines the set of potential participants as all those who have the capacity to take part in argumentation;
- the second set of conditions ensure that all participants have equal opportunity to contribute to argumentation;
- the third condition ensures that repression in any form be mitigated so as to avoid impacting upon the conditions for rights to universal access and equal participation for all.

Whilst I do not seek to specifically develop a situation of "ideal speech" with participants, working towards this situation and considering these conditions is seen as important in mind of social notions of procedural justice and fairness (*see* Siegrist, Connor and Keller, 2012; Visschers and Siegrist, 2012; Walker et al., 2014), and such considerations are also reflected in the methodology of the current research. As other scholars have incorporated the theory of Habermas (1989) on the pursuit of the ideal speech situation into their research design and methodology (e.g. Byrne and Gregory, 2007), my research is informed by the principles of the ideal speech concept, such that communicative environments are created which enable people to participate, deliberate, discuss and debate constructively and in a manner which respects the contributions of each participant and allows each participant to contribute should they wish to, and that the importance of *participation* and *context* (Byrne and Gregory, 2007) are acknowledged and inform process design.

I now turn to other theoretical literature in order to provide greater context to my position and research approach. The following section discusses the theory of 'post- normal science' in regards to realising the limitations of traditional approaches to scientific research and the need in modern times to acknowledge the limits of 'expert' knowledge. Thus, the value of more socially broad and 'non-expert' or 'lay' experiences in developing robust, sustainable solutions to scientific challenges is proposed.

3.2.4 Theoretical Considerations: Post-normal science

Central to this study is the notion of progressing beyond traditional approaches to engagement and decision-making, in the context of industrial and technological developments. In industries such as nuclear, technocracy has historically dominated, where technical excellence is not only

considered as critical, but has taken priority above other approaches or perspectives (Nuttall, 2007). However, as I suggest in previous work, "the option based on the pinnacle of technical excellence may not be acceptable to the wider public or appropriate in a community setting" (Whitton et al., 2015: 129). Such considerations correspond with the theoretical notions within Post-Normal Science Theory (De Marchia and Ravetz, 1999; Funtowicz and Ravetz, 1993a,b; Ravetz, 2004, 2006), which asserts that the traditional 'reductionist' approach of the scientific system, which has historically relied almost exclusively on the knowledge and direction of technical experts, is insufficient and should be democratically updated; that stakeholder involvement, which includes public participation, "should be viewed as necessary if the scientific system is to be legitimate and democratic" (*ibid*). A 'post-normal science' approach promotes *collective* production of knowledge via a participatory approach, which seeks to involve stakeholders and all those "affected by the issue who enter into dialogue on it" (Buhr and Wibeck, 2014: 8), extending the peer community, and deemed as appropriate in scenarios when there exists knowledge and value uncertainties (Funtowicz and Ravetz, 1993a) and complexities beyond the objective. Such theoretical assertions mirror my own epistemological views, and as I have stated elsewhere, such participatory approaches are highly appropriate when considering issues which present potential risks to society, such as large-scale energy infrastructure (Whitton et al., 2015). Therefore, given the technological nature of the current research, I find particular value in the theory of post-normal science, and it serves as a central point of reference throughout this thesis.

In summary, the works of Rawls, Young and Habermas provide a philosophical foundation to the current research, informed further by the notion of 'post-normal science' to describe the current context in regards to science-based decision-making, moving beyond technocracy and employing a more participatory approach. My work is informed by Rawls' theory of 'justice as fairness' (Rawls, 1971) and the concept of 'reflective equilibrium' (Rawls, 1971, 1999) in their consideration of effective and equitable stakeholder engagement and decision-making processes which are sustainable and socially 'just'. Theoretically, I look to contribute towards theories of procedural justice and fairness (MacCoun, 2005; Siegrist, Connor and Keller, 2012; Visschers and Siegrist, 2012) in the context of NNB. Young's work (1990) provides the basis for my considerations of social groups and their involvement in such processes within the context of broader social justice, linking to the work of Rawls (1971). Habermas's theory of Communicative Action and more specifically of communicative rationality (1984) provide a theoretical base to contribute towards a concept of fairness during participatory-based processes, such as stakeholder engagement, indicator development for sustainability assessment and strategic decision-making for NNB. The work of Cotton (2014) and Whitton (2010) on fairness and stakeholder involvement are of particular value in contributing towards a theory of *strategic stakeholder dialogue.* I assert that deliberative, discursive processes which promote the inclusion of stakeholder groups, and enable equitable and open dialogue on complex, value- laden issues,

are necessary if processes are to be fair and just, and if moral solutions are to be achieved and supported, and are therefore socially sustainable.

The following section discusses what this methodological chapter considers in developing the methodological approach, beginning with a brief critical overview of both quantitative and qualitative data, their epistemological underpinnings, and their potential contribution to research of this social and technological nature.

4.0 Methodological Approach and Research Strategy

This section will detail my methodological considerations and decisions in order to develop a research strategy and methodology. I commence with a discussion of the approach to research in Section 4.1, followed by a review of different methodologies which I have considered are provided from Sections 4.2 to 4.3. Section 4.4. details the strategy I have undertaken, expanding upon the meaning of social groups and also reflecting upon my positionality within the context of this research study. In Section 4.5., I discuss the research process in detail, followed by a discussion of the Pilot Study and Research Study in Section 4.6.

4.1 Research Approach

"What is needed is a means of defining the problem and the related issues in such a way that reflects its complexity as well as the various values of the multiple interest groups involved. Such a means would recognize that various persons and groups have different understanding of the problem, different interpretations of the possible solutions, and different values for evaluating those solutions"

(Chen and Mathes, 1989: 112).

The notion that traditional research approaches which involve little or negligible public participation are insufficient in order to reach widely acceptable solutions for large-scale technological projects has been known for some time, particularly for nuclear developments and facilities (e.g. Van der Plight, 1989). In this context, one of my central arguments is that more publically-inclusive approaches are needed to ensure greater socially legitimate and acceptable decisions and to rebuild trust and credibility both in the technology itself and those involved in nuclear-related decision-making. As the social psychologist Joop Van der Plight (*ibid*) observed decades ago, approaches to nuclear decision-making incorporating public participation were limited, reflecting a traditionally closed industry. This remains an area that requires more effective, socially engaging and inclusive approaches to this day.

To achieve more effective approaches, Van der Plight recommends that not only must they entail more than "a public relations task", but more specifically, "more openness…a different distribution of knowledge and expertise, and substantially improved communication between experts and the public" (1989: 249). On the latter point, he proposes that greater "mutual understanding and respect for the concerns and representations of the parties involved" (1989: 249) is necessary, an assertion which is echoed and addressed by the current research. Over 25 years since the above calls, effective approaches are still being sought.

As della Porta and Keating (2008) note, the term 'approach' describes the broad considerations of the researcher, and is far wider than both theory and methodology. I state in Chapter 3 my ontological and epistemological positions; that is, I work from a *critical constructivist ontology* and an *interpretivist epistemology*. This has led me to find great value and alignment in the approach of Action Research (AR). The following section discusses AR in greater detail and also details why I have found this approach valuable.

4.1.1 Action Research

An approach to research which has gained significant attention over the past 30-40 years, Action Research (AR) is an attractive approach to those researchers who see value in self-critique, reflection, and revision of practice. AR is an example of approaches to research that differ from traditional scientific approaches, in their promotion of participatory action and reflection to continually improve upon practice and knowledge. Their necessity in research is highlighted by arguments posing that solutions are sometimes required to address problems which differ to those solutions sought by science (Johnson, Johansson and Andersson, 2014; *also see* Weinberg, 1972). Other examples include 'post-normal science' research (*see* Funtowicz and Ravetz, 1993a, b) as discussed in Chapter 3.

McNiff (2013) provides a broad but clear description of AR in the first chapter of her book:

> *"Action research is a name given to a particular way of looking at your practice to check whether it is as you feel it should be…You can show the relationship between your learning and your actions in the world: you explain how you have learnt to improve your practice" (p. 23).*

In practical terms, as Eden and Huxham (1996) detail, the 'action' component represents a method to generate data but is also part of the analysis, as theory is grounded in action as well as data. Importantly, Johnson, Johansson and Andersson (2014) note that a central consideration for action researchers should be "whether the action that arises from the research processes" (p. 321) actively addresses or solves the problem at hand. AR is an approach that can be considered as enabling 'on-the-job' research, facilitating anyone, regardless of personal position or context, to undertake critical self-reflection of practice (ibid). The model of AR has also been described as a 'cyclical process', whereby – demonstrating the institutional origins of AR – "initial inquiry in an organization provides data that guide subsequent actions" (Manley and Shaw, 2002: 160), the results of which then provide more information, that informs further action; the process continues until necessary changes are eventually realised (Manley and Shaw, 2002). Such a cyclical process is shown in Figure 3 below, demonstrating a process of reflection and revision of original conceptualisations of problems, and of solutions over the long-term In regards to process, AR traditionally incorporates a series of standardised steps in gathering data; Blake and Mouton (1976) state that in the context of AR, research is "a method of empirical data gathering that is

comprised of a set of rather standardized steps: diagnosis, information gathering, feedback, and action planning" (p. 102, *cited in* Manley and Shaw, 2002). The broader benefits of Action Research include the detailed diagnosis of a problem, reflection, and eventual remediation of this problem to improve practice (Manley and Shaw, 2002; McNiff, 2013), and the mutual understanding of issues so that more informed action can be taken to address them (Reason, 2001).

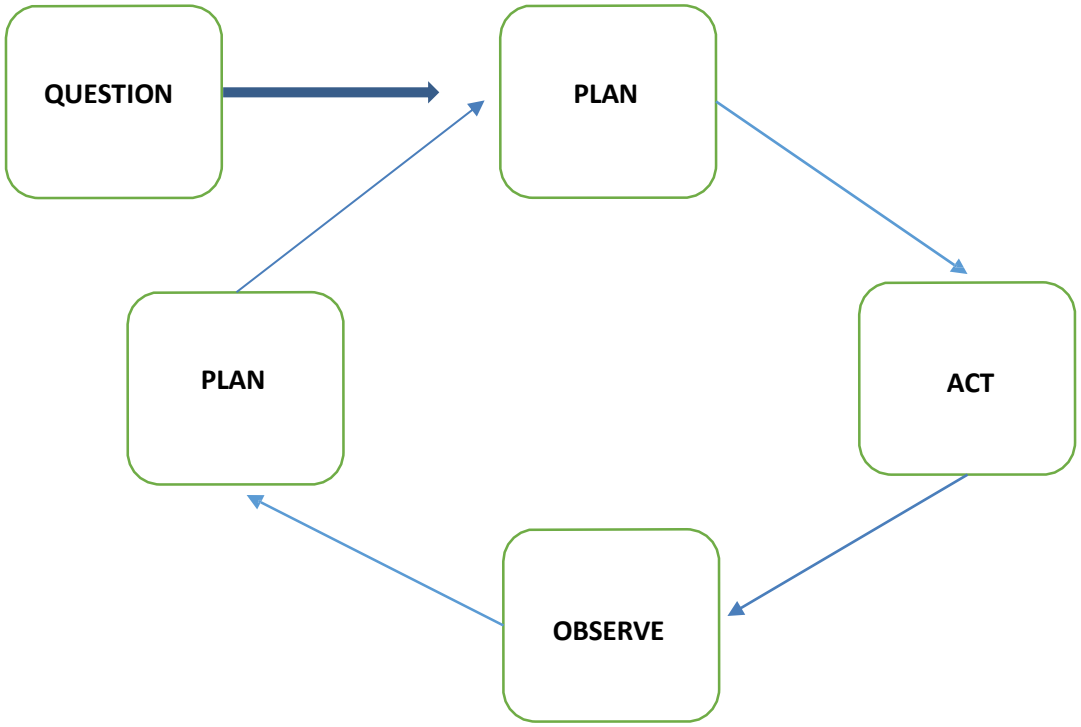

Figure 3. The process of Action Research (reproduced from COBE, 2005)

Having developed over time, Action Research (AR) now represents a multitude of approaches with which it is possible to "work to develop democratic dialogue in the service of mutual understanding and more informed action" (Reason, 2001: 192), and borne out of experience, engagement, self-respect and respect for others (Reason, 2001). In short, it is considered the 'umbrella approach' for research which is participatory and action-oriented in nature (Reason and Bradbury, 2001; Dick, 2006). As Greenwood and Levin (1998) assert, it lies at the heart of human life, and as Reason (2001) observes, it depends on and requires us to "rise above presupposition, to look, and to look again, to try out different behaviours" (p. 191). Reason and Bradbury (2001) broadly describe AR as "a participatory, democratic process concerned with developing practical knowing in the pursuit of worthwhile human purposes, grounded in a participatory worldview" (p. 1).

It is clear that AR can be applied in numerous research scenarios. However, is there value in AR approaches for energy-based research? A review of the energy literature finds that AR has been utilised in energy research in order to improve various processes or strategies in different contexts. In their study on community knowledge networks, Catney *et al*. (2013) undertake an AR approach to improve energy communication strategies; specifically, to "facilitate more effective action and strategies for circulating information about energy" (p. 507), sharing similarities with the current research in regards to research aims on energy communication and the engagement of local stakeholders. The study represents a response to current governmental approaches to energy information provision, which the authors argue suffer from "methodological individualism" (*ibid*), and the social implications of which are a strategy which is communicatively ineffective and potentially unjust. The AR approach undertaken by the authors facilitates the development of an alternative approach to 'energy and justice', in the form of the 'community knowledge networks', whereby existing social networks are utilised to make use of alternative forms of knowledge "about energy practices in everyday life" (*ibid*). Such an approach acknowledges the validity of broad social relations, practices, and different types of knowledge within which action situates (Pykett, 2012). Their research shares epistemological similarities with the current research, in that it argues for new knowledge, if it is to be "meaningful and durable" (*ibid*: 507), which I propose reflects knowledge which is *sustainable*, to be 'cultivated' using existing networks which are trusted and based on personal contexts and relationships (Gilchrist, 2009; Morgan, 2011). It has been argued that knowledge must be "co- produced" between researchers and practitioners if it is to be sustainable (Clark and Dickson, 2003); in the context of community-level issues, co-production of knowledge would occur between researchers and members of those communities with 'lived experience'. Other similarities with the current research include the authors' acknowledgement that "in-depth, experiential, and participatory techniques" (Catney et al., 2013: 516) are required if we as researchers wish to access knowledge which is tacit and shared between community members through experience and observation (Gertler, 2003).

AR is also employed in order to address energy efficiency issues in short sea shipping. Johnson, Johansson and Andersson (2014) utilise an AR approach in order to both improve practice and knowledge, and to enable new perspectives on 'barrier discourse' to be developed, and to "understand good energy management practices" (p. 320). The authors suggest that interpretative approaches such as AR provide could contribute towards new perspectives on traditional barrier discourse. As part of their study, they engaged collaboratively with two shipping companies and a consultancy with previous energy efficiency experience to understand the role of 'energy management system standards' or 'best practices'. This then enabled 'barriers' to be discussed based on data as opposed to theory, enabling them to gain a legitimate, real-life perspective. The methodology employed by the authors was constituted of "working in nested cycles of problem-formulation, problem-solving and reflection" (*ibid:* 326), whilst it was ensured that problems and solutions were able to be discussed by all project participants. This led them to conclude that the AR approach added to the quality of their understanding and practices, stating that "the collaborative project setup, enabling triangulation between projects, through time, and through action, enhances quality" (*ibid*: 326). This study is valuable for the current study in that it highlights the potential for AR to have a positive and tangible impact upon practices within a complex industry setting such as that of shipping. Whilst shipping and nuclear power developments are vastly different in many respects, this study demonstrates the value of AR for energy-related and industry-based problems involving multiple stakeholder groups.

AR is a process which accepts that a course of action, whilst suitable at one time, may not remain appropriate or suitable over time as conditions change, and through continued reflection can ensure that solutions and courses of action are both valid and legitimate (McNiff, 2013). I find particular value in aspects of the AR approach, notably those of reflective practice, collaborating with others in participatory practice, and utilisation of 'researcher positionality' (see Section 4.4.3). My personal values, which have been alluded to in previous chapters, also align with several AR principles, including the need and pursuit for justice and democracy, and the right to speak and be heard (McNiff, 2013; Whitehead and McNiff, 2006), hence its utilisation in this research.

Whilst I find value in the AR approach, I am not conducting research from within an organisation or institution, and therefore am not appropriately placed to conduct AR as it is traditionally conceived. Therefore, I deem the undertaken approach as one of an action-orientated approach. Rather than bring about change as a direct result of research, this action-orientated approach aims to highlight, through reflection and deliberation with stakeholders, potential opportunities for change. This change relates to multiple NNB-related aspects; engagement between industry and development-related officials and local stakeholders, indicator development for project-related assessments of social sustainability, and development-related decision-making at the local level.

4.2 Research methodologies

To this point, I have made clear the broad approach to research; that of an *action-oriented* approach. A review of the various methodological options considered is now provided. These include:

- Mixed-Methods;
- Social Development Needs Analysis; and
- Sustainability indicator development.

4.2.1 Mixed-Methods

Both quantitative and qualitative strategies to data collection possess strengths and weaknesses. Qualitative research enables a more in-depth understanding of the population under research to be acquired; the findings of which more accurately reflect the population sampled by the research. The detail of quantitative findings is often limited due to the larger size of the data set, whereas qualitative data sets are more detailed but much smaller in quantity, meaning that it is more difficult to extrapolate generalisations of the population from such data (Vanderstoep and Johnstone, 2009). Some researchers find value in methodologies that incorporate both qualitative and quantitative research in a complementary fashion, representing a third research paradigm, termed as 'mixed-methods research' (Bryman, 2012, 2015).

Mixed-methods approaches are increasingly used as social science researchers look to utilise the strengths of qualitative and quantitative research to generate more detailed and robust data sets and findings. Arguments against such methods include the epistemological commitments that research methods carry, that they are embedded in certain ontological and epistemological considerations and principles of what reality is and how knowledge to understand it is acquired, and that quantitative and qualitative research approaches represent distinct and separate paradigms and are thus incompatible, where their combination is only possible superficially (Bryman, 2015).

The most obvious benefit of a mixed-methods approach is that it is possible to test the findings or inferences from quantitative study in the subsequent qualitative analysis (*ibid*); for example, questionnaire results can be further explored or compared against those from focus group discussions. An example of this is provided by research conducted by academics at the University of East Anglia. Poortinga *et al.* (2004) employed a mixed-methods approach in their study of public trust in governmental communication and information provision and their risk perceptions regarding the Foot and Mouth Disease (FMD) incident in 2001 the U.K. They utilised both self-completion questionnaires (quantitative) and focus groups (qualitative) to gather detailed data from two areas of the UK which had been affected differently by the event. As a result, by using a mixed method approach the authors were able to derive a more in-depth account of the impacts

of the FMD event than if they had applied a singular-method approach. I argue that this 'depth' of research provided by mixed-methods is important when considering diverse local priorities and perceived impacts, particularly for complex subject matter such as new nuclear power developments.

A further example of energy research employing a mixed-methods approach is the study outlined by Bickerstaff *et al.* (2008) examining public perceptions of climate change, nuclear power and radioactive waste against a UK energy policy backdrop. Quantitative data was acquired from a national interview survey sample of UK adults and four focus groups in different UK towns, with two meetings in each location. The authors found that in addition to focus groups providing more context to survey responses, focus group responses supported the findings of the national survey regarding negative perceptions towards radioactive waste. This cross-checking exercise of comparing the findings from both strategies demonstrates an example of *triangulation* (Bryman, 2006), referring to the mutual corroboration of findings from multiple strategies. This triangulation strategy can be intentional or unintentional, that is it may or may not be part of the original research strategy. The study by Poortinga *et al.* (2004) demonstrates such a situation, where both research strategies supported one another in demonstrating public concern about FMD and its potential consequences in a study where triangulation was not intended. The authors had intended on combining both strategies for the purpose of *completeness* and *sampling*; these represent ways of combining strategies to provide more comprehensive understanding, and to facilitate the sampling of respondents respectively (Bryman, 2006).

4.2.2 Social Development Needs Analysis (SDNA)

In a similar vein to Social Impact Assessments (SIA), in which the primary aim is predicting and mitigating the *negative* social consequences of projects on communities, associated with 'point-in-time' assessments (Esteves, 2008a,b), Social Development Needs Analysis (SDNA) describes an approach where, whilst being similarly concerned with development-related social impacts and the community-scale, the emphasis is placed on facilitating *positive* social development outcomes within a sustainable development framework (Esteves and Vanclay, 2009). As with other socially-orientated forms of analysis, such as Value Orientated Social Decision Analysis (VOSDA) (Chen and Mathes, 1989), social values and needs are placed towards the centre of the method. VOSDA is based upon increasing communication among multiple interest groups and decision makers with a public decision-making process, with the objective of encouraging multiple parties "at conflict" (p. 112) to develop and share information about perceptions and trade-offs at successive stages of the process. Both VOSDA and SDNA share social aims of seeking appropriate resolution of the issue whilst representing the diverse interests of the affected populations and "multiplicity of social values" (1989: 112).

SDNA seeks to reconcile business needs with community needs within a sustainable development framework, with an aim to embed concepts of sustainability and social development into core

business strategies, by identifying commonalities and linking company with local community futures; effectively, the premise underlying SDNA is that communities and companies would both obtain greater benefit by closer alignment of interests (*ibid*). One of very few SDNA studies in the literature, Esteves and Vanclay (*ibid*), in their study of a mining community and in the interests of a mining company, ask the following question to frame their research:

> *"What are the priority social issues that should be addressed in order for us to contribute to sustainable development of the community and create value for our business?" (p. 137).*

The study details the development of an enhanced Social Impact Assessment (SIA) methodology in the form of Social Development Needs Analysis (SDNA) (*see* Figure 4) in order to guide 'corporate-community investment' in regards to the mining industry. This results from the growing social demands on industries, such as mining, which are known to result in societal impacts, and thus, in mind of philosophies of sustainability, SDNA:

> *"…aims to identify the priority social issues that need to be addressed in order for a company to contribute to a net positive impact in the community while building assets for the business"*

and,

> *"…seeks to address the higher level challenge of how to reconcile, within a sustainable development paradigm, business needs with community needs…"*
>
> (Esteves and Vanclay, 2009: 137).

There are parallels to be drawn between the mining industry and the nuclear industry, in that, for example, the impacts on the health of populations can *potentially* be significant should accidents occur, and the impacts of such industries on local economies and employment landscapes can be significantly altered with their arrival and departure. Indeed, the authors state that although the mining industry serves as the case study, the approach is applicable to "any private-sector industry and their local community" (p. 137). The approach of SDNA as detailed by Esteves and Vanclay (2009) is reflective of a shift in intentions and orientation of SIA, from the prediction and mitigation of negative social consequences, towards "facilitating positive social development outcomes within a sustainable development framework" (p. 137).

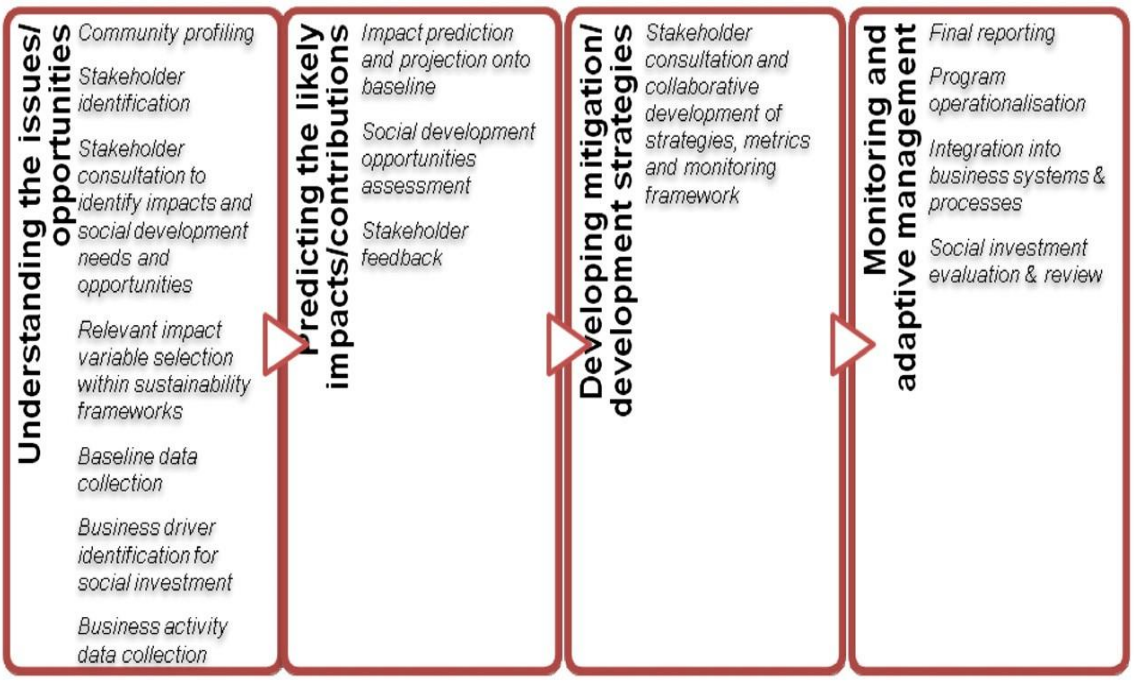

Figure 4. Participatory SIA process with a social development orientation (Source: Esteves and Vanclay, 2009).

Building upon SIA approaches, the authors state that SDNA proposes a "broader, ongoing, social monitoring program over the life of a company's operations, and should be mainstreamed into business planning and decision-making processes" (p. 142), and in so doing, "the company's engagement with governments and communities remains focused, relevant and appropriate to achieving sustainable development at the local level" (p. 142).

Several constituent elements, such as stakeholder consultation to identify impacts and social development needs (*understanding the issues/ opportunities*), stakeholder feedback (*predicting the likely impacts/ contributions*), and stakeholder consultation and collaborative development of metrics (*developing mitigation/ development strategies*) are elements which reflect my interpretivist position, in that they seek to identify the realities of stakeholders in order to effectively identify and address social issues. For this reason, I propose that the approach represents a progressive methodology for sustainable development which addresses both 'community' and 'business' needs. The general philosophies and goals of the approach, towards identifying community needs whilst pursuing sustainable development *in conjunction* with business, present more preferable conditions for social sustainability, given that procedural justice is legitimately pursued, and that businesses are 'open to change' should the results of such processes reveal problems with the original direction preferred by businesses. This remains a persistent caveat of collaborative community-business efforts; the willingness to pursue the direction deemed, by participatory processes, most suitable, most equitable, in regards to all stakeholders, and not the traditional path of greatest, commonly financial and relatively short- term, gain.

Similar to the argument made by Solomon *et al.* (2008) that the social dimension of resource communities are the least understood of the resource business, and yet are critical to their success, so too are the social dimensions of energy businesses and the communities in which they are sited, such as nuclear power for example, for their sustainable existence, a deficit which the current research seeks to address in part. It is approaches such as SDNA that present value for the current research, where the priorities of communities are identified and utilised to develop development-related decision strategies, and based on a philosophy where both community and developer may benefit. Whilst the process of SDNA is not employed directly, the foundational philosophies of the approach and central aim of the above study align with that of this PhD.

4.2.3 Urban Sustainability Indicator Development – Turcu (2013)

A key study highlighted within the review of methodological literature with strategic value is that undertaken by Catalina Turcu, in which she develops and tests a set of urban sustainability indicators in three different areas of the UK (Turcu, 2013). The research responds to what she deems as a failure "to uncover a convincing model in the literature" (Turcu, 2013: 702), following to a comprehensive review of sustainability indicator development models. The approach Turcu undertakes involves three key methods:

1. *Public consensus*, through which indicators draw on 'existing lists' that are the reflection of legitimate citizen consensus;
2. *Normative assumptions*, where indicators are based on (expert's) explicit or implicit assumptions about what people should (or do) value;
3. *Participatory processes*, where indicators are selected on the basis of ongoing purposive (expert and citizen) participatory exercises.

The following details the broad development process undertaken by Turcu to establish a list of sustainability indicators based upon the three methods above.

4.2.3.1 Public consensus

The sustainability indicator set (SIS) utilised in Turcu's study was developed in the first instance by drawing upon five established lists of sustainability indicators (SIs), which had achieved some level of public consensus during their development. The five established lists utilised were:

1. *'Securing the Future', HM Government (2005) – 39 sustainable community indicators,*
2. *'The Egan Review'*, ODPM (2004) – 46 sustainable community indicators,
3. *'Housing Corporation's Toolkit'*, Long and Hutchins (2003) - 49 sustainable community indicators,

4. *'Four Capital'*, Green *et al.* (2005) – 18 neighbourhood sustainability indicators
5. *'Sustainable Seattle'*, AtKisson (1996) – 40 urban sustainability indicators

Analysis of these studies highlighted 30 themes and 170 indicators in total, from which four key themes were identified; these were environmental, economic, social and institutional (governance).

4.2.3.2 Normative assumptions

The next methodological step in this study was to develop a qualified list of sustainability indicators, utilising normative reasoning and a three step selection process to select appropriate indicators from the 170 identified indicators in the literature review. This was done by applying the following normative requirements:

1. Indicators must be 'visible', perceptible and relevant at local level and to local people
2. Indicators must be a reflection of their specific urban settings, to depict conditions which were traceable to the three areas in the study
3. Indicators must reflect change triggered by urban policy and investment in order to make it possible to indicate potential impacts and causal relations.

Following the development of this qualified indicator list, further validation was sought by Turcu by its presentation at two academic conferences.

4.2.3.3 Participatory processes

The list of sustainability indicators was subjected to a further stage of validation in order to identify the core indicators which would form the final list of indicators to be. Turcu employed a *participatory consultation approach* at two academic conferences, in which the indicator list was consulted upon by 63 sustainability 'experts', community representatives and stakeholders in the three UK urban study locations. She details that these stakeholder 'experts' included "heads of policy, research and strategy at the local and regional level, urban regeneration and neighbourhood managers, planners and designers", whereas community representatives and stakeholders included "local head teachers, businesses, police, health services, housing associations and NGOs" (*ibid*: 714). This approach enabled the *integration* of various levels of 'expertise' and influence into the indicator determination process. Among the feedback academic conferences, it was suggested as necessary to include 'some kind' of health and education indicators. As a result, four additional indicators were included. Turcu stresses that the list resulting from the three methodological stages is not an absolute or final list. Rather, it is representative of an *integrated set* of indicators, synthesising both 'expert' and 'citizen' knowledge of local urban sustainability in a specific urban setting, combining normative

judgement and 'end-user' consultation (*ibid*: 706). The next stage of SIS development required empirical testing of the indicators in a number of designated study locations as to their relevance and legitimacy at the local level.

4.2.3.4 Empirical testing of SIs

Turcu (2013) details how the developed list of indicators underwent a process of empirical testing, in three urban areas in the north of England which had undergone "extensive urban intervention over a 20-year period in order to tackle significant urban deprivation and inner-city decline" (p. 703). The areas were predominantly residential in nature and perceived as becoming 'more sustainable' following public urban intervention, with many residents 'living through' the urban transformation process (p. 706). Between 2007 and 2008, discussions were held with a sample of 134 residents. They were 'talked through' a survey questionnaire composed of closed questions, the structure of which was two-part; the first part explained the development background of the list, whilst the second part asked participants to rate the importance of each indicator to them using a three point Likert scale (1 - very important; 2 – important; 3 – not important). The results of the survey were analysed via utilisation of a ranking system, a 'grading of importance scale' (*ibid*: 704) and by discussing which indicators received the greatest number of '1' or 'very important' ratings, thus indicating apparent priorities in each domain and study area. How these 'local priorities' related to policy initiatives targeting the sustainability of urban areas and communities was then reflected upon.

In summary, my work is informed by various aspects of the methodologies discussed. Provided the diverse social and strategic nature of the research - examining the views and priorities of social groups, the existence of potential differences between such groups, and what implications this may have for strategic engagement and decision-making processes - mixed-methods is deemed to provide the most appropriate methodological base for empirical research. Mixed-methods enables the necessary 'depth' of enquiry required to understand local stakeholder priorities and identify social criteria for sustainability indicator development, and to develop strategic approaches to engagement and decision-making. In particular, the research of Bickerstaff *et al.* (2008) and Poortinga *et al.* (2004) informs my work in the context of mixed-methods. I have found SDNA to be highly informative and in philosophical alignment in several respects with my own principles, including the prioritisation of needs and values, positive social development, and socially strategic decision-making. As detailed by Esteves and Vanclay (2009), the goal of SDNA is the identification of social needs with the aim of positive, sustainable and equitable development between local stakeholders and project developers; this is of particular relevance to the current research given its focus on stakeholder priorities and new nuclear power developments. Finally, the UK-based research of Turcu (2013) is methodologically important to this research. The participatory methods employed by Turcu in her development of sustainability indicators to reflect the diverse priorities of local stakeholders are informative, and have been influential in my

methodological considerations (*see* Section 4.4) provided the similarities in research themes and principles between that and the current research. Therefore, I undertake a mixed-methods approach to stakeholder engagement and sustainability indicator utilising participatory methods to understand the social priorities of local stakeholders in the context of NNB in Anglesey.

4.3 Research methodology: Methods (Quantitative/Qualitative)

As a result of the decision to use mixed-methods in regards to the collection of empirical data, the following section will review several methods of both a qualitative and quantitative nature in order to distinguish appropriate techniques of enquiry. The methods considered included the following options for each data type:

Quantitative methods

- structured telephone interviews
- postal questionnaires (predominantly closed questions)
- face-to-face questionnaires (predominantly closed questions)

Qualitative methods

- postal questionnaires (predominantly open questions)
- face-to-face questionnaires (predominantly open questions)
- focus groups

In consideration of the sensitive and topical nature of the subject of NNB in Anglesey, it was preferable to employ methods that involved elements of *personal interaction and dialogue* with participants, particularly in the interests of developing a greater understanding of the issues that were most important to both individuals and groups. The action-oriented approach employed means that participatory and interactive techniques are preferential, and my 'positionality' (*see* Section 4.4.3) was a key factor in my preference for conducting data collection in a face-to-face forum.

My previous research experience in Anglesey (Parry, 2011) contributes to my current research and thinking. During this previous research exercise in Anglesey, I found that many participants preferred the opportunity to converse with myself as the researcher, particularly on contentious and topical issues such as nuclear power, and to assist their engagement with the research itself. This concurs with Caserta *et al.* (1985), who note the importance of the researcher being present when sensitive or personal questions are being asked for developing rapport with individuals. During this previous study in Anglesey, I was informed by members of the farming and agricultural community during casual conversation that the only way in which a questionnaire

is guaranteed to be completed and returned to the researcher is to 'do it and get it out of the way', rather than being relied upon to set time aside to complete a questionnaire which they have received through the post and knew little or nothing about. Although there exists an opportunity to gather a large number of responses through postal questionnaire distribution, significantly lower return rate percentages and for this method when compared to face-to-face questionnaire was also a factor in deeming them potentially unsuitable. Telephone interviews were also deemed to be inappropriate given the ethical issues and restrictions in contacting younger members of the public by telephone, and due to this, the potentially inability to contact everyone using the same method.

Therefore, I decided that interactive, face-to-face methods should be employed to gather both quantitative and qualitative data, for which face-to-face questionnaires and focus group discussion sessions would be utilised respectively. I consider it important to operationalise elements of familiarity and 'reducing the distance' between researcher and participants; this is reflected in the choice of methods. I argue that such interactive and communicative methods enable participants to become familiar and comfortable with the researcher and research itself, and also provide them with the opportunity to not only ask questions directly to the researcher, but to receive direct responses. As I have stated previously, this research approach seeks to contribute towards a concept of procedural justice and fairness (*see* Section 2.2).

The following sections detail the various methods chosen to employ for the engagement of social groups and collection of empirical data, beginning with quantitative methods in Section 4.3.1 and qualitative methods in Section 4.3.2.

4.3.1 Quantitative methods: Questionnaires

Questionnaires are a commonly used quantitative tool; they are the most widely used survey instrument in the field of social science (Burton, 2000), and are often used by companies or organisations, on and off line, to gather data from and ask questions of individuals or customers. Therefore, they represent a method of data gathering and enquiry which a notable proportion of the UK general public are likely to be aware of or have personal experience and familiarity with, even from a relatively young age. Questionnaires are designed and intended to facilitate communication, based upon the agenda of the researcher (Davies, 2007). They are used to collect primary, factual data from a large number of individuals, are highly structured to allow information of a particular type to be collected in the same way, and for this data to be analysed quantitatively (Leung, 2001). As Bernard (2013) states, the purpose of structured interviewing methods, of which questionnaires are one example, is to "control the input that triggers people's responses so that their output can be reliably compared" (p. 216). Also, Burton (2000) notes that surveys and questionnaires enable insights into human behaviour, provided they are carefully designed.

As do all research methods, questionnaires have both advantages and disadvantages and can present challenges or opportunities to researchers, some of which are detailed in Table 2 overleaf. Numerous factors which are highlighted in Table 2 demonstrate why questionnaires, particularly when administered in person, were chosen as a quantitative research method. Firstly, all participants are asked the same questions, and in the context of the current research, this enables social groups and individuals within specific social groups to be compared as to their responses towards particular issues. Unfortunately, unless administered in person, researchers have no control over how questions are interpreted despite measures taken during their development. Another factor which is out of the control of the researcher is the certainty that if questionnaires are posted to individuals, that it is they who has completed the document, raising questions of validity and legitimacy on such responses and data. Finally, a positive aspect of questionnaires when they are made anonymous is that the participant cannot be identified, and thus provides them with a sense of security, enabling them to answer more honestly and respond freely to questions, particularly if they are of a sensitive or controversial nature.

Advantages	Disadvantages
All respondents are exposed to the same questions, and there is no concern regarding interviewer bias or influence as there may be during face-to-face interviewing	Researchers have little or no control over how people interpret questions. There is always a risk that respondents will be forced into making inappropriate choices in closed-ended questionnaires, no matter how much preparation the researcher conducts.
The researcher is able to ask more complex questions than during a face-to-face interview. Possible responses presented to the participant on paper can be numerous and interesting if worded correctly	Response rates can be much lower than expected. Low response rates mean that the researcher cannot draw conclusions about larger populations.
They enable the researcher to ask long batteries of questions which may not be possible or appropriate during a personal interview. Batteries involve participants responding to a series of items on the same topic	For mailed questionnaires, the researcher cannot be certain that the person who received the questionnaire (i.e. the addressee) is the same person as the person who completed it.
Anonymity provided by self-administered questionnaires provides a sense of security for the participant, which can be particularly beneficial if question topics are of a sensitive nature	Some respondents may be illiterate and unable to respond to such methods in the same way in which they could by being verbally asked a series of questions.

Table 2. The advantages and disadvantages of questionnaires as a social research method (Source: Bernard, 2013)

4.3.1.1 Questioning type

In reference to the type of questioning used – open or closed questions – there are also advantages and disadvantages. Closed questioning, usually preferred by researchers employing survey methods, are preferable when 'point by point' comparisons between different individuals, or between certain individuals at different times (Gomm, 2008), are to be made. Alternatively, open questioning enable respondents to provide their own answers of greater in length than for closed questioning. However, due to respondents providing such personalised answers, the researcher must also interpret them which carries with it potential for inaccuracies. Open questioning may provide the researcher with greater detail and insight into the views of the respondent for each question, but there also exists the risk of responses not answering the questioning to an appropriate degree and there being of limited use to the researcher (*ibid*). Closed questioning, although requiring short responses of limited detail from participants, aims to ensure that each question is clearly responded to, and that responses are comparable between individuals and groups. Due to the study aiming to understanding intergroup and intragroup similarities and differences, closed questioning was deemed as appropriate for use within the research questionnaires. However, given the value of open questioning in providing the opportunity to participants to express freely their views on stated issues, it was deemed that this type of questioning could be used in the final section of a questionnaire to enable participants to express any concerns or views which they had not been able to throughout their completion of the questionnaire.

This is particularly important given the local and context-based nature of the research, and the importance I place on understanding social priorities of residents within a specific locality and the priority differences between individuals and groups. As Stirling (2008) describes in his work on the social appraisal of technology, the focus is on "finding "priority" issues", "adopting "effective" methods", and "determining the "best" options" (p. 279). In the context of this PhD research, this relates to issues of social priority, methods of stakeholder engagement, and the most suitable options for development-related impact management respectively. This resulted in a questionnaire which was composed primarily of closed questions in order for responses to be provided relatively quickly with less time for deliberation, which was also intended to facilitate responses which were 'top of the head' and honest in nature, whereas open questioning provided an opportunity for participants to inform me of important gaps in knowledge regarding local circumstance. The closed questioning took the form of 'statements of importance' (SoI), in which participants were to identify how important each social issue was to them; the choice of response format for these statements is discussed in the following section.

4.3.1.2 Questionnaire response format

Once the questioning type had been established, in the form of SoI, the format by which participants were to respond was considered. In order to ensure that the closed statements were able to be responded to relatively easily and in a timely manner, it was important that the response

format was relatively simple and provided sufficient responses to ensure appropriate choice, whilst not providing too many options so as to impede participant response time to a significant degree. Several response formats which, due to the objective of understanding participant attitudes and priorities, were appropriate for attitudinal measurement, were considered:

- **Thurston scale** – developed by Thurstone and Chave (1929), it consists of a list of items which vary in their favourability towards an object (Lewis-Beck, Bryman and Liao, 2004). Thurston scales involve writing a number of items, giving these to a number of judges who proceed to sort them out into favourable and unfavourable categories, which are then numbered and a mean score is computed across the judges. Respondents are then asked to answer whether they agree or not with the items as they are presented in a random order, and depending on the mean scale value of the items selected, this produces the attitude score (*ibid*).
- **Likert scale** – developed by Rensis Likert (1932), Likert scales are now the most widely used scales for the assessment of attitudes, perceptions and beliefs. They involve a series of favourable or unfavourable statements about the focal object, whereby respondents are given a number of response choices, often presented along a scale (Lewis-Beck, Bryman and Liao, 2004). For example, they can range from 'strongly agree' to 'strongly disagree' in order to gauge a person's agreement with the statement, and therefore attitude towards the topic. The scale's popularity is primarily due to the ease and speed at which it can be developed, and that it has shown to yield reliable scales for assessing attitudes (*ibid*).
- **Guttman scale** – developed by Louis Guttman (1944), this method of attitudinal measurement involves a hierarchy of items which vary in favourability, and similar to the Thurston scale, participants are asked to respond as to which items they agree with, often in a Yes/No format. It is expected that participants with favourable attitudes will agree with the favourable items which are at their level or below, so that, for example, a moderately favourable person is unlikely to agree with the extremely favourable items (Lewis-Beck et al., 2004).

Due to the simplistic nature of Likert scales, and therefore the ease with which participants could probably respond to statements easily, and provided that the participants may include young people who are unfamiliar with questionnaire completion and responding to such questions, it was decided that the development of a series of statements in the form of SoI, with a Likert scale response format, was most suitable for utilisation in research questionnaires.

Considering the discussions above, I made the following decisions in regards to questionnaire design:

- develop and employ self-administered, in-person, questionnaires
- anonymise questionnaires,

- utilise predominantly closed questioning,
- utilise Likert scales for responses format

4.3.2 Qualitative methods: Focus groups

A common qualitative research method which has been utilised for almost a century, focus groups enable data to be collected from a social collective, often involving a number of individuals discussing a particular topic with a researcher; one of the earliest examples of focus group utilisation in social science literature is found in Bogardus's (1926) work on 'group interviews'. Focus groups represent one form of group interview (Morgan, 1997), and they can take various forms and be used for various purposes, such as *self-contained methods* which provide principal data, to provide *supplementary data* in research studies which primarily utilise other data collection methods, and multi or mixed method studies in which two or more methods provide data to complement one another (*ibid*). I concur with the view and preference of Morgan (1996) who considers focus groups an inclusive technique that uses group interaction to collect data on a researcher-specified topic. They enable engagement with a number of individuals at one time and in one space, which has clear advantages in regards to both time and resources when compared more individual methods such as face-to-face interviews, and also enables topics to be discussed and explored by group members. However, the level of detail that can be accessed by focus groups on individual perspectives and viewpoints can be limited by such group interaction. They often involve between 8 and 12 individuals – MacIntosh (1993) recommends between 6 to 10 people per group – and are often audio or video recorded and proceeded by a qualitative write-up (Gomm, 2008), such as transcription from which analyses can be conducted.

4.3.2.1 Focus groups: challenges and opportunities

Compared to individual interviews - a method that was also considered - focus groups require the researcher to make choices on the direction of the discussion and possibly giving more control to group members in leading and directing discussions, effectively resulting in group members playing a more significant role in the research process. This does present challenges, in whether free-flowing conversation is allowed to continue, which may limit the opportunity to discuss other topics, or whether to take control over the discussion and limit discussion on each topic (Morgan, 1997). However, focus groups also enable deeper understanding of people's experiences, viewpoints and opinions and the similarities between them in way that comparing individual interviews may not allow, as a result of the sharing of experiences and, potentially, concurrence of experiences between individuals. Focus groups can also result in issues being raised and discussed which may be important but might not been considered by other group members in an individual scenario, but there is also the possibility for group influence, both in personal responses and opportunity to respond, which the researcher must observe and address where possible, if group members' contributions are restricted by a dominant speaker for

example.

The interests of the research include examining how certain issues are discussed in a group environment and whether similar views on topics are provided, and also for group members who shared interests or social characteristics to discuss topics in an environment in which they felt comfortable, where those in attendance were 'familiar' to a degree. For example, Gomm (2008) observes that when group members are recruited from the same organisation, or in the case of the current research, the same group of social commonality, the way they discuss particular issues can provide insight into how such issues are discussed in everyday circumstances, and talk about issues in ways that might not occur during individual interviews. In earlier texts, Kitzinger (1994, 1995) argues that focus group interaction is extremely important, because it facilitates access to participant world views, participant beliefs towards a particular subject. It also highlights the language which participants use to discuss an issue, thus reflecting participant feelings and emotions towards it. Therefore, one of the key strengths of focus groups which make them an attractive method for the current research to utilise is the ability for them to produce data and insights that would be less accessible or likely without group interaction (Morgan, 1998). This has potential benefits for strategic engagement and public communication for decision-making processes. For example, empowerment of participants has long been promoted as a wider benefit of participation in focus groups, where they are valued as experts in their own right (Gibbs, 1997).

4.4 Research methodology: Social Group Strategy

Behind the current methodological approach was a strategy to engage with different 'social groups' as opposed to individual or random residents within a given locality. This is termed the '*social group strategy'*, the aim of which is to engage with specific social groups in locations which are convenient for and familiar to them, thus aiding the opportunity for participation and the facilitation of dialogue. At this point, it is important to revisit what is meant by 'social group' to provide definitional clarity, furthering the discussion in Section 3.2.2 regarding the philosophical contributions of Young (1990) on the subject, and introducing her more recent work on the themes of inclusion and democracy (Young, 2000).

4.4.1 Social Group: Meaning and significance

In the English language, the term 'group' has several definitions. However, a widely held definition of the term refers to 'a number of persons or things located close together, or considered or classed together' (COD, 1995). In a basic sense, groups are collectives, of people, items, or other 'things'; my work is concerned with 'social groups'. In theoretical literature, groups of people are referred to as 'sets of agents' which exist in various social spaces and are defined by their positions within these spaces (Bordieu, 1985). Turner (1982) provides the definition of a social group as:

"…two or more individuals who share a common social identification of themselves or…perceive themselves to be members of the same social category" (p. 15).

Alternatively, Iris Marion Young (1990) describes a social group as:

"…a collective of persons differentiated from at least one other group by cultural forms, practices, or way of life" (p.44).

Young (1990) notes that social groups are more than merely collections of people, rather they are "more fundamentally intertwined with the identities of the people described as belonging to them" (p. 44) and primarily defined by a sense of identity as opposed to a set of shared attributes.

People within social groups will commonly interact regularly, share common interests, or possess similar demographic characteristics, contributing to two or more people seeing themselves as a distinct social unit. As May (1987) proposes, groups are real not as substances, but as forms of *social relations*. Furthering this, Young (1990) states that social groups are not only formed from inter-society or between-society interactions, but that social processes also differentiate groups intra-societally, or within a single society. It is this intra-societal examination of different social groups within a designated society – Anglesey - that is undertaken by the current research. Social groups can vary in size dramatically, existing in forms from a family, to a special interest group, to a village, to an island; they are all social collectives which provide the foundation for society.

In broad terms, social groups, in their varied form, have always been and will continue to be of the most significant importance to human existence. Lewin (1948, 1951) noted the communicative importance of social groups in stating that group memberships guide our communication, particularly with strangers, by providing people with social identities. Young (2000) makes the distinction that whilst social groups may *position* people, "a person's identity is her own, formed in active relation to social positions" (p. 99). Such positioning occurs through 'communicative interaction', whereby people identify one another as "belonging to certain social categories, as standing in specific relation to themselves or others, and enforce norms and expectations in relation to one another" (p. 100).

Young (2000) asserts that whilst individuals do form their own identities, the conditions under which this occurs are independent and out of their control:

"Social relationships, institutions, and structures are prior to individual subjects, both temporally and ontologically. A person encounters an already structured configuration of power, resource allocation, status norms, and culturally differentiated practices" (p. 99).

As previously stated, the identity of individuals constitute and are reinforced by social groups,

with different groups impacting upon people's identities in different ways. People's identities are in part constituted by group meanings in terms of the cultural forms, social situation, and history that group members know as theirs, where such group meanings have been forced upon them, or forged by them, or both (Young, 1990, 2000). It is this observed connection between groups and personal identities which pose social groups as attractive research foci for this work; engagement and dialogue with different social groups provides us with, among many things, an insight into, and opportunity to better understand, individual *and* collective viewpoints, opinions, values and priorities, in a designated place and time, regarding a specified subject.

4.4.2 Social Group Strategy: Groups of Social Commonality

The identification of citizen-level priorities in order to understand key areas of social importance contributes to the objectives of this research. It was decided that engagement with various social groups would enable communication and engagement to occur in a more directed and strategic manner; this was done utilising an integrated selection process. For the purpose of this study, although social groups are based upon different social characteristics (e.g. special interest, employment, demographics – described here as primary descriptors) as I have discussed in previous sections, it was deemed appropriate that a collective term for eventual participating groups was provided for research purposes. As a result, I utilise the term 'group(s) of social commonality' (GSC); *commonality* is used to describe 'the sharing of an attribute' as defined by the Oxford English Dictionary, albeit in this sense social attributes.

The secondary descriptor to GSC is the element of common interaction in the form of regular group meetings. For example, a group of special interest may organise monthly group meetings which members are notified of and attend, whereas colleagues commonly meet on a more regular basis in workplace environments due to employment choices. As such, GSC include any group that is identifiable by common interests, employment roles and/or demographics, forming an identifiable group who by choice may meet or gather in a specific environment on a regular basis. This ranges from a daily (e.g. employment/workplace-based) to monthly or bi-monthly (e.g. special interest based) basis. This approach was taken in order to engage with multiple participants at one time in a place which was both *convenient* and *familiar* to them, contributing towards a theory of procedural justice and fairness. It was decided that such an approach was more time and resource effective than one which sought to engage and collect data on an individual basis. As such, the GSC approach encourages engagement within an environment in which individuals with potentially similar social priorities may raise and discuss them in front of or with other members of the group who may share similar views and values. In the case that there are differences of viewpoint or opinion, I argue that individuals are more familiar with other group members than members of the wider public (i.e. strangers), and are therefore more likely to feel more comfortable expressing their own views, based upon notions of a safety and familiarity.

The approach is strategic in the context of effective engagement; it reflects a process which seeks to accommodate participants geographically, engage with numerous participants at one time, and communicate with them in an environment which is both convenient and familiar to them, in order to make the engagement process more accessible, accommodating and attractive to dialogue facilitation. Such considerations reflect an intention and *desire* to engage, more so than merely acting upon a *need or requirement to*, a result of which being that stakeholder needs may not be a central consideration and engagement may occur at a time and place which is unsuitable, inconvenient and even intimidating for people.

The research approach places stakeholder needs towards the centre public stakeholder engagement. This is based upon an understanding that gatherings of individuals can represent rare instances where hard to reach respondents can be engaged with, and have their views heard, understood and deliberated. The methodology aims to be 'priority-centred', positioning the research participants – the local residents or stakeholders who are directly impacted by local energy infrastructure and decisions – and their priorities at the core of the process. The research-based dialogue is therefore based upon *local priority and circumstance* as opposed to expert judgement and opinions, reflecting efforts to understand the key social challenges faced by specific 'affected publics'. It aims to explore and identify the values and preferences of local stakeholders in process and discourse context and content, reflecting notions of justice, fairness and legitimacy.

I have discussed in Section 3.2.2 the notion of social positioning in relation to the pre- determined placement of people in society, involving notions of benefits and constraints (*also see* Young, 2000). At this point, the notion of 'researcher positionality', an important consideration for action researchers, and the influence of my previous interactions and research-based engagement with these specific groups, is discussed.

4.4.3 'Researcher Positionality' and previous research

As has already been stated, the research approach undertaken in this study is one which incorporates aspects of Action Research (AR), which is commonly undertaken by practitioners who seek to better understand and learn about environments and systems through action and reflection (McNiff, 2013). I seek to reflect upon what is learnt in order to identify opportunities to improve processes, both decision-based and engagement-based, at the local scale. Therefore, the approach is *action-oriented* as opposed to reflecting one of institution-based AR, which is primarily concerned with reflecting upon and directly changing practice. However, it does incorporate aspects of AR, such as self-reflection and the utilisation of 'researcher positionality'.

Due to the considerations discussed in the previous section, I determined that social groups would form the communicative component of the methodology, and a SGS structured methodological decisions. Following this, I sought to identify various special interest groups across Anglesey that

were suitable to participate in the research. However, it was then deemed more appropriate, in the interests of an action-oriented approach, to begin by considering the social groups in Anglesey with which communicative links and relationships already existed. To provide context, I am a Welsh speaker with strong links to both the island of Anglesey and its residents. I seek to learn and understand what is important to residents of the locality through the utilisation of my background and linguistic and cultural commonality with participants, linking to the notion of researcher positionality, which is now discussed.

'Researcher positionality' is linked to the notion that Action researchers are often outsiders or insiders to a particular setting (Herr and Anderson, 2014), which can raise issues requiring additional consideration when the researcher has or seeks to develop collaborative relationships with participants, placing the researcher's relationship to the study in a unique position. The insider/outsider positionality is fluid, dynamic and can be multi-layered, able to change throughout the period of study (Thompson and Gunter, 2011). The concept of researcher positionality is a common area of reflection and consideration for Action Researchers, often due to their position within an organisation or institution (McNiff, 2013). In short, the term refers to the relationship between researchers and research subjects. Researcher positionality raises questions as to the position of the researcher in relation to their setting and participants, one of many instances throughout the action research process where boundaries or borders are engaged with, and often crossed. Due to this familiarity with the study area due to the reasons mentioned above, I am unable to separate myself completely from the process and act as an objective researcher. Cassell and Johnson (2006) suggest that knowledge is always produced with interests influencing the process, and therefore, knowledge production cannot be neutral.

Why is researcher positionality important to social research such as the current study? Its importance and potential influence centres around the notion that a researcher's framing of epistemological, methodological and ethical issues in research can be greatly influenced by the degree to which they consider their positionality, as an insider or an outsider (Herr and Anderson, 2014). The proposition is made regarding positionality that researcher is located at a mid to far right position on the insider/outsider scale, or alternatively, a 5-6 out of 6 on the continuum of positionality (ranging from 1 to 6), as described respectively as positionalities of 'Outsider in collaboration with insiders' (5) and 'Outsider studies insiders' (6) by Herr and Anderson (*ibid*: 40).

My social networks (immediate and extended family) and previous research experience is important to consider as to the influence of researcher positionality. I accept the assertion of Cassell and Johnson (2006) on the inability for knowledge production to be neutral, and whilst the objective is to facilitate research with participants, I will also utilise my positionality to assist the research, such as conversing in Welsh where necessary. An example of the utilisation of researcher positionality, within an action-oriented approach, is provided by Whitton (2010). Whilst employed by the UK nuclear industry, Whitton conducted research with members of the

Nuclear Decommissioning Authority National Stakeholder Group (NDA-NSG), engaging in stakeholder dialogue to assess their perception of the NSG process in regards to their role and influence in engagement processes. This research is highly relevant and informative to the action-oriented research detailed in this thesis.

As an MSc researcher in 2011, I conducted research in Anglesey with different social groups. I engaged with farmers, sixth-form students and members of the public – utilising a predominantly quantitative methodology (closed questions questionnaire), but incorporative of some qualitative data also (comments section) – on their perceptions of nuclear power and more specifically their perceptions of risk towards current and proposed nuclear developments on Anglesey (Parry, 2011). As a result of this research study, the differences in perception between different groups within a specific locality became evident, and I also observed how differently each group communicated, with me as a researcher and also with the research topics.

Reflective Commentary

The MSc research study (2010-2011) was my first insight as a researcher into the potential value of a social group approach, which could highlight intracommunity differences and enhance the strategic element of communication and engagement approaches. Throughout this study, I communicated extensively with the Heads of Sixth Form at the three secondary schools at which research was conducted and students were engaged, developing working relationships with them, and also with the staff. It was apparent during this research period in Anglesey that my ability to speak Welsh – due to extensive family links both to North Wales and Anglesey specifically, and having grown up speaking Welsh regularly – was often critical in my ability to communicate effectively with participants, and also those people who facilitated meeting with participants and communication with them. Such facilitative individuals are utilised in the current research and are termed as 'facilitative group contacts' (FGCs).

Researcher positionality has been experienced and utilised previously in a research setting. I found during my MSc research, particularly among farmers, that merely mentioning the name of a family member and the family connection, or indeed their farm which had been in the family for some generations, was sufficient to generate familiarity and rapport with individuals who knew them or at least knew of them, such is the nature of the close social networks of the farming community on Anglesey. Reflecting on this personal experience, the impact of *familiarity* in the context of facilitating dialogue with strangers, particularly on topics of potential contention such as nuclear power, has been demonstrated. This included witnessing changes in body language, communicative tone and receptiveness of individuals once a common link has been

highlighted and identified, often through a personal or family link.

In addition to my own research in 2011, I was also involved in a further energy research project in Anglesey in the summer of 2013. This study was conducted to understand public perceptions of energy infrastructure on Anglesey, examining the perceptions of sixth-form students in three secondary schools. Previous relationships with these schools developed during the 2011 study were utilised to re-engage with the three schools to enquire about their interest in participating in the research. I communicated in both Welsh and English with the Heads of Sixth Form at each school, as two of the individuals spoke Welsh as their first language. As was the case in the 2011 study, the Heads of Sixth Form acted as FGCs for the duration of the study and assisted in the organisation of workshop sessions. This further demonstrated the communicative importance of both a partial- insider positionality, and of research-based familiarisation for progression of the research project, whilst the research group maintained a predominantly outsider role during participant engagement/data collection. This being said, in two of the three schools, I introduced the research and research group to the sixth-form groups in both Welsh and English as appropriate, and in one of the schools, a close family member was a sixth-form student and participated in the study. This further contributed towards the greater 'insider' positionality experienced during the current research, as it furthered familiarisation with these schools and with particular members of staff, thus facilitating more recent communication and dialogue with these institutions. This combination of my researcher positionality, whilst employing a priority-centred approach to dialogue and identifying priorities to develop series of indicators, leads to a process sharing aspects with that of participatory research. As the research is based upon engage with participant groups in a process of enquiry which is inherently researcher-devised, but attempts to better understand *their* social priorities to develop sustainability criteria for nuclear energy infrastructure, I suggest that the research is participatory but cannot be deemed fully collaborative.

Reflective Commentary

As a researcher I have frequently reflected upon my research approach given my personal history and attachment to Anglesey, and personal links with the area and people who contribute towards the focus of this research, critically evaluating my research decisions. Great efforts have been made to remain as a neutral outsider during the development of research methods, but then to utilise my 'insider' status - as a Welsh speaker with family links on the island - to facilitate communication, familiarisation and engagement with potential participants and FGCs. For example, my ability to speak Welsh was considered extremely valuable when communicating with predominantly Welsh-speaking schools and agricultural societies, based upon my own experiential knowledge of the value that many Anglesey residents place on maintaining the Welsh language. I am familiar with Anglesey as a place and extremely familiar with many residents of Anglesey through personal social networks, however I have never lived in Anglesey and so remain very much a 'residential outsider'. In order to define my own researcher positionality, as a Welsh-speaking researcher with long-term family ties to the area under study, I frame my position as one of *socially and culturally familiar/inside, residentially outside*.

4.5 Research methodology: Research process

I propose to engage what I term 'groups of social commonality' by utilising mixed-methods in the form of research questionnaires and deliberative dialogue, as part of an *Action-oriented approach* and a *social group strategy*. I do this in order to understand the complexity of social priorities at the local scale, in the context of a new nuclear power development, to inform future processes of stakeholder engagement and sustainability indicator development. The research process is conceptualised in Figure 5, which outlines a three-stage mixed-methods process of *identification*, *exploration*, and *clarification* of group priorities, which involves periods of reflection with participants on the outcomes of previous stages to inform deliberative dialogue, as is common in Action-oriented research.

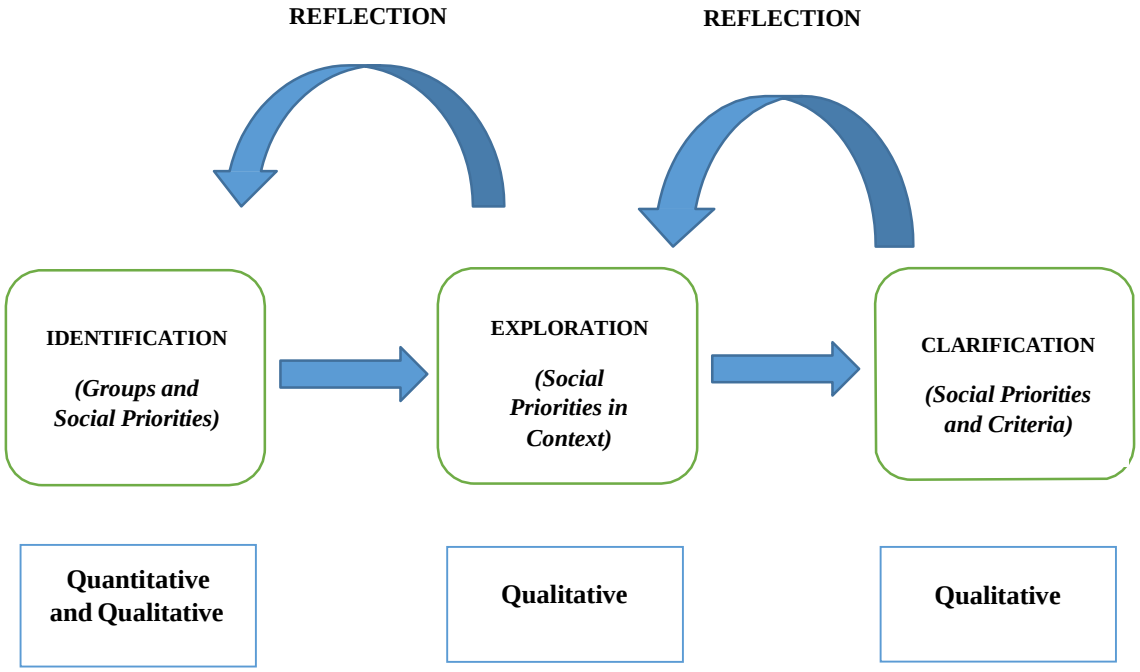

Figure 5. This shows the three-stage mixed-methods process of the current research to identify and understand the social priorities of different social groups

Figure 5 shows a process of *identification*, of suitable groups of social commonality to participate in the research and then their broad social priorities, followed by an *exploration* of these social priorities through dialogue-based group sessions, in the context of a new nuclear development in the locality, proceeded by a second dialogue-based group session in which social priorities are discussed and *clarified* for the purpose of drafting group-specific social sustainability indicators. Throughout the process, I engaged in periodical reflection, both with participants on previous sessions and the outputs from these, and on practice in order to identify and determine areas of potential improvement, a critical aspect of AR methodologies (McNiff, 2013).

4.5.1 Participant group identification

Before appropriate participant groups were selected and contacted, it was necessary to identify the different groups in Anglesey which would potentially be able to be engaged face to face and involving numerous group members at one time, in order to engage in dialogue with them. This acknowledges the "face-to-face ideal" (Page, 1996: 5) which forms the basis of traditional deliberation, and the influence on establishing rapport with participants which results from the researcher being present during communication, particularly when sensitive or personal questions are asked (Caserta et al., 1985).

The decision was taken early on employ a geographical boundary to the selection process, and only groups which were based on Anglesey itself were considered. A basic qualification process was then developed to identify suitable 'groups of social commonality' (GSC): three basic primary criteria were used as qualification criteria in identifying appropriate GSC, with two secondary criteria further qualifying the group as having suitable face-to-face engagement potential. If one of the primary criteria and at least one of the secondary criteria were met, the group was deemed suitable and appropriate for initial contact:

Primary Criteria - Appropriate groups:

1. Groups of common special interest (e.g. hobbies)
2. Groups of common demographics (e.g. age)
3. Groups of common employment or workplace (e.g. education)

Secondary Criteria - Potential for engagement:

4. Group is able to meet in a designated location at a designated time
5. Group/group members already meet on somewhat of a regular basis (minimum once every two months)

The groups presented in Table 3 overleaf were identified as suitable according to the above primary and secondary criteria and shortlisted for contact to participate, ordered alphabetically according to group subject. It is important to note that the groups included in the table do not reflect an exhaustive list of potential participant groups, but a mixed sample.

During the qualification process, it was clear that a select number of groups would have to be chosen, and considering the workshop series planned in order to conduct the necessary research, it was decided that the total number of participating GSCs would be limited to a minimum of three and maximum of five. Once this decision was made, my positionality became a factor in which groups to contact in the first instance. Based on my the prior experience in working with particular groups from those identified as suitable, the groups of farmers/agriculturalists, sixth-form students and secondary school teachers were deemed appropriate candidates for contact and invitation to participate. These groups were contacted by email and phone in March 2014 to inform them of the research and invite them to participate, to which all four groups demonstrated initial interest. Research documents were sent to FGCs once Ethical Approval had been received, at which point they were able to decide whether they wished to participate.

Following Table 3, I discuss the quantitative aspect of the mixed-methods approach to research.

	Primary Criteria			*Secondary Criteria*	
Nature of Group and Group Name	**Special Interest**	**Common Demographics**	**Employment or Place of Work**	**Designated meeting location and time potential**	**Regular meetings in place currently**
Agriculture **- Anglesey Grassland Society (Cymdeithas Tir Glas Ynys Môn)**	•	•	•	•	•
Agriculture **- Wales Young Farmers**	•	•	•	•	•
Arts, Culture and Heritage **– The Anglesey Antiquarian Society and Field Club**	•			•	•
Community and Leisure **– Criw Niwbwrch CYF**	•	•		•	•
Education **- Secondary School Teachers**			•	•	•
Education **- Primary School Teachers**			•	•	•
Education **- Secondary School Students (over the age of 16)**		•	•	•	•

Energy **- Protest/ Campaign Organisation – People Against Wylfa B (PAWB)**	•		•	•
Energy **- Protest/Campaign Organisation – Anglesey Against Wind Turbines (AAWT)**	•		•	•
Energy **– Protest/Campaign Organisation – No Pylons Campaign Group**	•		•	
Environment **– Ynys Môn Angling Association**	•		•	•
Food **- Anglesey Food Group (Gorau Môn)**	•	•	•	•
Gender **– Anglesey Federation of Women's Institutes**	•	•	•	•
Social **- Bangor and Ynys Môn Peace and Justice Group**	•		•	•
Young people **– Llais Ni (Our Voice)**		•	•	

Table 3. Social groups on Anglesey, which fulfil both primary and secondary criteria for research participation

4.6 Research methodology: Quantitative Data - Questionnaire Development and Validation

The mixed-method approach employed by the current research looked to combine both quantitative and qualitative methods of data collection in order to enable a detailed examination of group priorities in social contexts. In order to acquire a broad data set from which to work from and examine in greater detail, and considering the suitability of methods for a range of social groups and what members of the public would either be familiar with or be able to easily engage with, it was considered that the development of a questionnaire would be an appropriate tool.

In designing the questionnaire, a number of general considerations regarding questionnaires and their effectiveness were made. For instance, in order to be reliable and effective tools for data collection, it is important that researchers and the questionnaires they develop are consistent in their approach, asking respondents the same questions and that respondents are able to answer questions in a systematic fashion, and that only in extreme cases should using different questionnaires for different subgroups be considered (Burton, 2000). Therefore, in order to avoid this and enable to the questionnaire to allow comparability between all participants, it was first decided that a questionnaire was developed which could be engaged with and answered by all participants over the age of 16. At this age, students are becoming decision makers to a greater degree in regards to choosing whether to stay in or leave school following their GCSEs, and if deciding to pursue further education, which subjects they wish to study for AS/A Levels. Therefore, differences in age, educational experience, socio-economic background and other factors and their impact upon a person's ability to effectively engage with a questionnaire were considered at the earliest stage of development. I also considered a number of conditions that are highlighted by Fowler (1993) as impacting upon the validity of factual reporting and the accuracy of participant responses. These are:

1. **Participants do not understand the question**

   Participants may not wish to admit that they do not understand, or questions may be asked of the researcher identifying a potential issue. The participant may then guess the answer and provide an answer that is incorrect. In such cases, open-ended questions can be provided for questions that appear problematic, but this is very labour intensive and time consuming depending on the number of participants.

2. **Participants do not know the correct answer**

   This can occur where factual questions are being asked of participants, in which case, depending on the number of participants who do not know the correct answer, this may reflect a questionnaire design issue or a miscalculation of participant abilities and knowledge of the subject. This can be addressed by enquiring with participants on why they cannot answer, and altering the required detail of the question or changing the

question accordingly. Alternatively, it may be possible to allow participants to confer with others (e.g. colleagues) for detail purposes, or to assist participants in estimating answers. This must be considered in the design of the questionnaire, and the duration of enquiry may be significantly increased.

3. **Participants do know the answer but cannot recall it**

   The reasons for the occurrence of this condition and how it can be managed are often similar to the above condition (Condition 2.). Such responses by the researcher must be factored in to the design of the enquiry process, and in some instances follow-up questions or interviews may be necessary, and so this can also be time consuming and labour intensive.

4. **Participants do not wish to answer the question in an interview context**

   This can occur for a number of reasons as each person is different, but this is commonly encountered with issues of a sensitive nature. It is very important in such cases that the researcher clarifies that they will not make any personal judgements, and that accuracy is the objective of the questioning. In cases such as this, increased confidentiality of the data or its anonymization may be effective measures to reassure the participant.

Taking into account these conditions that may problematize enquiries using questionnaires, I decided that non-factual enquiry would not be employed. Instead, the questionnaire would explore the personal viewpoints and values of participants, which they would know the answer and be able to recall the information, in order to mitigate conditions 2 and 3. In order to avoid condition 4, it was also decided that no questions of an overly personal nature would be posed to participants, and that the questionnaire would explore personal views regarding the importance of specific social issues. Finally, in order to mitigate the possibility of condition 1, it was decided that not only would instruction be included in the questionnaire itself to best explain what was expected of the participant, but that the questionnaire would be completed by participants whilst I was present in order to allow participants to enquire with me directly, in the case of uncertainty or confusion towards any questions. I also considered the four questions proposed by Hague (1993) as necessary during questionnaire or survey design:

1. *Will this question be understood in the way I intend?*
2. *How many different ways could this question be interpreted?*
3. *Is this question likely to annoy, intimidate or offend?*
4. *Is there a better way of asking the question?*

Throughout the design of the research questionnaire, I engaged in a process of reflection in order to ensure that these four considerations were reflected in the developed questions. It was my intention to design questions that were short, clear and made obvious what was expected of the

respondent. Efforts were made to ensure that technical language and ambiguous terms were avoided and that familiar words and language formed the basis of questionnaire text so that the opportunities for misinterpretation and misunderstanding were mitigated. It has been found that positively-phrased questions are often easier for respondents to answer than negatively-phrased questions (Burton, 2000), and I therefore phrased the questions in such a manner. Both *familiarisation* and *ease of engagement* were key consideration criteria. Such considerations also impacted upon the type of questioning which I utilised in the questionnaire. In order to design the questions in such a way that participants could easily understand the question and communicate their viewpoints easily, in the context of how important certain issues were to them, it was deemed that the utilisation of a scaling technique would be appropriate. Reflecting upon my previous research in Anglesey (Parry, 2011) and the responses of research participants to the technique and style of questioning, a commonly used measurement tool in social science research to indicate how much a respondent agrees or disagrees with a statement - the Likert scale - was considered as a suitable format and was employed in the drafting of the research document.

Due to the importance of face-to-face communication for reasons which have been discussed earlier in this chapter, the decision was taken to develop a questionnaire to be completed 'in person' as opposed to one that was posted or emailed to participants. This method enabled an introduction and explanation of the questionnaire in person to be provided to each group, briefly going through the document in front of participants to explain the content of each section and what was required from participants. The potential response rate with such a method is also far greater, for the reason that a designated amount of time is made available to participants in which to complete the questionnaire, which can then be returned directly to the researcher with little to no opportunity for document loss or in-transit damage or misplacement if posted. Return rates commonly decrease quite dramatically if similar quantitative methods are utilised, such as postal, email or web-based questionnaires or surveys, as the recipient or participant must not only employ more self-motivation to take time to complete the document, which may have arrived with them among other paper-based or electronically-based mail, but then, in the case of postal questionnaires, employ further effort to post the completed document in the nearest postal box or office.

The development and utilisation of in-person questionnaires further reflect the philosophical basis of the current research methodology, that it is the local stakeholder who should be accommodated where possible as it is these individuals who critically provide the researcher with the necessary information and insight so as to construct, support and inform their work. The approach employed in the current research is one that seeks to *accommodate, and maximise the familiar* to produce a more attractive opportunity and environment in which to engage which respects the needs of and common demands on individuals.

Broadly speaking, the social emphasis of the current research is in identifying localised issues of social importance and priority, and it was important that the research questionnaire demonstrated

this. Turcu's research (2013) has been highly informative in the development of the current research methodology. Due to the significant work undertaken by Turcu to identify a range of common urban sustainability issues for a UK and local context, several themes from this study were considered for the questionnaire. Although the emphasis of the current research is social sustainability, and more specifically rural social sustainability given the nature of Anglesey, Turcu's work remains highly relevant by identifying themes and issues of sustainability at the national and local scale. It was also necessary to research and incorporate other issues that were not only social in nature (the study by Turcu (2013) examines a range of sustainability issues, including social) but which were relevant in the context of Anglesey itself, and reflected the area's unique context. This reflected my intention to include both broadly relatable and locally relatable issues to the questionnaire, providing elements of both balance and local legitimacy. In order to achieve this, the Anglesey and Gwynedd Joint Local Development Plan (IACC-GC, 2013b) was utilised to identify key development issues of a localised and social nature. This document was both recent and reflective of local circumstance. The Plan was based upon consultation work conducted at the local level, therefore providing broad public validation to the identified issues. Following the examination and review of both key sources – the work of Turcu (2013) and the Anglesey and Gwynedd Joint Local Development Plan (IACC-GC, 2013b) – 13 themes were identified, and for each theme, 3 issues were specified:

1. **Community**: *sense of community; social links and networks; trust in other local residents*

2. **Local culture**: *Welsh culture; Welsh heritage; Welsh language*

3. **Population changes**: *amount of younger people leaving Anglesey; amount of people moving onto Anglesey from elsewhere to live; number of Welsh speakers in Anglesey*

4. **Crime and safety**: *the amount of crime to or in homes in own town/ village; the amount of crime against people in own town/village; the amount of crime which affecting own town/village in general*

5. **Health**: *physical health; social health; mental health*

6. **Employment**: *variety of employment in Anglesey; quality of employment in Anglesey; amount of available employment in Anglesey*

7. **Quality of life**: *enjoyment of my time spent working/at school; ability (time and physical capacity) to do hobbies; enjoyment of leisure time*

8. **Training/skills courses**: *variety of training/skills courses in Anglesey; access to*

training/skills courses in Anglesey; amount of training/skills courses in Anglesey

9. **Local participation**: *taking part in voluntary activities in Anglesey; taking part in local decision-making in Anglesey; taking part in community events in Anglesey*

10. **Housing**: *amount of affordable housing on Anglesey; different types of housing on Anglesey; condition of housing on Anglesey*

11. **Transport**: *condition of roads on Anglesey; reliability of public transport on Anglesey; amount of traffic on roads in Anglesey*

12. **Access and communication***: local representatives on Anglesey; local authorities on Anglesey; large companies operating on but not based in Anglesey*

13. **Provision of local services and facilities**: *business, finance and retail; leisure and entertainment; educational, health and care*

The draft questionnaire (*see* Appendix 2) which was developed included four main sections, one of which provided the opportunity to collect more qualitative data in the form of additional participant comments:

1. *Basic demographic questions*: gender, occupation, closest town or village to residence, number of years living in Anglesey, first language

2. *39 Likert-scale (4-point, 'matters very little to me' to 'matters a lot to me') questions*, requesting participants identify how much each of the 39 social issues mattered to them (13 themes, with 3 issues within each theme).

3. *Social issue prioritisation exercise*, requesting participants identify, by writing, their three most and least important social issues from the 39 in the previous section

4. *Comments section*, inviting participants to provide further written comments and to note any social issues that they considered to be important which hadn't been included in the questionnaire.

The two key literary sources (Turcu, 2013; IACC-GC, 2013b) contributed both academic and local governmental validation of the social issues to be included given the validation processes that had been undertaken in order to generate both the research and the development plan. However, the questionnaire required a further process of validation once the two sources had been

sourced to develop the content of research questionnaire document. This involved the presentation of my research at peer and expert-attended industrial seminars and academic conferences, and the undertaking of a Pilot Study:

- Presentation of the proposed methodology at a National Nuclear Laboratory Signature Research seminar in December 2013. A poster presentation was given, providing me with the opportunity to answer the questions of leading nuclear researchers from various fields. Several researchers commented on the need for greater research into the 'identification and measurement of long-term social impacts'.

- Presentation of the research methodology and questionnaire themes at an international sustainability conference (*10th International Conference on Environmental, Cultural, Economic and Social Sustainability*) at the University of Split, Croatia, in January 2014. This was conducted in the form of a 20 minute presentation, discussing the methodology and data collection process to an audience of over 20 international sustainability experts. As a result of this academic conference, I co-authored on an academic publication which considered the social sustainability of energy infrastructure decisions (Whitton et al., 2015), presenting a conceptual framework to stakeholder engagement and sustainability criteria in this context (see Figure 6). This paper was informed by my research and social-group strategy, and was published in 2015 in the peer-reviewed journal *Energy Research and Social Science.*

- A Pilot Study was undertaken in April-May 2014, which enabled the draft questionnaire to be tested and commented on by a number of Anglesey residents or individuals who had previously lived in Anglesey for several years and were known to me.

During the development stage of the draft questionnaire, the document was discussed with a stakeholder engagement expert from the Environment Agency in order to provide feedback on the robustness of the questionnaire as a document to be engaged with and completed by the public. Their experience with documents of this nature provided an expert element to the validation process to complement the lay element of the Pilot with residents. Suggestions were provided regarding the terminology of the questions, such that it was suggested that using 'matters to me very little' and 'matters to me a lot' may be more suitable and something that members of the public could relate to rather than 'this is not at all important' and 'this is very important'. The length of the document and the number of questions was deemed to be appropriate for most members of the public, including young people, in regards to retaining their attention. It was also considered that due to the relatively familiar nature of the social topics covered and the personal context of the questions, it was likely that participants would hold an opinion of some degree on each issue. Therefore, a strategic decision was taken to direct people to answer on one side of the

question scale or the other by providing a four point Likert scale ranging from ‘matters to me very little’ to ‘matters to me a lot’, as opposed to five, thus avoiding the inclusion or option of a ‘neutral’ or ‘I don’t know’ option.

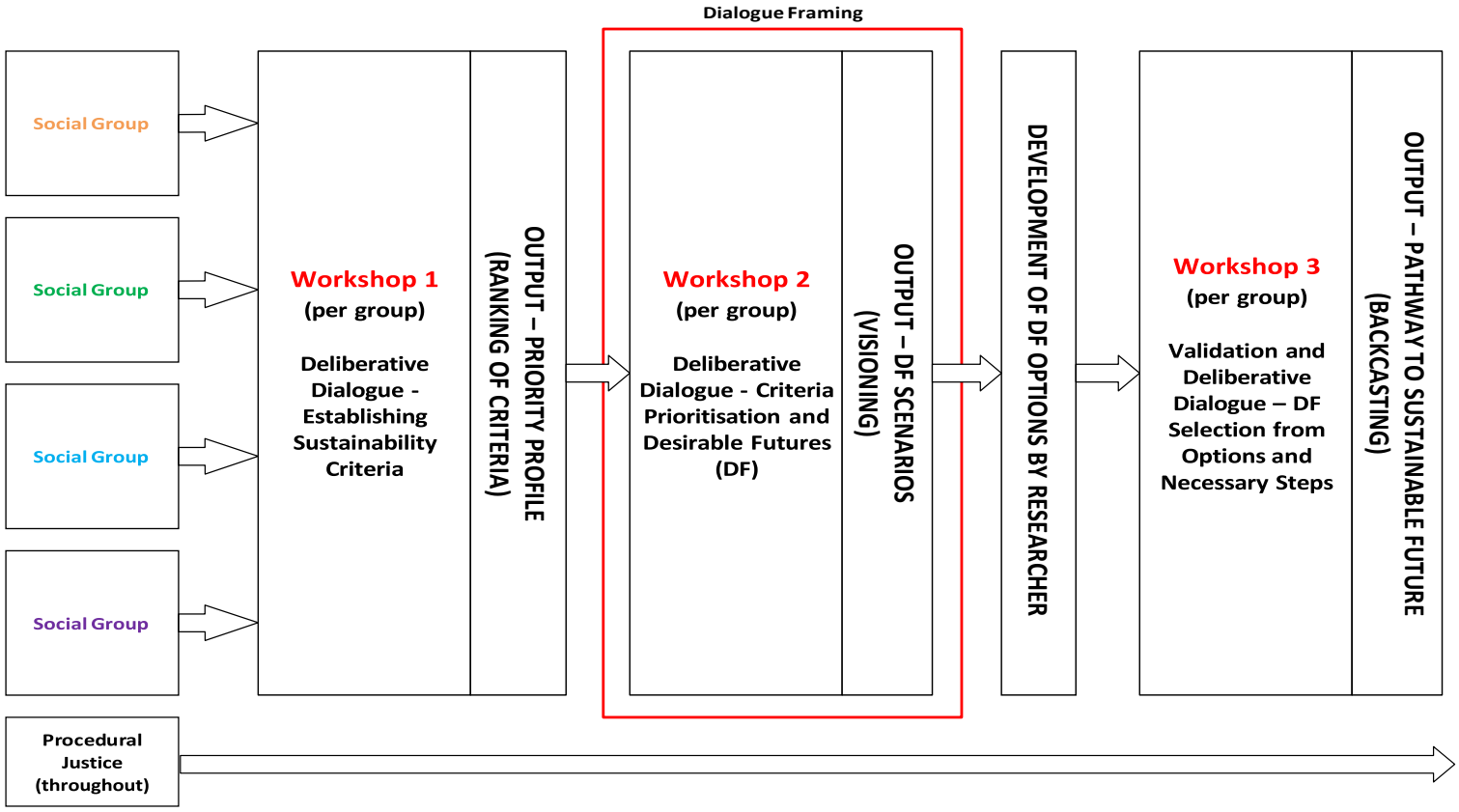

Figure 6. Conceptual framework for the establishment and prioritisation of sustainability criteria with various community-level social groups, and developing sustainable future pathways (Source: Whitton et al., 2015)

Following the preliminary development of the draft questionnaire, the revised questionnaire document was submitted for Ethical Approval from the University in early March 2014, with Ethical Approval being granted after a period of seven weeks at the end of April 2014 (*see* Appendix 3). This process took longer than initially anticipated, based upon the intended duration specified by the University of 10 working days, the impact of which will be discussed later in Chapter 7. Once documents had received Ethical Approval, they were distributed to FGCs for their review and approval, at which point they decided whether or not they wished to confirm intended participation. I also made contact with other groups to enquire about the participation of a fifth and final group. These included Wales/Anglesey Young Farmers, protest group 'People Against Wylfa B' (PAWB), Women's Institute, and Anglesey Food Group 'Gorau Mon'. However, similar interest from these groups was not attained. Reasons ranged from a lack of communication following several invitations, to a group not wishing to engage with the research if there was an opportunity that it could assist the nuclear industry in any way on Anglesey and more broadly into the future.

At this point, the data-orientated element research process will be discussed, beginning with the pilot study, and followed by the empirical aspects of the research process.

4.6.1 Questionnaire Development: Testing - Pilot Study

Following the pre-dissemination validation of the document from technical expert and academic perspectives, and the proceeding acquisition of Ethical Approval, the document was then disseminated to several members of the Anglesey 'lay' public for comment and feedback. The draft questionnaire was distributed to five individuals, by email and post depending on their preference, with strong social links to and experience of living in Anglesey for their review and feedback:

- Two 17 year old students from two different locations in Anglesey, attending two different secondary schools, who had both lived in Anglesey since birth
- One University lecturer from Bangor University, North Wales, who had lived in Anglesey since birth until 4 years previous (resident for approximately 30 years, visits friends and family on Anglesey on a weekly basis)
- One ex-teacher who had lived in and worked on Anglesey since birth and was a current Anglesey resident (resident for over 50 years)
- One retired farmer who had lived in and worked on Anglesey, on the same farm, since birth (resident for over 60 years)

This range of individuals reflected a range of levels of education and circumstances but who had sufficient experience of living in the study area to be able to provide valuable insight as to the important issues facing individuals of various ages, life experience and life position, and length of residency. Upon reflection, it may have also been constructive to include a number of

individuals who had not been Anglesey residents since birth but had moved onto the island later in life in order to include a different perspective. However, for the purpose of the Pilot Study, the aim of the validation process was to target a range of current or recent Anglesey residents who possess legitimate knowledge and experience of common issues of local importance on Anglesey. As mentioned previously, these individuals were known to me. This is not deemed to be problematic or to produce issues of researcher-participant influence, as the comments requested were regarding the content, structure and style of the document and not upon my personal opinions. Therefore, it was communicated to each participant that their honest critique and feedback would be valuable in developing the document for its wider dissemination to the Anglesey public as a research tool, and that any comments were welcomed. Due to my researcher positionality, it was possible to communicate the importance of his involvement and feedback for the development of the questionnaire; pilot study participants understood that all comments were welcomed and viewed as constructive. Indeed, it is proposed that the element of researcher-participant familiarity facilitated, rather than hindered, the provision of honest and constructive criticism of the document.

Comments from participants were provided by email and by phone. Comments received from the Pilot Study feedback included:

- For some questions, 'on Anglesey' may be more appropriate than 'in Anglesey'
- For some questions, 'in school or at work' may be appropriate if engaging with students and adults
- The number of questions and length of the questionnaire is appropriate and short enough to hold people's attention
- The lack of a middle number on the scale (i.e. neutral or I don't know option) is quite daunting
- The comments section is a good idea
- A five or seven point Likert scale would be appropriate, as would including a 'neutral' option
- Strongly agree/disagree language is familiar and may be more suitable for use on question scales
- The themes covered are appropriate and sufficient for Anglesey
- Some confusion over whether the questions are asking about how important the issues are *personally,* or how important they think they are to the *Anglesey residents*
- In regards to the issue ranking exercise, having the full list of issues presented to select the top and bottom three would make the exercise quicker and easier.

This feedback facilitated reflection and amendments to be made to the questionnaire. The length and the composite themes and sections of the questionnaire were deemed appropriate, and the changes made predominantly related to questioning style and structure. The comment received on whether the questions related to a personal opinion or to Anglesey residents more broadly was constructive. However, taking into account that the in-person questionnaire would be provided to participants directly and completed by participants whilst I was present, it was deemed suitable to clarify this briefly within the questionnaire but also by further communicating the personal nature of the questions to participants during the first sessions.

4.6.2 Questionnaire Development: Post-pilot study reflection

In response to the comments and feedback from pilot study participants, the following amendments were made to the questionnaire:

- The Likert scale was increased from four points to five to include a neutral option

- The style of questioning was altered so that statements were made about the importance, and the language of responses was altered to 'strongly disagree' to 'strongly agree'. This was deemed as likely to be more familiar to, and easier to engage with for, participants

- The social issue prioritisation exercise was modified to a ranking exercise; all 39 options were presented on the page with a small box next to each, for which participants would number their top three and bottom three issues of importance, where 1 represents their most important and 39 represents their least important issue, and 6 answers were made in total (1-2-3 for most important and 37-38-39 for least important)

In addition to the comments received by pilot study participants, it was decided to amend the ordering of the sections within the questionnaire, so that participants would not be asked to provide demographic information, which some may view as personal in nature, at the very beginning of the process. The decision was made to include this as the second section of the questionnaire. This also enabled the style of questioning to alternate throughout the document, having the effect of 'breaking up' the questionnaire to a greater degree and reducing the potential for perceived monotony. Therefore, the questionnaire developed as a result the Pilot Study was structured as follows:

1. *39 Likert-scale (5-point, 'strongly agree' to 'strongly disagree') statements*, requesting participants identify how important each of the 39 social issues were to them (13 themes, with 3 issues within each theme). An example is provided overleaf:

Welsh culture is important to me

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

2. *Basic demographic questions*: gender, occupation, closest town or village to residence, number of years living in Anglesey, first language

3. *Social issue ranking exercise*, requesting participants identify their three most (1-2-3) and least (37-38-39) important social issues from the 39 in the previous section

4. *Comments section*, inviting participants to provide further written comments and to note any social issues that they considered to be important which hadn't been included in the questionnaire.

These amendments to the questionnaire document demonstrate principles of Action Research such as reflection and deliberation, altering the document according to the feedback of participants, whilst also demonstrating aspects of procedural justice in the involvement of pilot study participants in impacting upon research materials, and therefore, the research overall which is primarily concerned with the views and opinions of Anglesey residents. Once these amendments were made to the document, they were again translated by a professional translator, following which they were distributed to the FGCs for the four selected groups – two sixth-form student groups, a teachers group, and a farming/agricultural group - for their approval for distribution, with supporting documentation which included consent forms and 'Invitation and Information' sheets (Appendices 4 and 5). Hopkins (2007) notes that ensuring informed consent is an important aspect of research with participants, particularly when they include people of a young age (Hill, 2005). In the current research, participants were requested to read the Information and Invitation sheets fully and complete a consent form prior to taking part in research sessions. This documentation can also play a role in empowering participants and developing capacity. When discussing information sheets and consent forms, Valentine (1999) suggests that for participants, consent forms represent a "useful way of giving them a sense of control, individuality, autonomy and privacy" (p. 144) whilst assisting them in learning "how to make safe choices and to read the document carefully" (*ibid*). The documentation provided an introduction to the researcher/myself and an overview the research itself, with an invitation for people to participate on a voluntary basis. Once this documentation had been distributed to the FGCs, sessions were organised and this information could then be distributed to group members via the FGCs due to the familiarity of group members with these FGCs, and the communicative access of the FGCs with group members (e.g. face-to-face contact).

In order to summarise the research process up to this point, the development process of the

quantitative data tool – the research questionnaire – is detailed in Figure 7 overleaf. This process demonstrates processes of *review, design, validation, reflection and development,* which all facilitated the development of the final questionnaire document, designed to represent *local* social issues of priority, to be completed by participating local social groups.

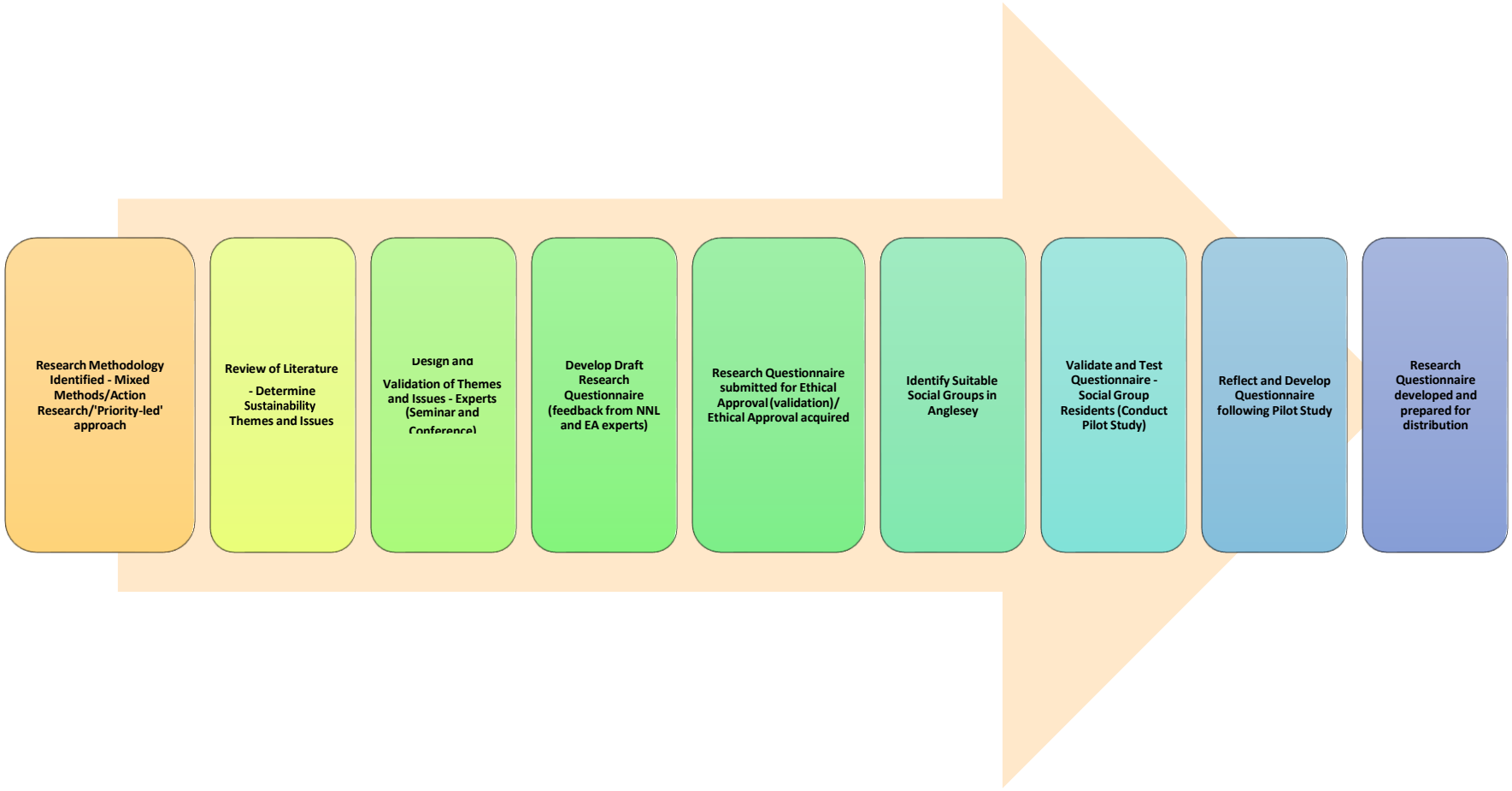

Figure 7. This block diagram shows the development and validation process of the research questionnaire

4.7 Research methodology: Quantitative Data - Social Group Session 1

Each session was individually organised with the group contact at a place and time which would best suit the group. For example, for sixth-form students, this was during the day when they did not have planned lessons; for teachers, this was during the school lunch break; for farmers, this was in the evening prior to an organised CTGYM meeting. Each session was less than hour in length, often lasting approximately 45-50 minutes, with time allocated for participant questions.

4.7.1 Location and Duration

The first sessions all took place at locations which were familiar and regular meeting places for each group; students and teacher sessions took place at their respective schools in classrooms or vacated libraries and common areas, whilst farmer sessions took place in an upstairs function room at a public house where Society meetings took place on a monthly basis during 6 months of the year (October – March). Combined with the first sessions all lasting less than an hour in duration, this approach saw the mitigation of room-booking costs as they were already occupied by the groups. Figure 8 shows the map of locations where the sessions with each group took place.

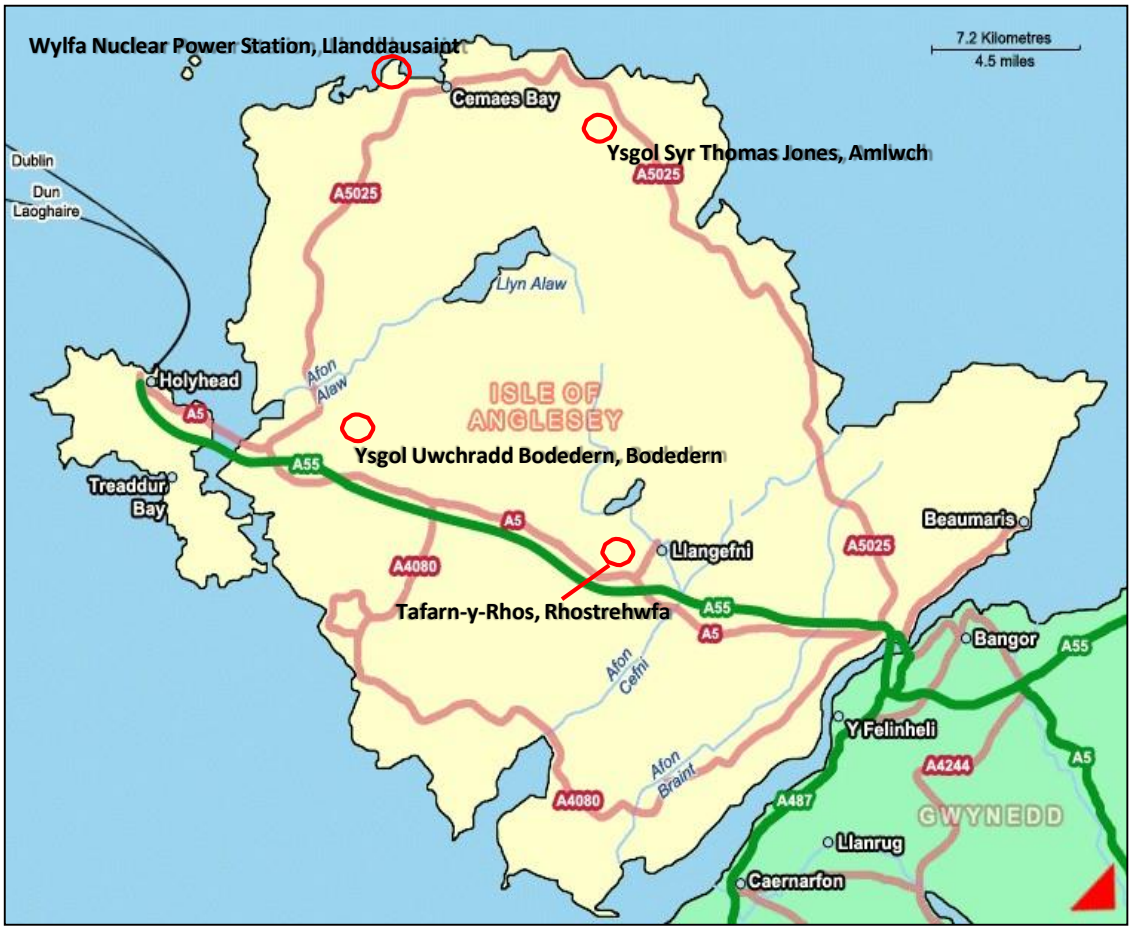

Figure 8. Map of Anglesey, north Wales, with key arterial roads, and the Wylfa Nuclear Power Station site and three research locations highlighted (red circles)

The purpose of the first round of workshop sessions was two-fold:

1. To introduce myself as the researcher, my research aims and research process to the group

2. To conduct quantitative research through dissemination of researcher-developed questionnaire (*see* Appendix 3) to each individual in the group

The timings and duration of the first workshop sessions are detailed in Table 4, as are the number of participants. The participant numbers do not reflect the number of attendees; for the CTGYM Farmers group, a select number of those attending the group meeting decided to participate, reflecting approximately half of those in attendance. Unlike other groups, I spoke with CTGYM Farmers at the beginning of a pre-planned, monthly group meeting. Therefore, the participant numbers reflect voluntary participation within each group.

Although the structure was broadly retained in each session, these timings were not intended to be exact and were fluid to a degree depending on whether there were questions from the group. Supporting this, Table 5 provides details of each of the first workshop sessions in Anglesey across each of the participant groups. Each session was approximately 45-50 minutes in duration, which in the case of schools, sought to accommodate the duration of class times (Students) and lunch breaks (Teachers). For the CTGYM Farmers group, this duration was also used in order to ensure equity and fairness between sessions and groups.

As Proctor (2003) states, "many populations of interest are too large to work with directly" (p. 100), and due to this, sampling techniques were utilised to sample from larger populations. Sampling was primarily based upon group interest to participate in the research. The emphasis on specific social groups in Anglesey reflects a *purposive* approach to sampling. As described by Bryman (2012), the sample groups are selected because they possess certain characteristics or features which enable the researcher to explore the various themes under study, i.e. socio-demographic similarities (Ritchie et al., 2014). The invitation for group members to participate if they wished to, on a voluntary basis, reflects a *convenience* approach to sampling. I did not aim to gather a statistically representative sample of the Anglesey population or of each group. In this sense, I did not seek to explicitly engage in probability sampling (*ibid*), but rather sample based on voluntarism within the group which had gathered as a result of pre-distributed invitation, in the interests of procedural justice and fairness (*see* Section 2.2). The samples were utilised for statistical analysis as is common with probability sampling, however this was done to highlight inter-group differences on social issues. Therefore, initial group sample size was a result of intra-group interest to participate, rather than based upon a pre-determined quota as is common with probability sampling (Ritchie et al., 2014).

Social Group	Date of workshop session	Location (geographic and session space)	Number of participants	Main language spoken in session (researcher)
Students – Ysgol Syr Thomas Jones/ Sir Thomas Jones High School	15/07/14	Cemaes, Northern Anglesey/ Classroom	30	Welsh and English
Students – Ysgol Uwchradd Bodedern/ Bodedern High School	12/11/14	Bodedern, Western Anglesey/ Sixth Form Room	45	Welsh
Teachers – Ysgol Syr Thomas Jones/ Sir Thomas Jones High School	15/07/14	Cemaes, Northern Anglesey/ Classroom	15	English
Farmers/Agriculturalists – Cymdeithas Tir Glas Ynys Môn/ Anglesey Grassland Society	28/10/14 and 25/11/14	Rhostrehwfa, Central Anglesey/ Public House -Function Room	15	Welsh and English

Table 4. Details of first social group sessions held across Anglesey

Timing (12:00 is used as an example start time)	Duration	Activity
12:00	5 minutes	Introduction of researcher and background
12.05	5 minutes	Research description and reason for participant involvement
12:10	5 minutes	Introduction to research questionnaire with run-through explanation
12:15	5 minutes	Opportunity for questions from participants
12:20	15 - 20 Minutes	Completion of consent form and questionnaire by participants, collected by researcher upon completion
12:35 – 12:40	5 minutes	Description of and invitation to second workshop session, Information and Invitation sheets disseminated for second sessions
12:45	5 minutes	Closing remarks, thanks given to participants

Table 5. Structure of first social group sessions held in Anglesey

4.7.2 Communication and Language

During the first workshops, initial communication was conducted in both Welsh and English, and group participants and primary contacts were asked whether they would prefer communication to be in English or Welsh. The language in which the session was conducted was directed by their responses. For example, the Ysgol Syr Thomas Jones (Sir Thomas Jones School) sessions with both students and teachers was conducted predominantly in English due to some people being less proficient in the Welsh language. However, the sessions with students in Ysgol Uwchradd Bodedern (Bodedern High School) and with members of Cymdeithas Tir Glas Ynys Môn (Anglesey Grassland Society) were predominantly conducted in Welsh due to the wider proficiency of Welsh among the groups. For example, a request from the primary contact (Head of Sixth Form) in Ysgol Uwchradd Bodedern was made to conduct the session in Welsh if possible, due to the school's preference for speaking Welsh. The school is well known across Anglesey for its promotion of the Welsh language and its use over English wherever possible. Due to the nature of the first session, centring around the completion of the research questionnaire, the importance of which language to conduct the session in could be considered as being of less importance in comparison to proceeding discussion-based second and third sessions. However, due to my positionality and prior knowledge of the importance that many Anglesey residents place on the Welsh language (*also see* Day, 2002; Nguyen et al., 2013), it was deemed as a wholly appropriate question and opportunity to be raised and provided to each group. It was intended that each group was given the option and that a majority response would direct the decision, in order to ensure that all group members were able to participate fully in the session. It should also be noted that any questions from participants were responded to in the language in which they were asked. This was a conscious decision, acknowledging the importance which language plays in dialogue, and informed by the theories of Habermas (1984) on the importance of language in effective communication, and the importance of participation and context in developing an 'ideal speech situation' (Habermas, 1989). As other scholars have done so in focus group scenarios (e.g. Hopkins, 2007), research participants were informed that participation was voluntary, and that participation was encouraged but only when if wished to do so.

At the end of each of the first sessions, I briefly re-informed the group of the second session and of its nature and intention. Information and Invitation sheets for the second sessions were distributed to all group participants (Appendix 7) prior to their departure from the session; these included details of what the session would entail; its expected duration; how many participants were required; and further instructions of how to participate in the sessions if individuals were interested (i.e. the details of the group contact).

4.7.3 Between Group Sessions: Social priority format

Following the first workshop sessions, and prior to the second workshop sessions, questionnaire data was recorded for each participant, and organised within group-specific spreadsheets. Similar to the ranking approach undertaken by Turcu (2013), in order to identify issues of social priority for each individual and identify which issues would be discussed with the group in the second session a ranking exercise within the questionnaire requested the participant to number, out of 39 social issues (as included in the preceding questionnaire sections), their most and least important social issues. The exercise requested that each participant number their responses 1 - 3 (first to third most important issue) and 39 - 37 (first to third least important issue), resulting in 6 ranking responses in total; this developed process is termed '*Social Priority Ranking'*, based on a constructivist ontology that reality is individual and context-dependent, that individuals construct and perceive their own realities and in this sense will prioritise different issues according to these individual contexts and differing realities (*see* Bryman, 2015; della Porta and Keating, 2008). Data from the ranking section was organised using the following scoring system:

- Issues ranked by participants as most (1), second most (2), and third most (3) important were given scores of three, two and one respectively. Therefore, every issue identified as [1] by an individual received a three score, every issue identified as [2] received a two score, and every issue identified as [3] received a one score.

- Issues ranked by participants as least (39), second least (38), and third least (37) important were given scores of three, two and one respectively. Therefore, every issue identified as [39] by an individual received a three score, every issue identified as [38] received a two score and every issue identified as [37] received a one score.

This scoring process enabled overall issues of group priority to be identified. From the group data, the four highest scoring social issues and the four lowest scoring social issues were identified for discussion in the second session, where the topic of the potential new nuclear power development and the perceived potential impacts of such a development, would be introduced to frame the dialogue and provide context for discussion. It was decided that four social issues from each category would be chosen in order to include a social issue which was still of importance to group members which had potentially been marginally outscored by the scoring process. In the case that there were two societal issues from those selected with equal scores, the next highest scoring issue in either the most important or least important category would be included to ensure that there would be at least four issues included from each category. The maximum number of social issues included from either category was five, due to the limited time allowance in each of the second sessions and to allow time for each issue to be discussed; therefore, a minimum of eight issues and a maximum of ten issues would be discussed with the group during the second session.

Participant responses to the main body of questions were analysed in order to identify differences between groups; for this, the statistical software package SPSS was utilised. In order for statistical tests to be carried out on the questionnaire data to identify significant differences between groups, in the form of between group one-way Analysis of Variance (ANOVA), it was ensured that even sample sizes of each group were attained for the purpose of comparability. Therefore, 15 participants were randomly sampled from each student group data set (YUB Students, n = 45; YSTJ Students, n = 30), using SPSS random sampling techniques. Based upon these calculated means for each question, between-group one-way ANOVA tests were performed in order for significant differences to be highlighted between participating groups (see Section 5.1.5).

ANOVA tests enable multiple conditions of an independent variable to be compared, and through the acquisition of a variance statistic in one way ANOVA tests, known as the ratio *F*, researchers are able to look at the variability in scores between conditions compared to the variability in scores which may result from random factors or error (Hinton et al., 2004). ANOVA tests enable us to identify that differences exist, but post-hoc tests are then utilised to identify where these differences occur; in the case of the current research, this means identifying whether differences between groups exist on the prioritisation of certain social issues, and between which groups these differences exist, or as Hinton *et al.* (2004: 164) states, "which conditions are producing the effect". Due to the multiple comparisons between groups, the post-hoc test conducted was Fisher's LSD method. Utilising the statistical software SPSS to carry out these tests, a table of descriptive statistics is first produced, providing information such as the number of variables and the mean scores calculated for each of these, which provide the first indication of variance.

Following this, SPSS produces the Levene's Homogeneity of Variances table; this provides further detail on whether the variance is significant, according to the *p* value. If this *p* value is > 0.05 (representing less than 95% confidence), then the variances are considered approximately equal, whereas if the *p* value is < 0.05 (representing greater than 95% confidence), then the variance is considered to be significant, or significantly different (Hinton et al., 2004). The next table produced by SPSS is the ANOVA table, which presents further statistical details including the between and within group differences between conditions, the degrees of freedom (df) between conditions, the *F* statistic, and the *p* value. The *p* value provides further indication on the probability that significant differences between groups exist; a value of < 0.05 indicates the existence of significant difference. The final table produced is the multiple comparisons table for the Fisher's LSD post-hoc test, showing between which groups significant differences were found, according to the probability (Sig.) values; if the value is < 0.05, this indicates that there is a significant difference for that condition between the two compared groups, rejecting the null. ANOVA findings are reported by stating the F statistic (F), the degrees of freedom (df), and the probability (Sig.) (*ibid*) for each case, and the multiple group comparisons findings are reported by stating the groups and the probability (Sig.); these are included in Appendices 10 to 22.

4.7.4 Between Group Sessions: Communication

Communication was maintained with each social group via the FGCs during this inter-session period in order to organise a suitable date and time for the second session with the wider group, and to keep a record of the number of people who had demonstrated an interest in participating in the next session. Communication was maintained using both email and telephone with primary contacts, as there were varying preferences for communicating between each individual, and response times also varied with each medium of communication. These group contacts enabled both a communicative and organisational link and degree of researcher-participant 'distance' to be maintained, aiding the mitigation of researcher influence on participant decision-making and choice, the retention of anonymity between researcher and participants, and communication between researcher and group through a familiar and trusted individual to the group who held a position of leadership and 'organiser'. With each group, communication took place between the primary contact and the group to remind them of the opportunity of taking part in the second workshop to discuss in greater depth the issues of importance they had highlighted in the first session. The groups' response to this was communicated by the primary contact to myself, who was informed of the number of people who had responded and demonstrated interest in participating, to a maximum of eight, on the date which had been agreed upon between the primary contact and the wider group as suitable. This provided further opportunity to dictate the decision-making process and ensure that the research session was not only based upon identified issues of social importance to group members, but was also to take place at a time which was suitable and preferable to them, and which I was able to accommodate. Other details such as the most appropriate/preferred refreshments for each group were discussed with the primary contact, which were also accommodated to an appropriate degree.

4.8 Research methodology: Qualitative data - Social Group Session 2

The second session with each of the groups took place in the same locations as the first sessions. For the students and teacher groups, the location to hold the sessions was limited to their schools due to limitations of availability of group members. For the farmer group, maintaining the same location meant that the elements of familiarity and convenience were retained. As previously, consent forms (*see* Appendix 6) were completed prior to the commencement of the session. The details of each session is provided in Table 6 below, including the details of the language in which the session was conducted.

Social Group	Date of workshop session	Location (geographic and specific)	Number of attendees and participants	Main language spoken in session (researcher)
Students – Ysgol Syr Thomas Jones/ Sir Thomas Jones High School	10/09/14	Cemaes, Northern Anglesey/ Private Library	8	English
Students – Ysgol Uwchradd Bodedern/ Bodedern High School	26/01/15	Bodedern, Western Anglesey/ Private Common Space	8	English
Teachers – Ysgol Syr Thomas Jones/ Sir Thomas Jones High School	10/09/14	Cemaes, Northern Anglesey/ Classroom	8	English
Farmers/Agriculturalists – Cymdeithas Tir Glas Ynys Môn/ Anglesey Grassland Society	23/02/15	Rhostrehwfa, Central Anglesey/ Public House (Function Room)	7	Welsh

Table 6. Details of second round of social group sessions held across Anglesey

The empirical nature of these sessions was qualitative, with an aim to understand, for each group, whether they considered a new nuclear power station would impact upon the issues of most and least importance to them, to what degree, and whether certain social issues became more or less important when the framing topic of a new nuclear power development was introduced. I sought to engage in a dialogue on the issues of importance, and discuss these in the context of a potential new nuclear power station development, on whether a development would impact them in a positive or negative way primarily, but also to begin to understand how each group perceived and considered such a development in a local and social context. These are areas which have been highlighted in the Chapter 2 (*Literature Review*) as lacking when compared to environmental and economic considerations.

The second sessions were conducted by holding round-the-table discussions with each group, with each member being provided with handouts containing the themes and specific issues which had been scored as most and least significant following the first workshop, with room provided on the documents for participant comments. Consent forms were provided to and completed by each participant to confirm their willingness to participate in the session. In addition, it was discussed with each group which language they would prefer the session to be conducted in; this was done as a result of personal principles such as respect and fairness, and a recognition of the importance of language for effective communication, as argued by Habermas (1984).

Reflective Commentary

The decision to ask participants whether they wished the group discussion to be conducted in English or Welsh was in response to both the results of the questionnaires, where the Welsh language was identified as an important social issue for many people, but also due to my own positionality (discussed in Section 4.4.3) and personal knowledge of how certain groups consider the Welsh language as not only culturally integral, but how some individuals prefer, some on principle, to converse in their native tongue. From the four participating, the farming and agricultural group were the only group that requested the session to be conducted in Welsh. My fluency in Welsh to a level of conversational competence, but, due to never having lived in Wales, I do lack the full vocabulary of individuals who have grown up in Wales predominantly or completely speaking Welsh. Due to this, I was able to conduct the group discussion in Welsh, but this was somewhat of a challenge, both in conversing in Welsh correctly with participants, and also being able to understand fully every response given by participants at the time of delivery. However, the importance of respecting the wishes of the participants and enabling the discussion to be conducted in Welsh for those individuals who deem it of great importance or who may feel unhappy *having to* converse in English was paramount, particularly considering the focus of this research on social priorities

Each session then began with a reflection on the first workshop, of the work that I had done since that time, and what the issues detailed on the handouts represented. The emphasis on the priorities of the group, as opposed to Anglesey residents in general, was reiterated during each session. An open group dialogue was encouraged, and I framed the session as an opportunity for free discussion on group specific issues. Also encouraged was group discussion on potential positive or negative impacts as perceived by the group. Sessions were between 40 and 50 minutes long, and it was proposed to each group that they were intended as anonymous with mention of group member names discouraged. 8 participants were in attendance for the majority of these sessions; a member of the farming and agricultural group intending to participate was unable to attend the session on the day, and was the only session of the four with less than 8 participants.

Each session was audio recorded with the permission of group members for transcription and data analyses purposes, for which qualitative data management software NVivo was used. Transcribed discussions were analysed by researcher-performed contextualised thematic analysis (Bryman, 2012), conducted line by line on each transcription twice. Similar to the method utilised by Lidskog and Löfmarck (2016), I utilised a multi-step process of coding group discussions, conducted in three stages. Firstly, broad themes were identified by open and tentative coding, through an initial line by line reading of each transcription. Secondly, each transcription underwent a second line-by-line reading, where a more selective coding process was employed to develop the initial codes and identify sub-themes. As noted by Lidskog and Löfmarck (2016), this development of the initial codes was done in a way "that made the most analytical sense" (p. 178) to the subject of inquiry (*see* Thornberg and Charmaz, 2014). Finally, the themes and sub themes were reflected upon, and four main analytical themes were identified summarizing group dialogue; *'Impacts (negative)'*, *'Opportunities (positive)', 'Right and Wrong (ethics)'* and *'Questions or Neutral Statements'*. These main themes are described below:

- The 'Impacts/Negative' (I/N) theme identifies those statements and comments which reflect notions of *concern, uncertainty/doubt, dissatisfaction* and/or *perceived risk.*
- The 'Opportunities/Positive' (O/P) theme identifies statements and comments which reflect notions of *hope, desire, growth* and/or *perceived enhancement.*
- The 'Right and Wrong (ethics)' (RW (e)) identifies comments or statements on subjects and issues made by group members which reflect notions of *justice, beliefs* or *ethics*, where they believe something should or shouldn't be the case based on the above notions.
- The theme of 'Questions or Neutral Statements' (Q/NS) identifies where group members have commented on an issue by posing a question or making a statement, which is neither strongly negatively or positively inclined, and serves to request or offer clarity.

At the end of each of the second sessions, group members were informed of the opportunity to participate in a third and final session and were each provided with 'Information and Invitation Sheets' (Appendix 9) regarding the nature of the next session. They were advised to contact the FGCs with an expression of interest if they wished to participate, and that a date for the workshop would be communicated to them in due course. I communicated with the FGCs by phone and email in order to maintain a record of expressed interest from each group.

4.9 Research methodology: Qualitative data - Social Group Session 3

The final session with each of the groups took place in the same locations as for the two previous sessions, and as previously noted, consent to participate was given by each participant by completion of consent forms (Appendix 8). As for the previous sessions, the location to hold the sessions with students and teacher groups were limited to their schools due to limitations of availability. Also, for the farmer group, maintaining the same location meant that the elements of familiarity and convenience were retained. The aim of the workshop was to identify which sustainability criteria accurately reflected group-prioritised issues which could be measured in order to indicate the social impacts, and therefore indicate the social sustainability, of a new nuclear power development.

Details of each session are shown in Table 7 overleaf, including the language in which the session was conducted. As shown by the dates of each session, it was found to be difficult to organise sessions close to one another, with particular delays being experienced with the farming group. This was primarily due to the demands of the spring and summer farming season on group members, in addition to communication and organisational difficulties with the primary group contact. As informed by primary group contacts for schools, demands on both students and teachers also meant that only a few dates over several weeks would be possible or preferable for sessions to be held.

As during preceding sessions, the second dialogue-based sessions were conducted in English apart from the farming group; this was again due to a request by this group to conduct the session in Welsh. As noted in reflective commentary in the previous section, this adherence to the request of the group demonstrates the adherence to notions of procedural justice and fairness. The research explores the priorities of the participants and participating groups, and this is reflected in such decisions to converse with participants in the language of their choice. The duration of each session was approximately 40 minutes. Refreshments were provided for each group; refreshments were purchased beforehand and provided for student and teacher groups, whereas meals were purchased for farmer group members due to the mid-evening timing of the session.

Social Group	Date of workshop session	Location (geographic and specific)	Number of attendees and participants	Main language spoken in session (researcher)
Students – Ysgol Syr Thomas Jones/ Sir Thomas Jones High School	22/01/15	Cemaes, Northern Anglesey/ Classroom	8	English
Students – Ysgol Uwchradd Bodedern/ Bodedern High School	25/02/15	Bodedern, Western Anglesey/ Private Common Space	7	English
Teachers – Ysgol Syr Thomas Jones/ Sir Thomas Jones High School	25/02/15	Cemaes, Northern Anglesey/ Classroom	8	English
Farmers/Agriculturalists – Cymdeithas Tir Glas Ynys Môn/ Anglesey Grassland Society	15/07/15	Rhostrehwfa, Central Anglesey/ Public House (Function Room)	6	Welsh

Table 7. Details of third round of social group sessions held across Anglesey

Group discussions were recorded with the permission of the group using audio recording devices. Each group member was provided with a consent form and information sheet prior to the commencement of the session to ensure they were aware of the nature of the workshop and that they agreed to participate. I also provided a brief summary of my work since the previous session, what the workshop would entail, and time was also allowed for group members to ask any questions they had; approximately five minutes was given for this to take place before the group discussion began, but this was flexible depending on the number group questions.

The empirical focus of these sessions was qualitative, based upon the facilitation of a group dialogue of the issues raised and discussed in the previous session. The objectives of these workshops was to validate the working indicators which I developed in draft following the first

dialogue-based sessions. These indicators were based on key themes and issues were identified from group discussions using an NVivo-based contextualised thematic analysis (Bryman, 2012), as detailed in the previous section. Thematically organised sheets detailing the working criteria were provided to each group member, with space provided underneath those suggested for group members to write comments or suggest other potential indicators, which could also be discussed during the session. Each theme and indicator cluster was discussed with the group; a semi-structured format to this dialogue was employed in order to provide opportunity to discuss, to a degree, the issues according to their preference and what they deemed to be important.

Lists of group-specific sustainability criteria were then developed which, similar to the Priority Profiles developed previously, could distinguish groups in regards to their social priorities and specific indicators for assessing the social sustainability of a new nuclear development and also providing further insight into the development-related concerns of each group. This was done utilising a similar process of analysis to that of the previous session in the form of contextualised thematic analysis (Bryman, 2012); in this case, a two rather than a three stage process of analysis was undertaken. This was because it was not a priority for this analysis to identify broad analytical themes of group dialogue, but rather identify more specific issues and criteria. As a result of this analysis, a set of sustainability criteria were prepared for each group in the form of *group-specific indicator sets* (GSISs), reflecting each group's social priorities and development- related concerns.

The number of indicators in each GSIS was specific to each group, as they are based upon the group's expressed social priorities as opposed to a pre-decided number of necessary criteria, which would serve to ignore the realities of group difference (*see* Young, 1990). To mitigate excessive variance between groups, each GSIS was developed according to a minimum of five and a maximum of ten indicators. Developed indicators reflect the researcher-group dialogue from both dialogue-based sessions, as to discount wholly the views of group members from the previous dialogue-based workshop could be perceived as poor engagement practice. Therefore, GSISs are primarily based on the discussions from the final group sessions, but are also informed by those group discussions from the previous dialogue-based session, so as to reflect group-priorities more accurately.

The purpose of these final workshops was not only to identify key issues for developing sustainability indicators, but to engage in further deliberative dialogue with group members. This enabled both author and participants to gain a deeper understanding of the impacts, both experienced and perceived, of current and prospective nuclear power developments, and of the areas of greatest social concern and priority in this context. Importantly, the process of discussing sustainability indicators also had a facilitative function, of facilitating deliberative dialogue, information sharing, and mutual learning between participants and between participants and myself.

4.10 Challenges experienced during research

I experienced a number of challenges during the process of conducting this mixed-methods research with various social groups on Anglesey. In practical terms, the facilitation of group-based sessions was a challenge experienced throughout, in addition to effectively communicating the research process and intentions to all potential research participants and effectively explaining terminology. The term 'sustainability' was an unfamiliar term to many people, and this had to be explained to individuals in order for them to fully understand the objectives and intentions of the research, and the reasoning for the process of indicator development. This is unsurprising provided that the term has been extensively debated and differentially conceptualised by scholars in the literature (*see* Kreibich, 1996; Parris and Kates, 2003). Similar difficulties with terminology were found during the GDA Public Dialogue process, with the prolific use of acronyms and technical terminology resulting in both confusion and some frustration expressed by workshop participants (*see* 3KQ, 2015; Whitton et al., 2016). I felt that many participants, whilst comfortable discussing issues of concern and priority, were uncertain of the value of the process of indicator development. Within the medical literature, Patel, Doku and Tennakoon (2003) suggest that people are unlikely to participate in research if they cannot fully understand how it is relevant to them and thus its validity. This led to group-based dialogue that sometimes strayed from the original intentions for this process. An example of this would be the discussion of issues with the CTGYM Farmers group of priority for the purposes of identifying suitable measurable criteria that would reflect these priorities. It became challenging to gain clarity from this group not only what they prioritised and wished to discuss, but how to translate this into measurable criteria for the purposes of research. This highlighted the challenges of seeking participation and input from individuals who have not been part of the research development process, and therefore have no direct investment achieving the aims of the researcher. For student groups, challenges were presented in regards to maintaining a flow of dialogue between participants and gaining responses to questions regarding issues of importance to them. This potentially demonstrates a disinterest with the process, or an inability to respond to questions due to a lack of knowledge or to articulate their views in the group environment with their peers. This may also reflect the impact of unfamiliarity with such processes of dialogue, and a difficulty in discussing such matters that are rarely discussed with young people. The exclusion of young people from decision-making processes and dialogue-based processes with the public is discussed by authors such as Hart (2009) and Larkins (2014). Greater engagement of these younger participants, resulting in a greater familiarity with dialogue-based processes, may indeed result in more productive discussions between participants and facilitators, and potentially impacting upon future processes of engagement and collaboration in a positive manner.

A further challenge of the research process came in communicating in Welsh with the CTGYM Farmers group and translating these group discussions from Welsh into English. My ability to communicate in Welsh was sufficient but not proficient to the extent of being able to understand

every word communicated by participants. This was made more challenging by the relaxed manner of communication of some members of the farmers group, which made it additionally difficult to understand during the sessions and also during the translation process. This style of communication between group members is normalised, however it was often difficult, even upon multiple playbacks of the recordings, to establish exactly what had been said. In addition to this, the tendency for group members to speak over one another during discussions led to further difficulties in transcribing all contributions from participants, despite my requests for all participants to allow each person to speak and communicate their point clearly. This is a challenge inherent in group-based work, as dialogues are rarely tidily organised. Discussions ebb and flow with the natural input of participants as and when they feel it is necessary, and this is difficult to control when honest and natural communication is sought. Due to this, it is often difficult to identify the degree to which dialogue clarity has been affected at the time of facilitation. Also, given the short duration of these sessions, there was little time to revisit several points over the course of the session to gain additional clarity. Such group-related challenges are highlighted by Gibbs (1997); the researcher naturally has less control, when compared to quantitative data collection, over the type of data which is produced during focus group sessions (Morgan, 1998) due to the open nature of, and inability to predetermine, focus group research. However, Gibbs (1997) asserts that researchers must allow participants to engage in open discussion and that the researcher has little control over this inter-participant interaction, and that this interaction is very valuable in that participants can ask questions of one other, and re-evaluate their own understandings of experiences. As noted earlier, Kitzinger (1994, 1995) argues that focus group interaction is crucial due to its ability to highlight participant worldviews, participant beliefs towards a subject, and indeed the language, which participants use to discuss a particular issue, and reflect feelings and emotions.

The third challenge detailed in this section is that posed by the process of Ethical Approval. As is common in research of a social nature, I was required to submit research documentation to undergo and acquire Ethical Approval; only when this approval was acquired could I progress with the process of distribution of documentation to participating groups and commence data collection. This is an unfortunate potential reality of the Action-oriented research process, where the researcher seeks to engage directly with individuals sometimes over multiple instances, and particularly of processes of Approval where work must be reviewed and assessed by numerous individuals. This challenge was highly unfortunate, and whilst proving frustrating, it is also appreciated that such processes are susceptible to delays and unforeseen problems, and it is up to the researcher to manage this process when it arises, and prepare for such challenges.

Reflective Commentary

Documentation was submitted for Ethical Approval at the beginning of March 2014 with a stated duration of 10 working days for the process of review and approval. However, this duration overran significantly, and due to delays out of my control, Ethical Approval was not acquired until the end of April 2014, following approximately 7-8 weeks. My Action-oriented approach involved face-to-face engagement with social groups in order to engage in dialogue; therefore, the organisation of in-person sessions was necessary. This prolonged process of Ethical Approval resulted in an unforeseen delay to the distribution of research materials to facilitative group contacts (FGCs) and the commencement of the data collection process by over four weeks, which I was required to manage with social groups intending to participate in the research and communicate to them the development of this unexpected delay in acquiring necessary institutional approval. This reduced the amount of time that was then available to visit schools and conduct the research, and due to the schedule of both students and teachers becoming busier towards the end of the school year in July, identifying suitable dates with schools became challenging. As a result, and in conjunction with delays in responses from the institutions that had been contacted, only one session was held with a school before the end of the 2013-2014 school year. This also meant that by this time, group meetings of the Anglesey Grassland Society were coming to an end in time for the spring and summer periods, which is known as the busiest time of year for farmers. Therefore, it was not possible to attend a group meeting with society members until after this summer period, and until group meetings had commenced again in the autumn.

The duration of group-based sessions also presented challenges in regards to my ability to engage with groups in a sufficiently detailed and extensive dialogue. The duration of the sessions was originally decided upon in order to 'fit in' with group schedules. For example, sessions of under an hour were required to fit in with school lesson durations for students, lunchtime breaks for teachers, and an appropriate amount of time prior to society meetings for farmers. However, I found that such short sessions did not allow for a great amount of exploration of the numerous issues highlighted as important to the groups. In future research, this will be reflected upon and sessions of this length may be supported by longer periods of group contact in order to explore issues of group importance in sufficient detail that it can be ensured that group priorities are able to be communicated recorded and understood comprehensively.

Finally, as had been experienced with schools, delays in communication and response were also an issue for the CTGYM Farmers group. Communication with the FGC for CTGYM was difficult at times in regards to gaining responses to queries and confirming meeting attendances, resulting

in occasional uncertainties as to the genuine interest of the FGC in participating, or in the group participating, in the research. In future projects, it would be preferable to either establish a regular line of communication with group contacts, or to ensure that when communicating with individuals by their preferred medium, that as many details a possible can be clarified at a time, thus reducing the number of occasions where contact is required. However, the need for this and indeed the ability to ensure this is uncertain, due to the differential nature of individuals; the response time and willingness to participate and engage of some individuals may differ greatly to others.

5.0 Results

The following section details the findings of the mixed-methods study, which was structured in three stages. Firstly, the quantitative findings are presented reflecting the first stage and first sessions with each group. These are based upon the completion by participants of a researcher-developed questionnaire. Secondly, the qualitative findings of the second stage of the research process are reported. This represents the first of the dialogue-based sessions with each group. Finally, the qualitative findings of the second dialogue-based session with each group are reported, which reflect the third stage of the mixed-methods approach to study.

5.1 Quantitative data: Questionnaire (Social Group Session 1)

Four social groups participated in the research process; two sixth-form student groups from two schools, a group of teachers from one of these schools, and a farming/agricultural society. The specific groups and the number of participants/respondents for each group were as follows:

- Ysgol Uwchradd Bodedern (Bodedern High School) (Students) – 45 respondents
- Ysgol Syr Thomas Jones (Sir Thomas Jones School) (Students) – 31 respondents
- Ysgol Syr Thomas Jones (Sir Thomas Jones School) (Teachers) – 15 respondents
- Cymdeithas Tir Glas Ynys Môn (Anglesey Grassland Society) (Farmers) – 15 respondents

These groups enabled a range of perspectives to be represented, as the groups represent a broad range of social positions, demographics and experiences, providing a diverse sample of the Anglesey populace. In addition, the inclusion of two groups from the 'current generation' (farmers and teachers) and two groups from the 'next generation' (students) is important for matters of inter-generational impact such as NNB.

The research questionnaire was comprised primarily of 39 social issues with 'statements of importance' (SoI) attached to them (*see* Appendix 3). These were sub divided into 13 sub-themes, with 3 social issues allocated to each theme; these are briefly detailed in Section 4.6, but are reproduced on the following pages in full form, without the 5 point Likert response scale (Strongly Agree to Strongly Disagree).

1. **Community**
    a. *Feeling a sense of community (e.g. feeling 'part of' a community) is important to me*
    b. *My social links and networks (e.g. friends, family, interest groups) within Anglesey are important to me*
    c. *Having trust in other local residents (e.g. neighbours, those who live in your town or village) is important to me*

2. **Local culture**
    a. *Welsh culture is important to me*
    b. *Maintaining Welsh heritage (things inherited from the past, e.g. land, buildings) is important to me*
    c. *The Welsh language (at least maintaining its current level of use in Anglesey) is important to me*

3. **Population changes**
    a. *The amount of younger people leaving Anglesey is important to me*
    b. *The amount of people moving onto Anglesey from elsewhere to live is important to me*
    c. *The number of Welsh speakers in Anglesey is important to me*

4. **Crime and safety**
    a. *I am concerned about the amount of crime to or in homes (e.g. vehicle theft, theft of possessions, damage to home) in my town/ village*
    b. *I am concerned about the amount of crime against people (e.g. verbal or physical assault, robbery whilst mobile or in town) in my town/village*
    c. *I am concerned about the amount of crime which affects my town/village (e.g. property damage, theft of communal property, graffiti) in general*

5. **Health**
    a. *I consider my physical health (e.g. being physically fit and healthy, a balanced diet, doing exercise) to be of paramount importance for me to be happy in life*
    b. *I consider my social health (e.g. ability to interact with others in social settings) to be of paramount importance for me to be happy in life*
    c. *I consider my mental health (e.g. memory, awareness) to be of paramount importance for me to be happy in life*

6. Employment

a. *Having a variety of employment in Anglesey (e.g. different types of jobs, a lot of choice) is important to me*
b. *The quality of employment in Anglesey (e.g. highly paid, highly skilled) is important to me*
c. *The amount of available employment in Anglesey (e.g. number of available job positions) is important to me*

7. Quality of life

a. *The enjoyment of my time spent working/at school is important to me*
b. *The ability (time and physical capacity) to do hobbies or activities unrelated to work /school is important to me*
c. *The enjoyment of my leisure time (time spent not working/at work/at school) is important to me*

8. Training/skills courses

a. *The variety of training/skills courses in Anglesey (e.g. different types of courses), related to employment, is important to me*
b. *Access to training/skills courses in Anglesey (e.g. being aware of courses, courses being open to anyone), related to employment, is important to me*
c. *The amount of training/skills courses in Anglesey (e.g. the number of courses being run), related to employment, is important to me*

9. Local participation

a. *Taking part in voluntary activities in Anglesey (e.g. conservation work, helping elderly residents) is important to me*
b. *Taking part in local decision-making in Anglesey (e.g. part of a local board, attend council meetings or meetings about large developments) is important to me*
c. *Taking part in community events in Anglesey (e.g. St. David's Day celebrations, local festivals) is important to me*

10. Housing

a. *The amount of affordable housing on Anglesey (e.g. number of houses affordable to local people) is important to me*
b. *Having different types of housing on Anglesey (e.g. flats, semi-detached, detached) is important to me*
c. *The condition of housing on Anglesey (e.g. comfortable and attractive housing, in a good state of repair) is important to me*

11. Transport

a. *The condition of roads on Anglesey (e.g. potholes and road surface degradation, suitable width) is an important issue to me*
b. *The reliability of public transport on Anglesey (e.g. enough buses or trains per hour, arriving on time) is an important issue to me*
c. *The amount of traffic on roads on Anglesey is an important issue to me*

12. Access and communication*:*

a. *Having access to and being able to communicate with local representatives in Anglesey (e.g. local politicians, MPs) is important to me*
b. *Having access to and being able to communicate with local authorities in Anglesey (e.g. Anglesey County Council, Police) is important to me*
c. *Having access to and being able to communicate with large companies operating on but not based in Anglesey (e.g. energy companies) is important to me*

13. Provision of local services and facilities:

a. *It is important to me that there are more business, finance and retail (e.g. banks, food or clothes shops) services and facilities on Anglesey*
b. *It is important to me that there are more leisure and entertainment (e.g. swimming pools, cinemas) services and facilities on Anglesey*
c. *It is important to me that there are more educational, health and care (e.g. libraries, GP surgeries, care homes) services and facilities on Anglesey*

The responses to the SoI are presented here in two forms: the overall results (inclusive of all participating groups) and the group-specific results (each social group presented separately).

5.1.1 Group-inclusive results: main social issues/statements of importance

Table 8 shows the group-inclusive data, presented as sum totals for each statement/social issue and each potential response from 5, with 1 representing 'Strongly Agree' and 5 representing 'Strongly Disagree'. To supplement this, Figures 9 and 10 present the group-inclusive data in graphic form, with Figure 9 showing responses according to five agreement categories, whilst Figure 10 shows the responses according to the combined 'Agree' and 'Disagree' categories. Following this, Table 9 includes the percentage figures for each response, shown as a total of the responses for that statement/social issue. Finally, in regards to this group-inclusive data, Table 10 identifies the social issues which received the greatest amount of 'Agree' ('Strongly Agree' and 'Agree') and 'Disagree' ('Strongly Disagree' and 'Disagree') responses, reflecting the most important and least important issues, respectively, in a group-inclusive context. Due to several issues achieving identical scores, the number of issues highlighted in each combined agreement category has been limited to six. These group-inclusive findings will be compared to the group-specific data, and is examined and discussed in Chapter 6.

	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree	Missing Answers
1a	41	40	15	6	3	
1b	63	21	16	3	1	1 missing
1c	43	41	9	5	7	
2a	53	29	14	4	5	
2b	47	32	16	7	3	
2c	66	20	14	3	2	
3a	21	27	45	7	5	
3b	28	33	21	17	6	
3c	54	26	20	3	2	
4a	29	28	20	15	12	1 missing
4b	24	35	20	16	10	
4c	25	31	22	17	10	
5a	41	41	16	5	2	
5b	48	44	7	4	2	
5c	66	29	5	5	0	
6a	66	27	9	2	1	
6b	60	35	8	2	0	
6c	74	20	7	2	1	1 missing
7a	56	33	9	5	2	
7b	62	33	6	4	0	
7c	74	20	8	3	0	
8a	26	53	20	6	0	
8b	27	53	22	3	0	
8c	27	44	30	4	0	
9a	17	40	34	11	3	
9b	11	27	36	23	8	
9c	13	38	30	18	6	
10a	37	38	22	7	1	
10b	23	42	31	9	0	
10c	38	45	19	3	0	
11a	47	47	11	0	0	
11b	40	38	20	7	0	
11c	30	35	29	10	1	
12a	15	31	44	10	5	
12b	23	44	30	8	0	
12c	18	33	37	14	2	1 missing
13a	28	55	18	4	0	
13b	37	46	18	4	0	
13c	66	26	10	3	0	

Table 8. Group-inclusive questionnaire responses to Statements of Importance (SoI) for 39 different social issues (1a – 13c), including missing responses from participants

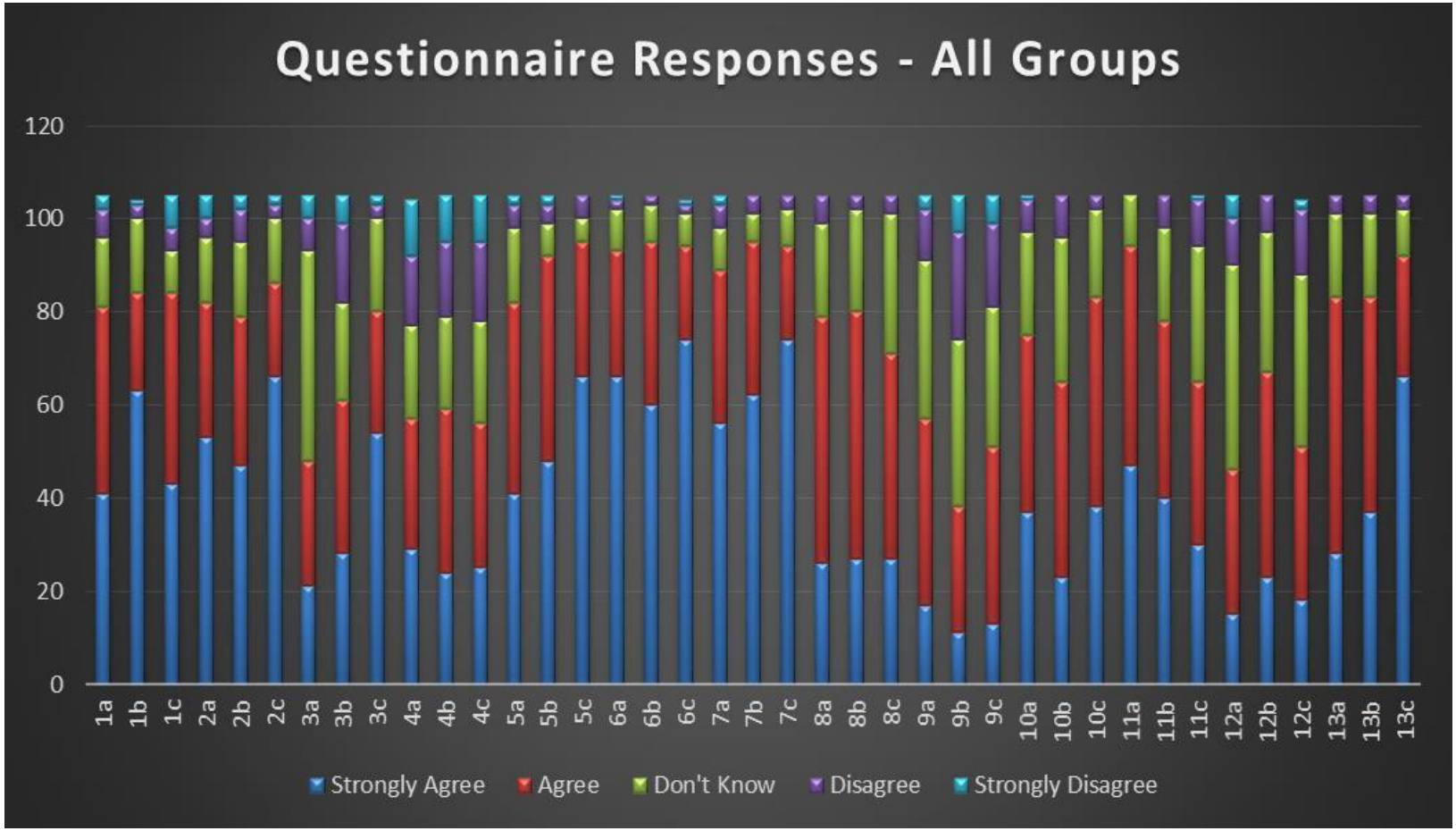

Figure 9. This graph shows the group-inclusive responses to the 39 statements of importance in the research questionnaire, according to five Likert-scale response categories

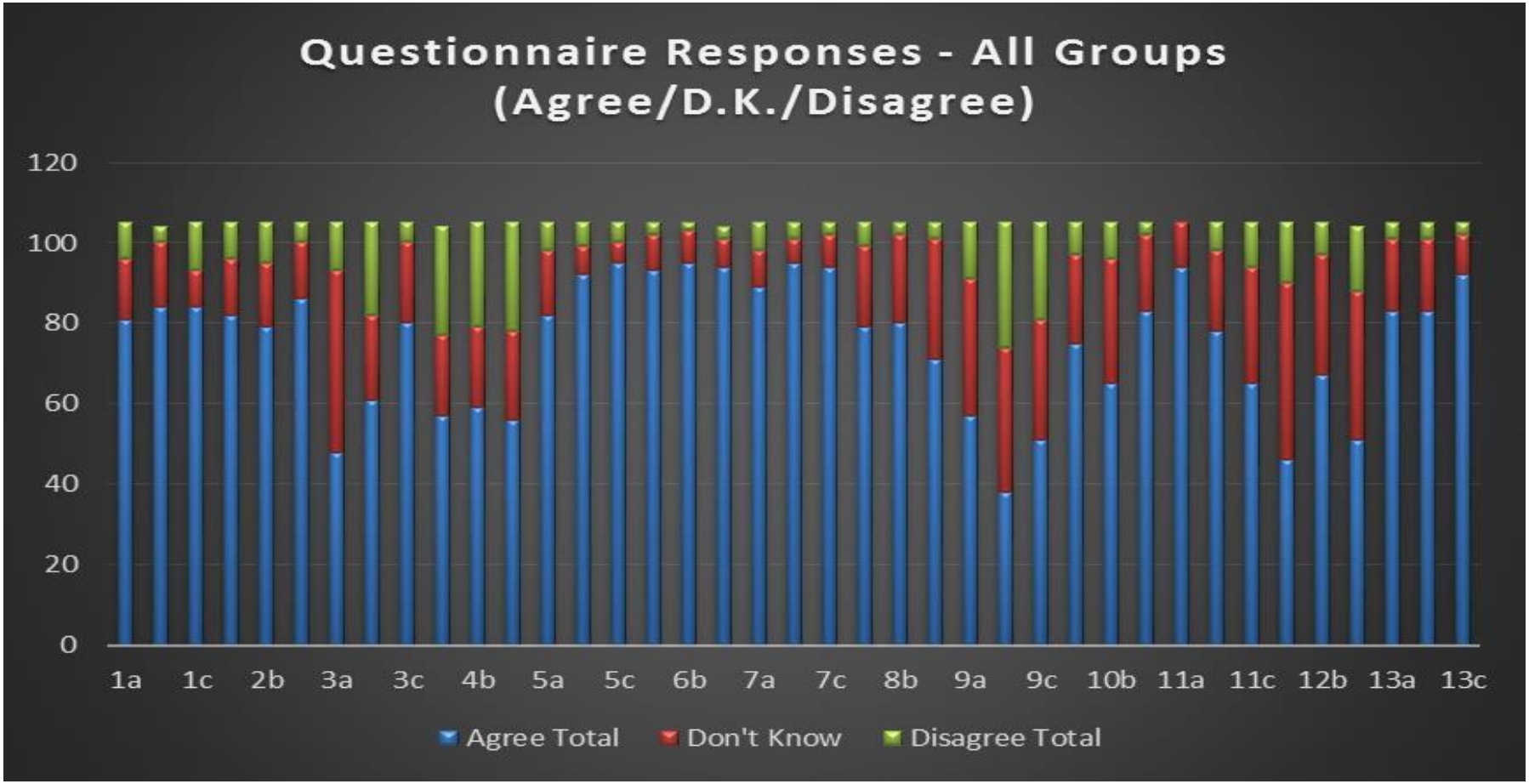

Figure 10. This graph shows the group-inclusive responses to the 39 statements of importance (SoI), showing the combined 'Agree' and 'Disagree' category totals (Note: results are shown as total number of responses for both categories of agreement or disagreement)

	1	%	2	%	3	%	4	%	5	%
1a	41	*39.05*	40	*38.10*	15	*14.29*	6	*5.71*	3	*2.86*
1b	63	*60.58*	21	*20.19*	16	*15.38*	3	*2.88*	1	*0.96*
1c	43	*40.95*	41	*39.05*	9	*8.57*	5	*4.76*	7	*6.67*
2a	53	*50.48*	29	*27.62*	14	*13.33*	4	*3.81*	5	*4.76*
2b	47	*44.76*	32	*30.48*	16	*15.24*	7	*6.67*	3	*2.86*
2c	66	*62.86*	20	*19.05*	14	*13.33*	3	*2.86*	2	*1.90*
3a	21	*20.00*	27	*25.71*	45	*42.86*	7	*6.67*	5	*4.76*
3b	28	*26.67*	33	*31.43*	21	*20.00*	17	*16.19*	6	*5.71*
3c	54	*51.43*	26	*24.76*	20	*19.05*	3	*2.86*	2	*1.90*
4a	29	*27.88*	28	*26.92*	20	*19.23*	15	*14.42*	12	*11.54*
4b	24	*22.86*	35	*33.33*	20	*19.05*	16	*15.24*	10	*9.52*
4c	25	*23.81*	31	*29.52*	22	*20.95*	17	*16.19*	10	*9.52*
5a	41	*39.05*	41	*39.05*	16	*15.24*	5	*4.76*	2	*1.90*
5b	48	*45.71*	44	*41.90*	7	*6.67*	4	*3.81*	2	*1.90*
5c	66	*62.86*	29	*27.62*	5	*4.76*	5	*4.76*	0	*0.00*
6a	66	*62.86*	27	*25.71*	9	*8.57*	2	*1.90*	1	*0.95*
6b	60	*57.14*	35	*33.33*	8	*7.62*	2	*1.90*	0	*0.00*
6c	74	*71.15*	20	*19.23*	7	*6.73*	2	*1.92*	1	*0.96*
7a	56	*53.33*	33	*31.43*	9	*8.57*	5	*4.76*	2	*1.90*
7b	62	*59.05*	33	*31.43*	6	*5.71*	4	*3.81*	0	*0.00*
7c	74	*70.48*	20	*19.05*	8	*7.62*	3	*2.86*	0	*0.00*
8a	26	*24.76*	53	*50.48*	20	*19.05*	6	*5.71*	0	*0.00*
8b	27	*25.71*	53	*50.48*	22	*20.95*	3	*2.86*	0	*0.00*
8c	27	*25.71*	44	*41.90*	30	*28.57*	4	*3.81*	0	*0.00*
9a	17	*16.19*	40	*38.10*	34	*32.38*	11	*10.48*	3	*2.86*
9b	11	*10.48*	27	*25.71*	36	*34.29*	23	*21.90*	8	*7.62*
9c	13	*12.38*	38	*36.19*	30	*28.57*	18	*17.14*	6	*5.71*
10a	37	*35.24*	38	*36.19*	22	*20.95*	7	*6.67*	1	*0.95*
10b	23	*21.90*	42	*40.00*	31	*29.52*	9	*8.57*	0	*0.00*
10c	38	*36.19*	45	*42.86*	19	*18.10*	3	*2.86*	0	*0.00*
11a	47	*44.76*	47	*44.76*	11	*10.48*	0	*0.00*	0	*0.00*
11b	40	*38.10*	38	*36.19*	20	*19.05*	7	*6.67*	0	*0.00*
11c	30	*28.57*	35	*33.33*	29	*27.62*	10	*9.52*	1	*0.95*
12a	15	*14.29*	31	*29.52*	44	*41.90*	10	*9.52*	5	*4.76*
12b	23	*21.90*	44	*41.90*	30	*28.57*	8	*7.62*	0	*0.00*
12c	18	*17.31*	33	*31.73*	37	*35.58*	14	*13.46*	2	*1.92*
13a	28	*26.67*	55	*52.38*	18	*17.14*	4	*3.81*	0	*0.00*
13b	37	*35.24*	46	*43.81*	18	*17.14*	4	*3.81*	0	*0.00*
13c	66	*62.86*	26	*24.76*	10	*9.52*	3	*2.86*	0	*0.00*

Table 9. Group-inclusive questionnaire responses to statements of importance (SoI) for 39 different social issues, with percentage scores

(Note: 1 = Strongly Agree; 2 = Agree; 3 = Don't Know; 4 = Disagree; 5 = Strongly Disagree).

Questionnaire Statement Number and Social Issue	No. of 'Agree' category responses from total	Percentage of total responses
5c – Mental health	95/105	*90.48*
6b – Quality of employment in Anglesey	95/105	*90.48*
7b – Ability to do hobbies and non-work activities	95/105	*90.48*
6c – Amount of available employment in Anglesey	94/104 (1 missing response)	*90.38*
7c – Enjoyment of leisure time	94/105	*89.52*
11a – Condition of roads on Anglesey	94/105	*89.52*
Questionnaire Statement Number and Social Issue	**No. of 'Disagree' category responses from total**	**Percentage of total responses**
9b – Taking part in local decision-making on Anglesey	31/105	*29.52*
4a – Amount of crime to or in homes in town/village	27/104 (1 missing response)	*25.96*
4c – Amount of crime affecting town/village in general	27/105	*25.71*
4b – Amount of crime against people in town/village	26/105	*24.76*
9c – Taking part in community events in Anglesey	24/105	*22.86*
3b – Amount of people moving onto Anglesey from elsewhere	23/105	*21.90*

Table 10. Group-inclusive responses to questionnaire statements of importance, according to combined responses to 'Agree' (Strongly Agree and Agree) and 'Disagree' (Strongly Disagree and Disagree) categories, with number of responses/total and percentages/total

5.1.2 Group-exclusive data: main social issues/statements of importance

5.1.2.1 YUB Students

The responses from the YUB Student group indicate the strongest degree of agreement (strongly agree/agree) for the issues of:

- Ability to do hobbies or non-work activities
- Enjoyment of leisure time
- Condition of roads on Anglesey

The issues which received the greatest number of uncertain or indifferent responses were:

- Number of Welsh speakers on Anglesey
- Access to and being able to communicate with local representatives in Anglesey
- Access to and being able to communicate with large companies, operating on but not based in Anglesey

The responses indicate the strongest degree of disagreement (strongly disagree/disagree) for the issues of:

- Amount of crime to or in homes
- Amount of crime which affects town/village in general
- Amount of crime against people in town/village
- Taking part in local decision-making in Anglesey

The empirical questionnaire data is presented in Table 11, showing the combined results for each SoI with the issues detailed above highlighted for each category. The empirical data is also presented in graphic form; for each response option in Figure 11, and for combined responses in Figure 12.

	Strongly Agree/Agree	Don't Know	Strongly Disagree/Disagree
1a	29	11	5
1b	34	8	3
1c	31	6	8
2a	37	3	5
2b	34	7	4
2c	38	4	3
3a	10	30	5
3b	22	14	9
3c	30	13	2
4a	21	8	15
4b	23	9	13
4c	20	11	14
5a	29	12	4
5b	37	4	4
5c	37	4	4
6a	38	4	3
6b	39	4	2
6c	38	3	3
7a	34	5	6
7b	40	3	2
7c	41	3	1
8a	35	6	4
8b	35	7	3
8c	31	11	3
9a	27	13	5
9b	18	14	13
9c	18	15	12
10a	35	5	5
10b	26	13	6
10c	33	10	2
11a	40	5	0
11b	34	9	2
11c	22	15	8
12a	13	24	8
12b	27	13	5
12c	19	17	9
13a	30	11	4
13b	32	10	3
13c	35	8	2

Table 11. Questionnaire responses for YUB students (n = 45) (combined results)

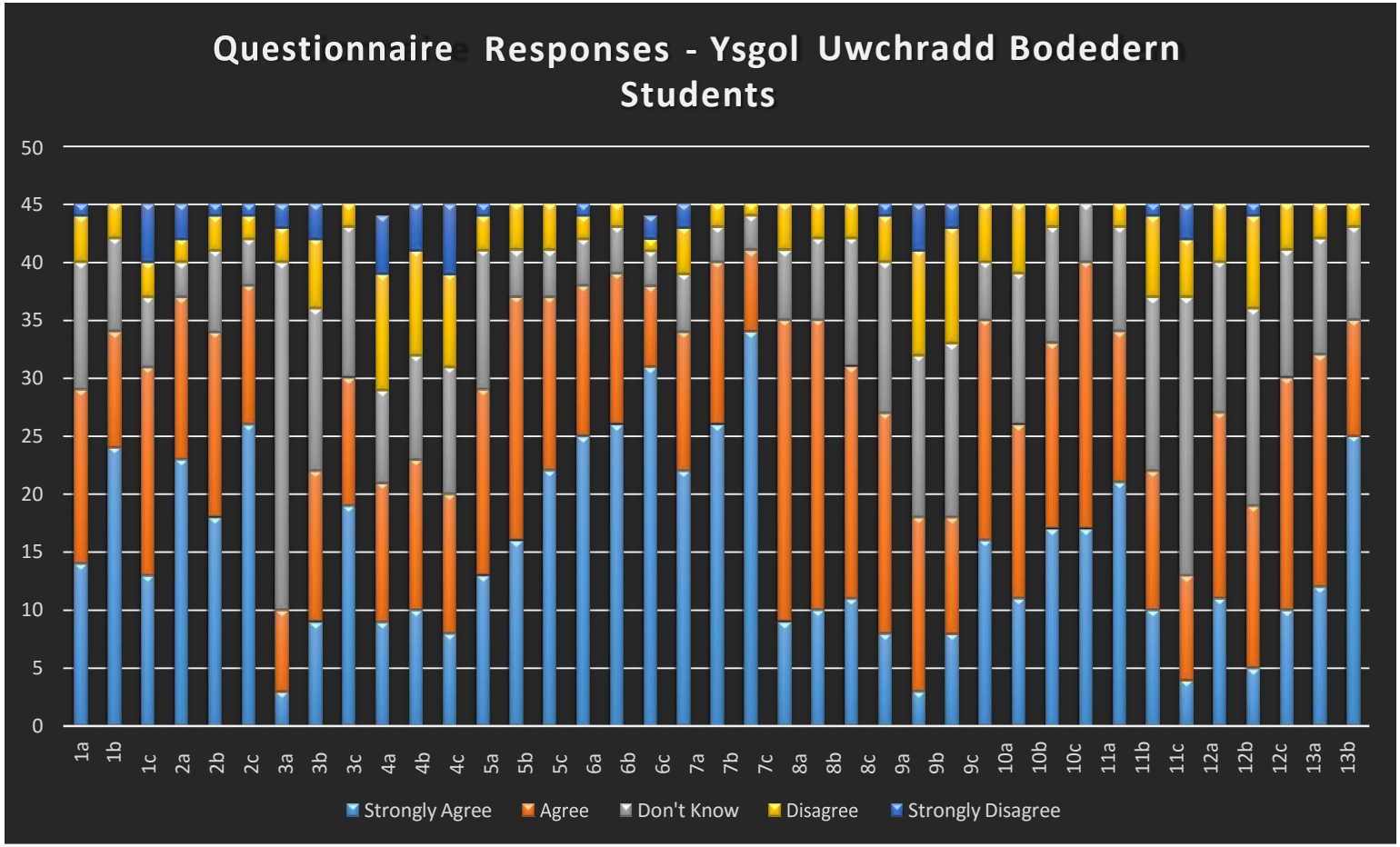

Figure 11. Questionnaire SoI responses from YUB Students group (n = 45)

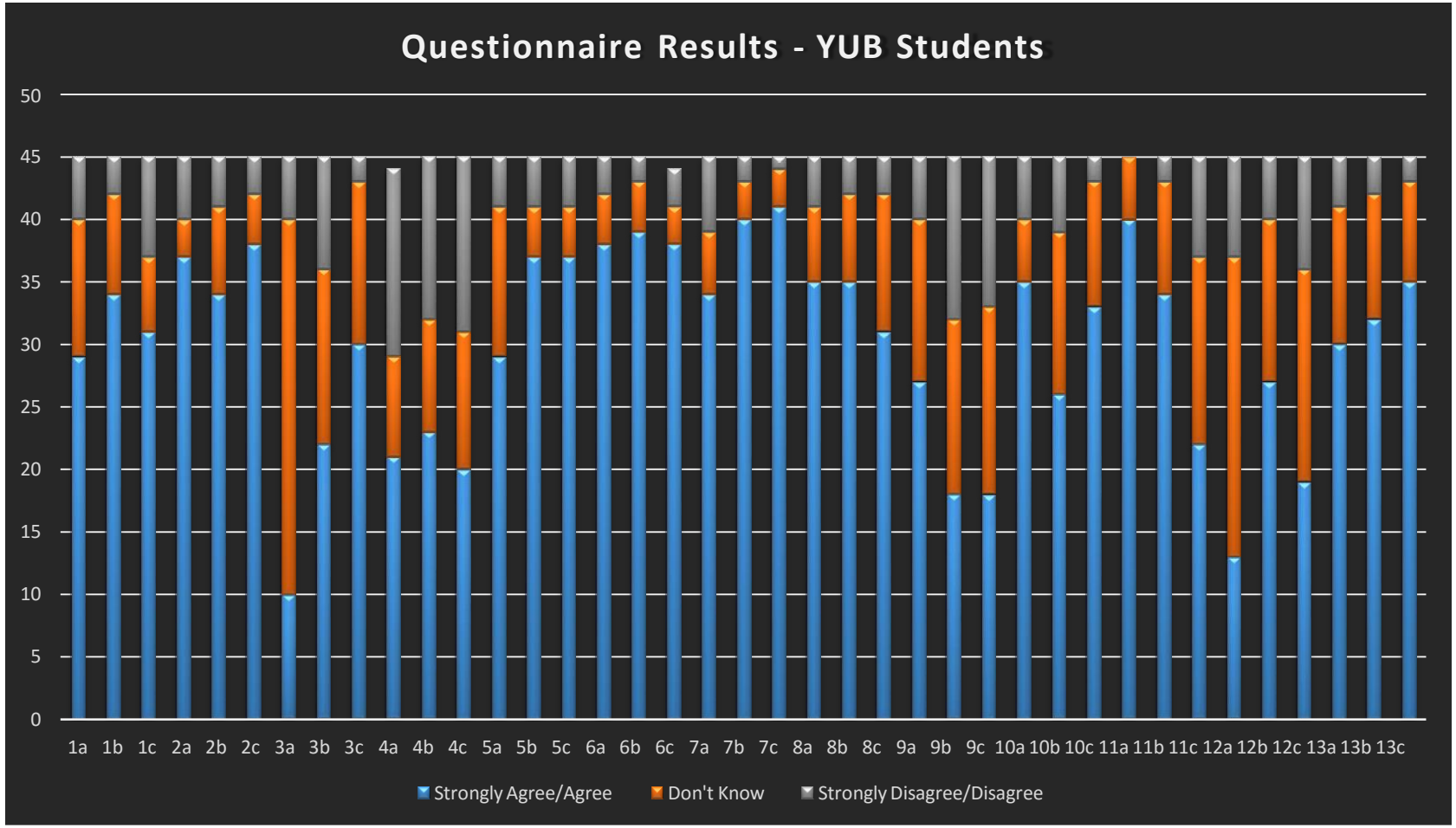

Figure 12. Questionnaire SoI responses from YUB Students group (combined results)

5.1.2.2 YSTJ Students

The responses from the YSTJ Student group indicate the strongest degree of agreement (strongly agree/agree) for the issues of:

- Mental health
- Enjoyment of leisure time

The issues which received the greatest number of uncertain or indifferent responses were:

- Taking part in local decision-making in Anglesey
- Access to and being able to communicate with local representatives in Anglesey
- Amount of younger people leaving Anglesey
- Access to and being able to communicate with local representatives in Anglesey

The responses indicate the strongest degree of disagreement (strongly disagree/disagree) for the issues of:

- Amount of people moving onto Anglesey from elsewhere
- Taking part in local decision-making in Anglesey

The empirical questionnaire data is presented in Table 12, showing the combined results for each SoI with the issues detailed above highlighted for each category. The empirical data is also presented in graphic form; for each response option in Figure 13, and for combined responses in Figure 14.

	Strongly Agree/Agree	Don't Know	Strongly Disagree/ Disagree
1a	25	2	3
1b	24	5	1
1c	24	3	3
2a	18	9	3
2b	19	7	4
2c	21	7	2
3a	11	13	6
3b	14	5	11
3c	22	5	3
4a	17	6	7
4b	19	4	7
4c	18	7	5
5a	25	2	3
5b	27	1	2
5c	29	0	1
6a	28	2	0
6b	28	2	0
6c	27	3	0
7a	26	3	1
7b	28	1	1
7c	29	0	1
8a	23	6	1
8b	23	7	0
8c	20	9	1
9a	16	11	3
9b	4	15	11
9c	17	6	7
10a	20	9	1
10b	22	6	2
10c	27	3	0
11a	27	3	0
11b	28	2	0
11c	21	8	1
12a	10	15	5
12b	15	13	2
12c	13	12	4
13a	27	3	0
13b	28	1	1
13c	27	2	1

Table 12. Questionnaire responses for YSTJ students (n = 30) (combined results)

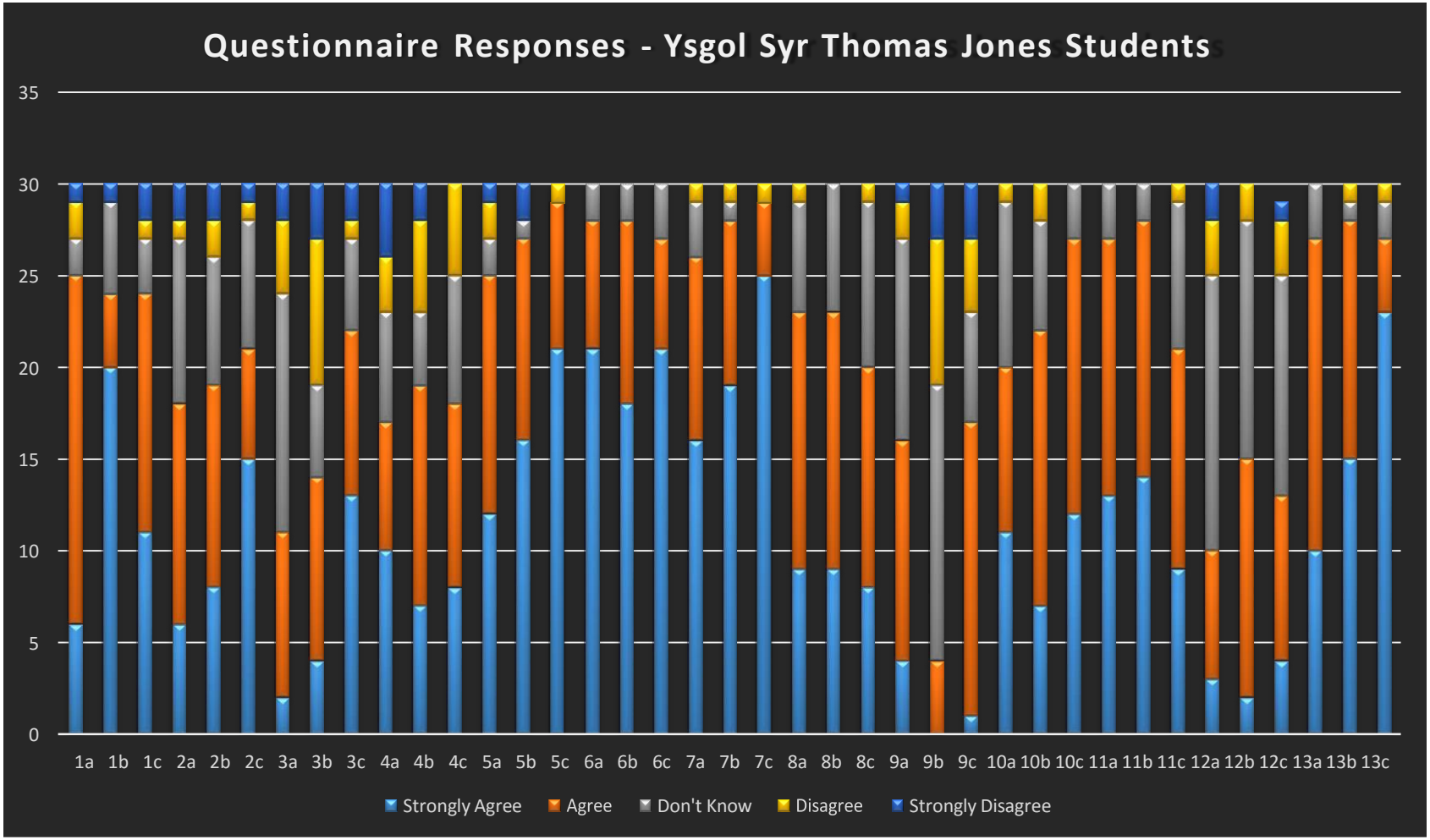

Figure 13. Questionnaire SoI responses from YSTJ Students group (n = 30)

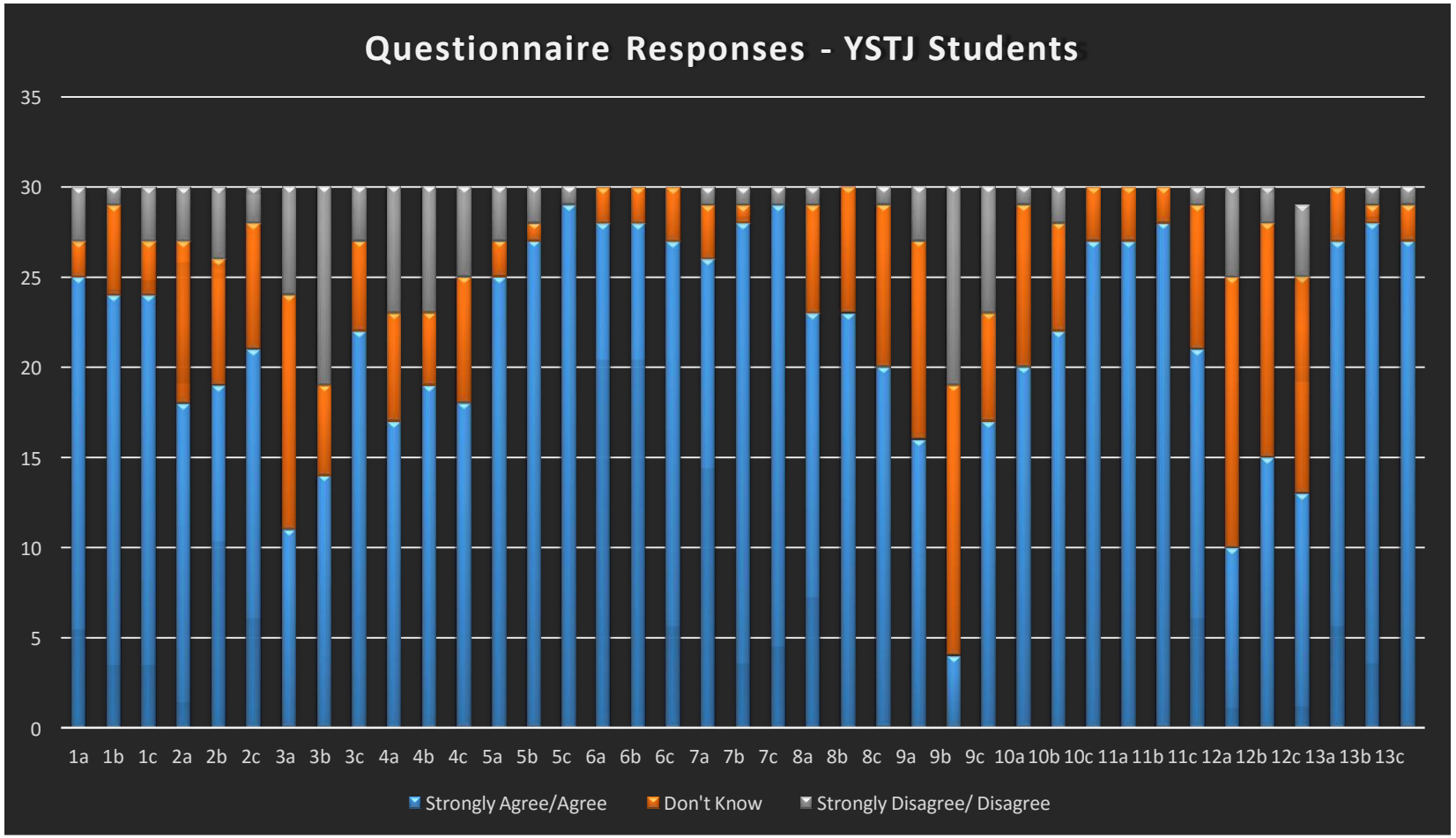

Figure 14. Questionnaire SoI responses from YSTJ Students group (combined results)

5.1.2.3 YSTJ Teachers

The responses from the YSTJ Teacher group indicate the strongest degree of agreement (strongly agree/agree) for the issues of:

- Mental health
- Variety of employment in Anglesey
- Quality of employment in Anglesey
- Amount of available employment in Anglesey
- Enjoyment of leisure time
- Equal access to educational, health and care services

The issues which received the greatest number of uncertain or indifferent responses were:

- Taking part in voluntary activities in Anglesey
- Reliability of public transport in Anglesey

The responses indicate the strongest degree of disagreement (strongly disagree/disagree) for the issues of:

- Amount of crime to or in homes
- Amount of crime which affects town/village in general
- Amount of crime against people in town/village
- Taking part in voluntary activities in Anglesey

The empirical questionnaire data is presented in Table 13, showing the combined results for each SoI with the issues detailed above highlighted for each category. The empirical data is also presented in graphic form; for each response option in Figure 15, and for combined responses in Figure 16.

	Strongly Agree/Agree	Don't Know	Strongly Disagree/ Disagree
1a	13	1	1
1b	14	1	0
1c	14	1	0
2a	14	1	0
2b	14	1	0
2c	14	1	0
3a	13	2	0
3b	14	1	0
3c	14	1	0
4a	6	4	5
4b	6	3	6
4c	7	1	7
5a	14	1	0
5b	13	2	0
5c	15	0	0
6a	15	0	0
6b	15	0	0
6c	15	0	0
7a	14	1	0
7b	14	1	0
7c	15	0	0
8a	12	3	0
8b	13	2	0
8c	12	3	0
9a	4	6	5
9b	7	4	4
9c	10	2	3
10a	9	4	2
10b	10	4	1
10c	11	3	1
11a	14	1	0
11b	8	5	2
11c	12	2	1
12a	13	1	1
12b	14	1	0
12c	9	4	2
13a	14	1	0
13b	13	2	0
13c	15	0	0

Table 13. Questionnaire responses for YSTJ Teachers (n = 15) (combined results)

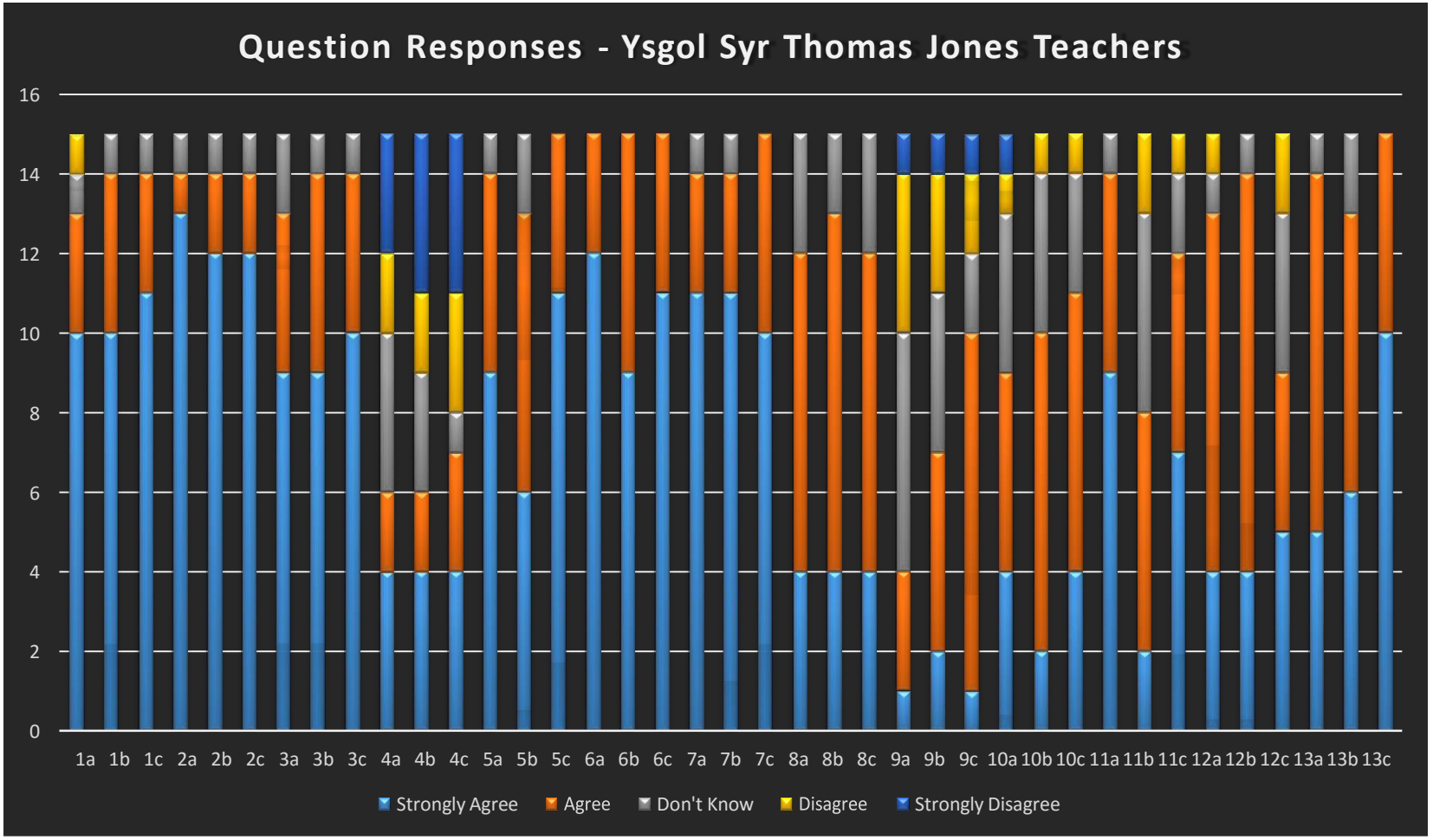

Figure 15. Questionnaire SoI responses from YSTJ Teachers group (n = 15)

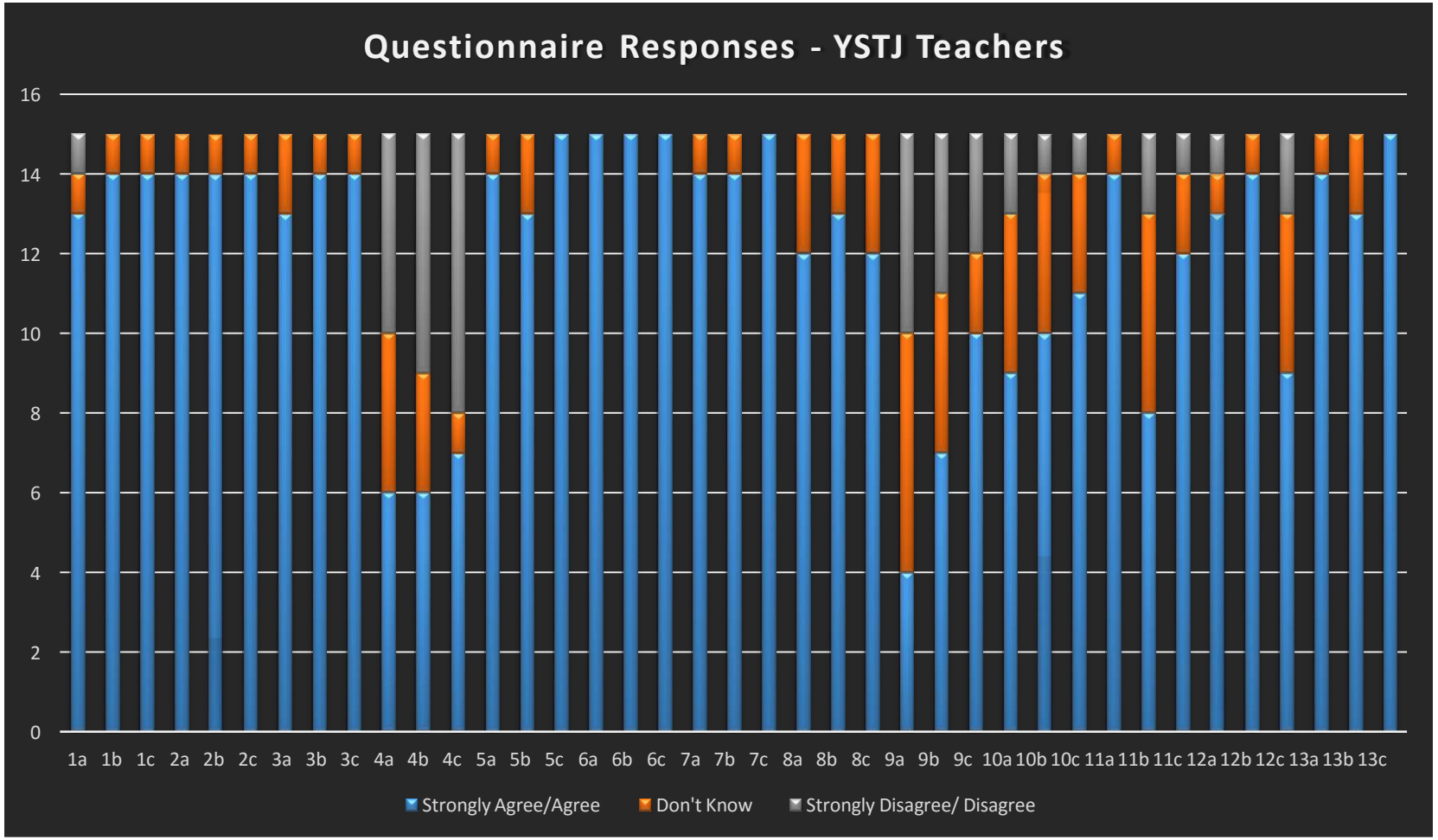

Figure 16. Questionnaire SoI responses from YSTJ Teachers group (combined results)

5.1.2.4 CTGYM Farmers

The responses from the CTGYM Farmers group indicate the strongest degree of agreement (strongly agree/agree) for the issues of:

- Trust in other local residents
- Social health
- Enjoyment of time spent working/at school
- Equal access to educational, health and care services

The issues which received the greatest number of uncertain or indifferent responses were:

- Different types of housing on Anglesey
- Amount of training/skills courses in Anglesey
- Taking part in community events in Anglesey

The responses indicate the strongest degree of disagreement (strongly disagree/disagree) for the issues of:

- Amount of people moving onto Anglesey from elsewhere
- Taking part in local decision-making in Anglesey
- Reliability of public transport on Anglesey

The empirical questionnaire data is presented in Table 14, showing the combined results for each SoI with the issues detailed above highlighted for each category. The empirical data is also presented in graphic form; for each response option in Figure 17, and for combined responses in Figure 18.

	Strongly Agree/Agree	Don't Know	Strongly Disagree/ Disagree
1a	14	1	0
1b	13	2	0
1c	15	0	0
2a	14	1	0
2b	12	2	1
2c	13	2	0
3a	14	0	1
3b	11	1	3
3c	14	1	0
4a	13	2	0
4b	11	4	0
4c	11	3	1
5a	14	1	0
5b	15	0	0
5c	14	1	0
6a	12	3	0
6b	13	2	0
6c	14	1	0
7a	15	0	0
7b	13	2	0
7c	9	5	1
8a	9	5	1
8b	9	6	0
8c	8	7	0
9a	10	4	1
9b	9	3	3
9c	6	7	2
10a	11	4	0
10b	7	8	0
10c	12	3	0
11a	13	2	0
11b	8	4	3
11c	10	4	1
12a	10	4	1
12b	11	3	1
12c	10	4	1
13a	12	3	0
13b	10	5	0
13c	15	0	0

Table 14. Questionnaire responses for CTGYM Farmers (n = 15) (combined results)

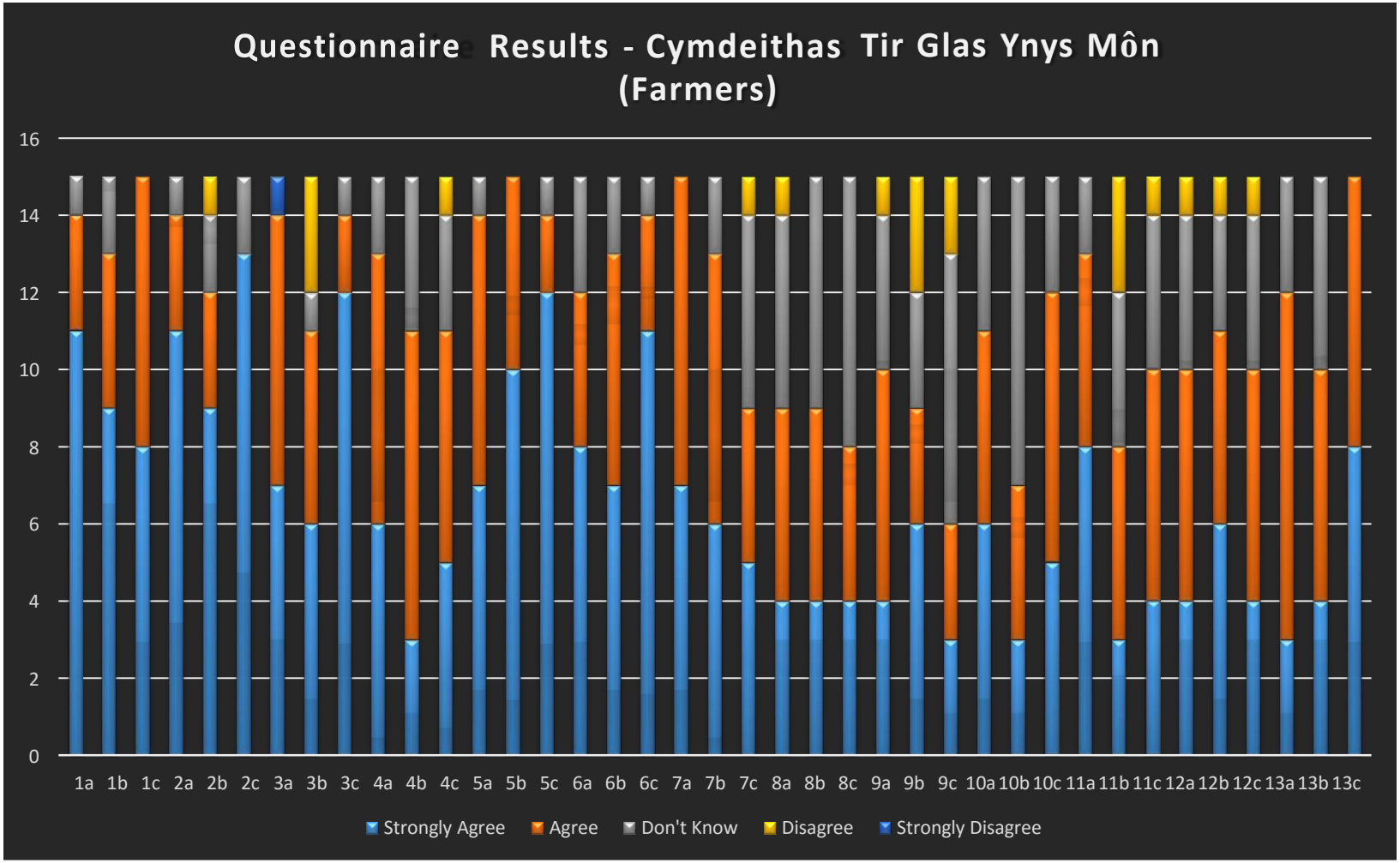

Figure 17. Questionnaire SoI responses from CTGYM group (n = 15)

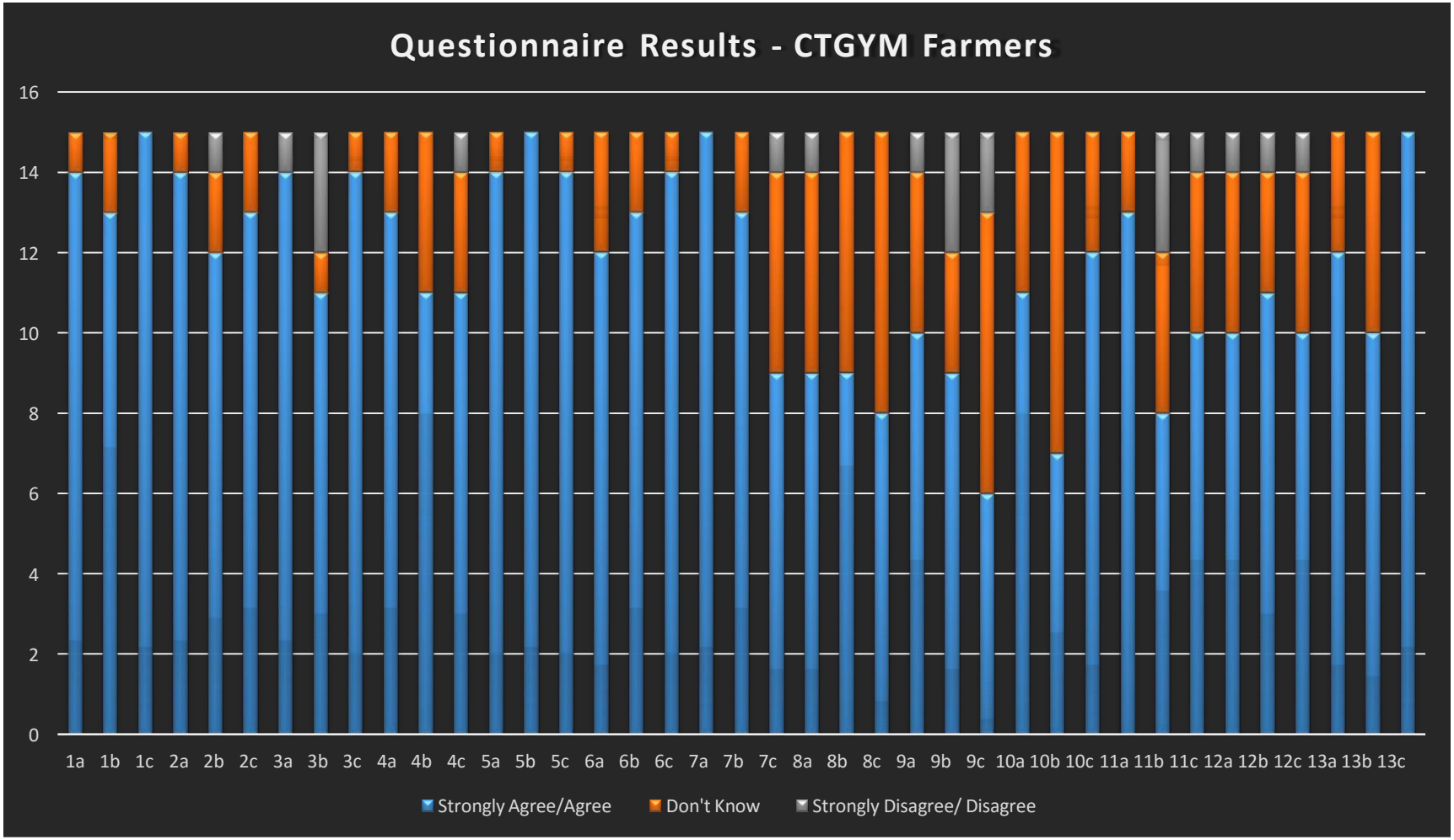

Figure 18. Questionnaire SoI responses from CTGYM Farmer group (combined results)

5.1.3 Social issue prioritisation: ranking scores

During completion of the research questionnaire each participant was requested to select and identify their least and most important social issues. The empirical data for this section is tabulated below (Tables 15 to 18), for each social group. Scoring bars are also included to visualize the results of this scoring exercise. The results from this component of the questionnaire are also presented in graphic form, for each group, to further highlight the distribution of group responses (Figure 19 to 22). To reiterate, the quantitative data from which Figures 19 to 22 have been generated are the rank *scores* of each social issue, based on the scoring system detailed in Section 4.8.3, as opposed to the sum figure of the number of times each issue has been individually identified as important or less important by a participant (i.e. a tally count).

5.1.3.1 Ysgol Uwchradd Bodedern - Students

The results reveal a distribution which appears to reflect greater agreement for issues in the early and mid-stages of the questionnaire, and greater disagreement for those issues in the latter half of the document; this is shown in Figure 23. The two clear issues of greatest importance – shown here as positive figures to reflect agreement - are those of Welsh language and the amount of available employment on Anglesey, receiving ranking scores of 50 and 31 respectively. Other issues of importance were physical (17) and mental health (13). The three issues of least importance - shown here as minus figures to reflect disagreement - were the amount of traffic on roads in Anglesey, different types of housing on Anglesey, and access to large companies operating on but not based in Anglesey, receiving ranking scores of -34, -31 and -30 respectively.

Social Issues	Top	Bottom
1a	3	-8
1b	6	-3
1c	4	-2
2a	11	-6
2b	2	-5
2c	50	-4
3a	2	-9
3b	5	0
3c	9	-4
4a	2	0
4b	0	-1
4c	0	0
5a	17	0
5b	10	0
5c	13	0
6a	7	-1
6b	9	-11
6c	31	-9
7a	7	-4
7b	10	-3
7c	15	-6
8a	1	-8
8b	5	-3
8c	2	0
9a	12	-11
9b	2	-4
9c	0	20
10a	10	-3
10b	0	-31
10c	3	-9
11a	7	-3
11b	1	-4
11c	0	-34
12a	0	-1
12b	1	-5
12c	0	-30
13a	2	-10
13b	1	-3
13c	2	-5

Figure 19. Ranking scores for most important (top) and least important (bottom) social issues for YUB Students group (n = 45)

Note: Scoring: 3, 2 and 1 points allocated for most, second most and third most important; -3, -2 and -1 points allocated for least, second least and third least important

Social Issues	Top	Bottom
1a	6	-10
1b	4	0
1c	3	0
2a	6	-4
2b	2	-2
2c	14	-3
3a	0	-17
3b	5	-7
3c	4	0
4a	1	0
4b	0	-3
4c	8	-3
5a	9	-1
5b	7	-3
5c	7	0
6a	0	0
6b	2	0
6c	54	0
7a	2	-4
7b	22	-2
7c	8	-1
8a	0	-4
8b	0	0
8c	3	-6
9a	2	-9
9b	0	-11
9c	0	-11
10a	3	-5
10b	0	-8
10c	1	-6
11a	4	-2
11b	1	-3
11c	0	-17
12a	0	-25
12b	0	-3
12c	0	-11
13a	0	0
13b	1	0
13c	16	-2

Figure 20. Ranking scores for most important (top) and least important (bottom) social issues for YSTJ Students group (n = 30)

Note: Scoring: 3, 2 and 1 points allocated for most, second most and third most important; -3, -2 and -1 points allocated for least, second least and third least important

Social Issues	Top	Bottom
1a	2	-1
1b	0	0
1c	5	0
2a	8	-3
2b	1	-2
2c	8	0
3a	1	0
3b	4	0
3c	0	-3
4a	0	0
4b	0	0
4c	1	0
5a	15	0
5b	1	-1
5c	10	-3
6a	0	0
6b	0	0
6c	6	0
7a	3	-1
7b	3	-3
7c	0	-2
8a	0	0
8b	0	-2
8c	0	-5
9a	0	-5
9b	0	0
9c	0	0
10a	0	-5
10b	0	-13
10c	0	-1
11a	1	0
11b	0	-3
11c	0	-2
12a	0	-1
12b	0	-4
12c	0	-26
13a	0	-2
13b	0	0
13c	9	0

Figure 21. Ranking scores for most important (top) and least important (bottom) social issues for YSTJ Teachers group (n = 15)

Note: Scoring: 3, 2 and 1 points allocated for most, second most and third most important; -3, -2 and -1 points allocated for least, second least and third least important (scores reflected by bars)

Social Issues	Top	Bottom
1a	3	0
1b	5	0
1c	1	-2
2a	7	0
2b	1	0
2c	12	0
3a	8	0
3b	7	0
3c	2	-1
4a	3	-2
4b	0	0
4c	0	0
5a	12	0
5b	0	0
5c	3	0
6a	0	0
6b	0	0
6c	1	0
7a	3	0
7b	0	0
7c	0	0
8a	0	-3
8b	0	0
8c	0	0
9a	0	-3
9b	0	-3
9c	2	0
10a	0	-5
10b	0	-5
10c	0	-3
11a	0	-7
11b	0	-12
11c	0	-8
12a	0	-1
12b	0	-3
12c	0	-8
13a	0	-3
13b	0	-3
13c	1	0

Figure 22. Ranking scores for most important (top) and least important (bottom) social issues for CTGYM Farmers group (n = 15)

Note: Scoring: 3, 2 and 1 points allocated for most, second most and third most important; -3, -2 and -1 points allocated for least, second least and third least important (scores reflected by bars)

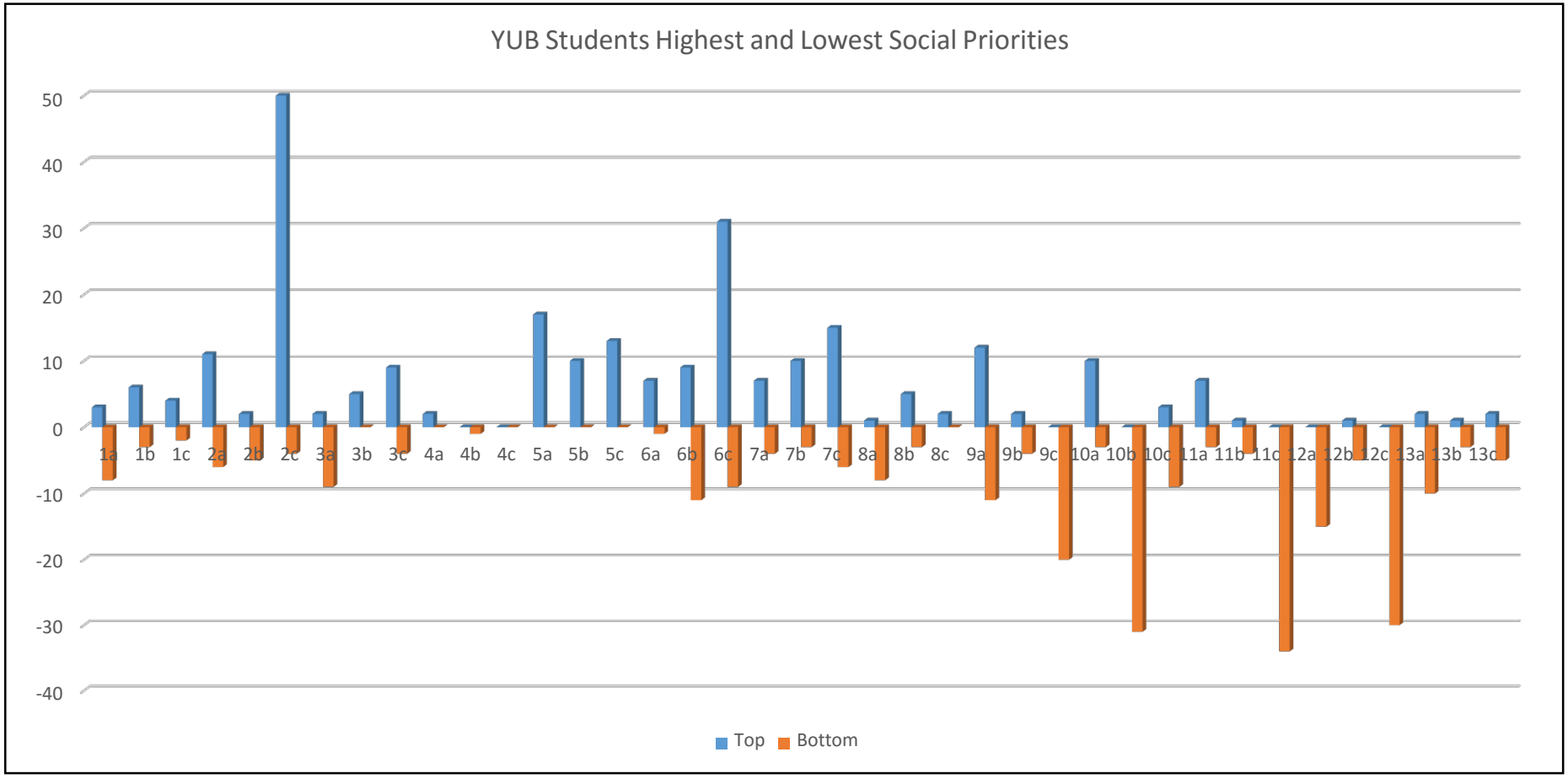

Figure 23. This graph shows the ranking scores of the 39 social issues constituting the research questionnaire for the YUB Students group.

(Note: Scores are based upon the scoring system detailed in Section 4.6.3)

5.1.3.2 Ysgol Syr Thomas Jones – Students

The graph in Figure 24 reveals a distribution of results which indicate a broader distribution of responses than for the other student group. The issue of greatest importance is the level of available employment on Anglesey, receiving a ranking score of 54. Other issues of importance were the ability to do hobbies or non-work activities (22), equal access to educational, health and care services (16) and Welsh language (14). The three issues of least importance were access to local representatives on Anglesey, the number of young people leaving Anglesey, and the amount of traffic on roads in Anglesey, receiving ranking scores of -25, -17 and -17 respectively.

5.1.3.3 Ysgol Syr Thomas Jones – Teachers

The graph in Figure 25 reveals a distribution of results more similar to the YUB Student group than the student group of the same institution as the YSTJ Teacher group, albeit with much fewer participants. The issues of greatest importance are physical health (15), mental health (10), equal access to educational, health and care services (9), Welsh culture (8) and Welsh language (8). The clear issue of least importance for the group was access to large companies who operate on but are not based in Anglesey, receiving a ranking score of -26. Other issues of lesser importance to the group were different types of housing on Anglesey, the amount of training/skills courses on Anglesey, and taking part in voluntary activities on Anglesey, receiving ranking scores of -13, -5 and -5 respectively.

5.1.3.4 Cymdeithas Tir Glas Ynys Môn – Farmers

The graph in Figure 26 also reveals a distribution of results more similar to the YUB Student and YSTJ Teachers groups, but is the most pronounced positive and negative distribution according to the two halves of the questionnaire of all groups, with the first half receiving more positive responses and the latter half receiving more negative responses. The issues of greatest importance are Welsh language (12), physical health (12), the amount of younger people leaving Anglesey (8), the amount of people moving onto Anglesey from elsewhere (7), and Welsh culture (8). The issues of least importance for the group were the reliability of public transport in Anglesey, the amount of traffic on roads in Anglesey, access to large companies who operate on but are not based in Anglesey, and the condition of roads in Anglesey, receiving ranking scores of -12, -8, -8 and -7 respectively.

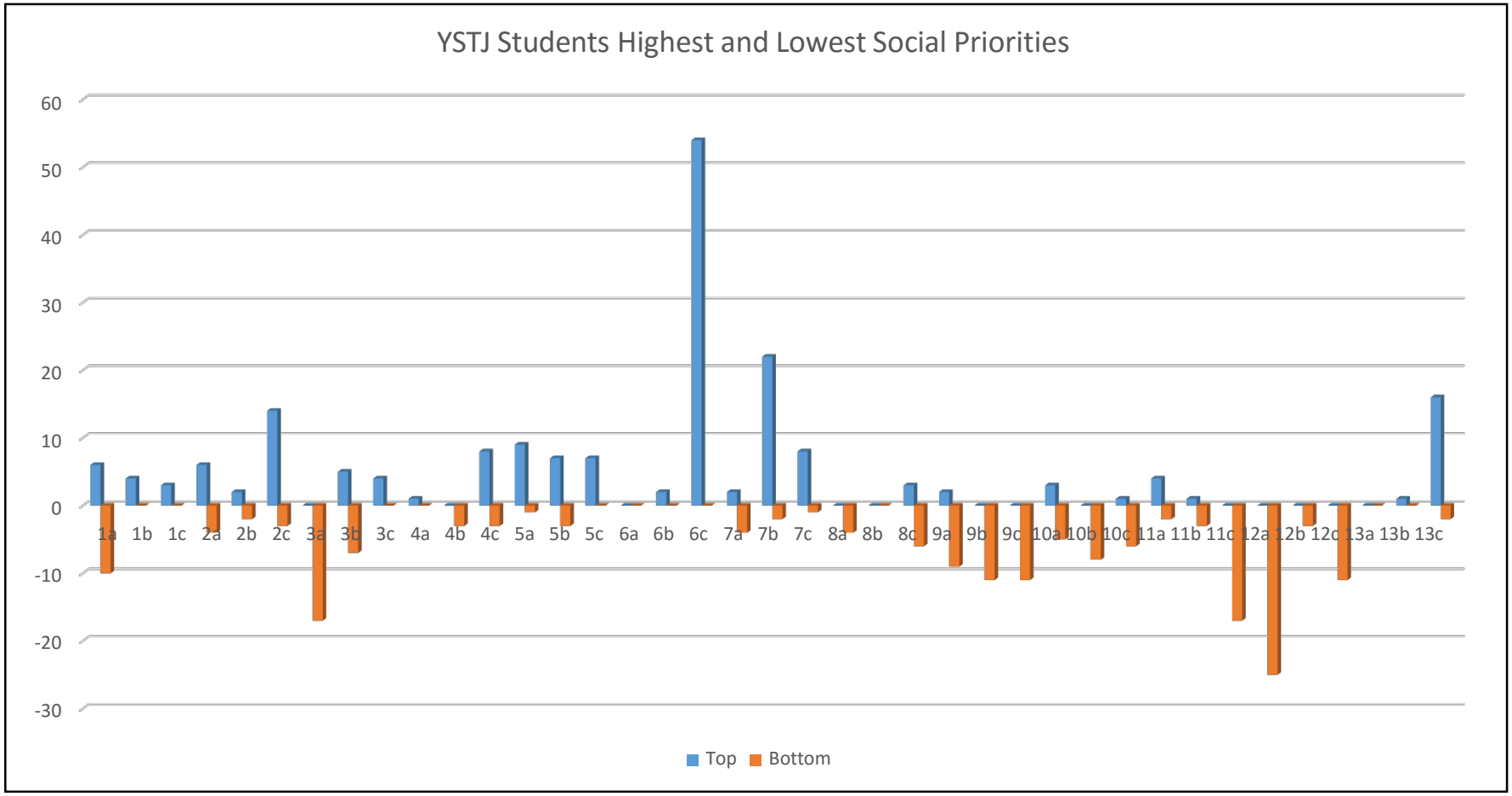

Figure 24. This graph shows the ranking scores of the 39 social issues constituting the research questionnaire for the YSTJ Students group. (Note: Scores are based upon the scoring system detailed in Section 4.6.3)

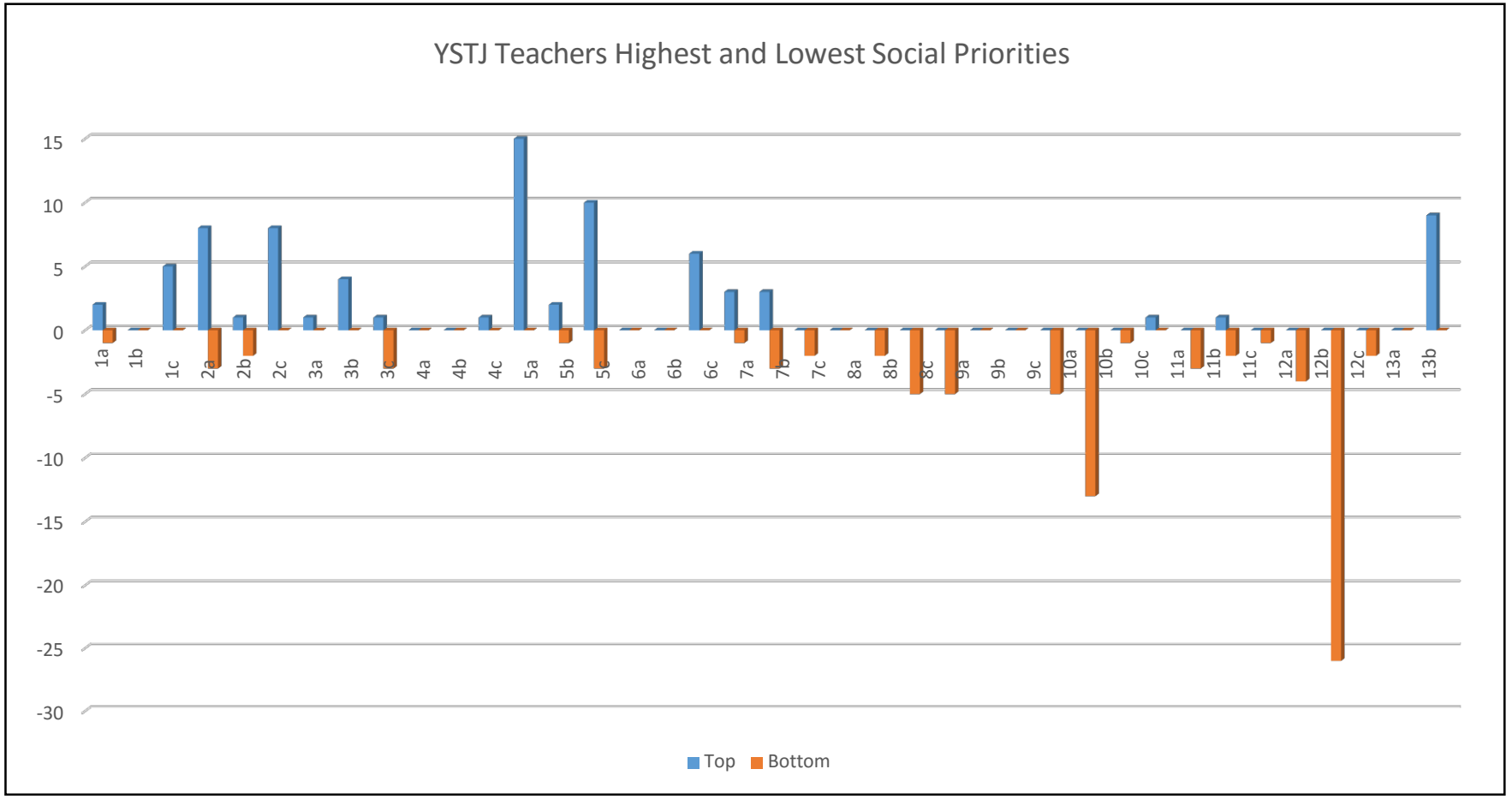

Figure 25. This graph shows the ranking scores of the 39 social issues constituting the research questionnaire for the YSTJ Teachers group. (Note: Scores are based upon the scoring system detailed in Section 4.6.3)

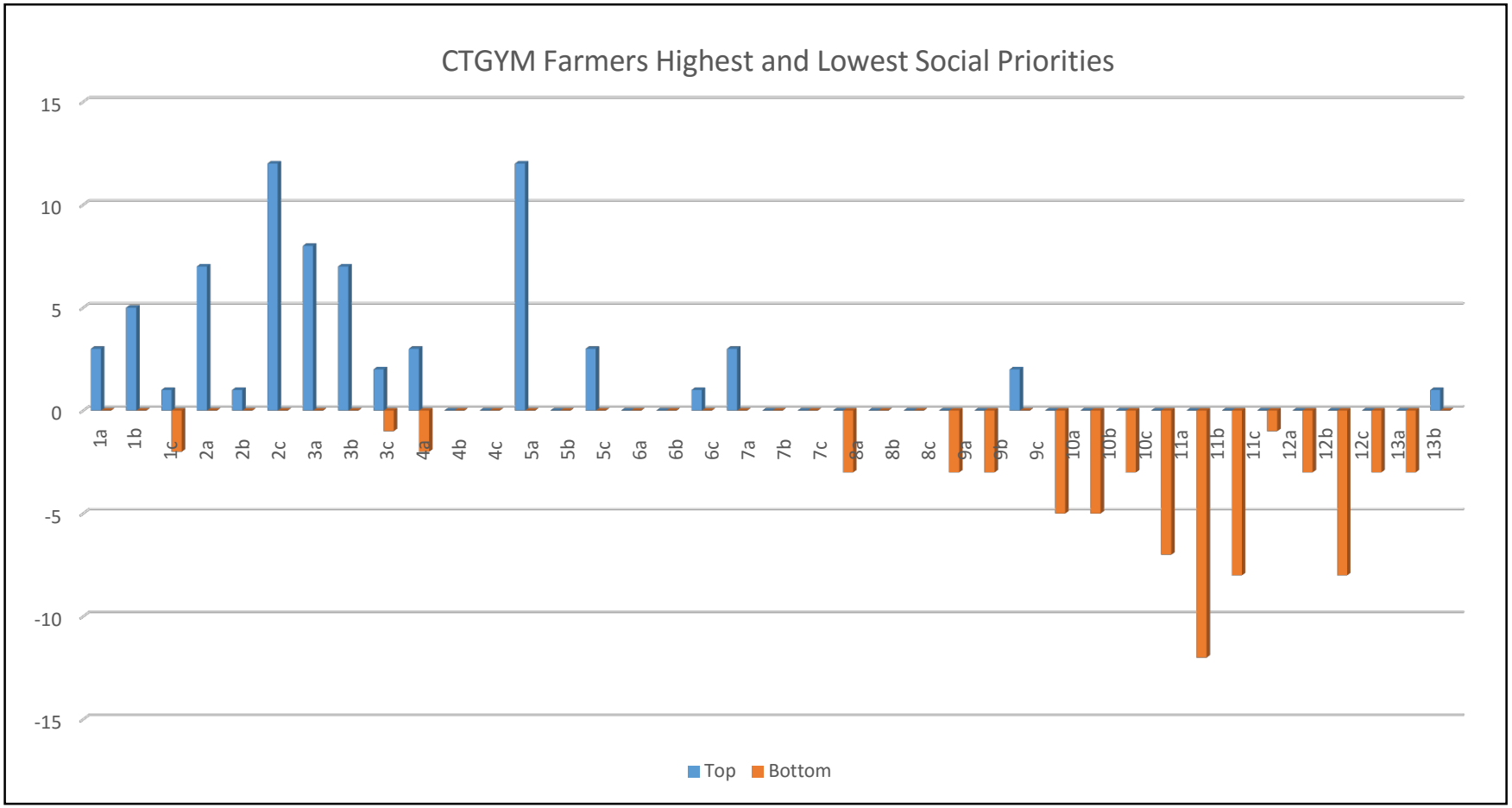

Figure 26. This graph shows the ranking scores of the 39 social issues constituting the research questionnaire for the CTGYM Farmers group. (Note: Scores are based upon the scoring system detailed in Section 4.6.3)

These results will be discussed in detail in Section 6.1. Based upon the same empirical data, I also developed a series of 'Priority Profiles' for each group which identified the most and least important issues as identified by participants. These are discussed in the following section.

5.1.3.5 Social issue prioritisation: Priority Profiles

As detailed in the preceding section, social priority responses were scored and a total calculated for each participating group. The results of this scoring exercise, presented previously, are reported below in greater detail, in the form of a series of group-specific *Priority Profiles* (see Tables 17 to 20). To provide a basis for the first discussion group with each social group, Priority Profiles are constituted of the four to five most important, and three to four least important, issues identified for each group based upon these ranking scores. Therefore, each profile would include a maximum of *5 most important* issues and *4 least important* issues. For the most important issues, four differently scored issues were included, and in the case that an issue was 'score-tied' (of the same score) with another issue, five issues were then included. For the least important issues, three differently scored issues were included, with four issues of least importance being included if the score of one of the issues of least importance was score-tied with another issue. In the case of *more than* one other issue being score-tied (such as in the case of YSTJ Students, where three issues of least importance held a joint score of -11), the profile retained only three issues of least importance.

This reflects a *Positive Priority Strategy* (PPS) implemented for the purpose of developing Priority Profiles, primarily concerned with issues of greatest importance, to reiterate the priority and stakeholder-focussed nature of the research, whilst still including key social issues of lesser importance. This was done because a key element of the group dialogue was to identify priority shifts when the topic of new nuclear power developments were introduced to frame group discussions. Therefore, it was important to include *both* the most and least important issues in group discussions in order to identify significant priority shifts in either direction. This enabled me to examine whether group priorities altered when the technological research topic was discussed in the context of perceived social impacts, and if so, the general degree of these changes. The development of group-specific Priority Profiles perform the dual function of identifying where initial group priorities lie, and thus, provide a preliminary structure to proceeding group discussions. Priority Profiles were also developed to present clearly the overall group priorities and their associated scores, reflecting the broad intra-group consensus regarding the perceived importance of each issue. Methodologically, the Priority Profiles, based upon stakeholder priorities, reflect intentions of procedural justice and goals to ensure proceeding discussions are locally relevant and legitimate.

Social Group	Importance Category (high or low priority)	Issues of highest and lowest priority (resulting from self-ranking exercise)	Ranking scores
Ysgol Uwchradd Bodedern Students	***High***	**Welsh language**	*50*
		Amount of available employment	*31*
		Physical health	*17*
		Mental health	*13*
	Low	**Amount of traffic on roads**	*-34*
		Different types of housing	*-31*
		Access to large companies who operate on but are not based in Anglesey	*-30*

Table 15. Priority Profile for YUB Students group, showing issues of highest and lowest importance, based upon participant ranking scores.

Social Group	Importance Category (high or low priority)	Issues of highest and lowest priority (resulting from self-ranking exercise)	Ranking scores
Ysgol Syr Thomas Jones Students	***High***	**Amount of available employment**	*54*
		Ability to do hobbies or non-work activities	*22*
		Educational, health and care services	*16*
		Welsh language	*14*
	Low	**Access to local representatives**	*-25*
		Number of young people leaving Anglesey	*-17*
		Amount of traffic on roads	*-17*

Table 16. Priority Profile for YSTJ Students group, showing issues of highest and lowest importance, based upon participant ranking scores.

Social Group	Importance Category (high or low priority)	Issues of highest and lowest priority (resulting from self-ranking exercise)	Ranking scores
Ysgol Syr Thomas Jones Teachers	***High***	**Physical health**	*15*
		Mental health	*10*
		Educational, health and care services	*9*
		Welsh culture	*8*
		Welsh language	*8*
	Low	**Access to large companies who operate on but are not based in Anglesey**	*-26*
		Different types of housing	*-13*
		Amount of training/skills courses	*-5*
		Taking part in voluntary activities	*-5*

Table 17. Priority Profile for YSTJ Teachers group, showing issues of highest and lowest importance, based upon participant ranking scores.

Social Group	Importance Category (high or low priority)	Issues of highest and lowest priority (resulting from self-ranking exercise)	Ranking scores
Cymdeithas Tir Glas Ynys Môn Farmers	***High***	**Welsh language**	*12*
		Physical health	*12*
		Amount of young people leaving Anglesey	*8*
		The amount of people moving onto Anglesey from elsewhere	*7*
		Welsh culture	*7*
	Low	**Reliability of public transport**	*-12*
		Amount of traffic on roads	*-8*
		Access to large companies who operate on but are not based in Anglesey	*-8*
		Condition of roads on Anglesey	*-7*

Table 18. Priority Profile for CTGYM Farmers group, showing issues of highest and lowest importance, based upon participant ranking scores.

Based upon the questionnaire ranking exercise for which participants were asked to specify and rank the issues of greatest importance to them, the four most important issues (five in the event of tied scoring) for each group (based on ranking scores) are as shown in Table 19 below as 'Positive Priority Profiles' (PPPs).

YUB Students	YSTJ Students
1. Welsh language **2.** Amount of employment **3.** Physical health **4.** Mental health	**1.** Amount of employment **2.** Ability to do hobbies or non-work activities **3.** Educational, health and care services **4.** Welsh language
YSTJ Teachers	**CTGYM Farmers**
1. Physical health **2.** Mental health **3.** Educational, health and care services **4.** Welsh culture **4.** Welsh language	**1.** Welsh language **2.** Physical health **3.** Amount of young people leaving Anglesey **4.** Amount of people moving onto Anglesey from elsewhere **4.** Welsh culture

Table 19. Positive Priority Profiles, showing the issues of most importance for each group

Based upon the means calculated for SoI responses, based upon even samples of each group (n = 15), the four issues which had the lowest numerical mean scores of the 39 included in the questionnaire, therefore indicating the issues of greater importance for the group, are shown in Table 20 overleaf. Due to number of issues with the same calculated means, the number of issues included in Table 20 for each group has been limited to four, except in the instance where the fourth and final issue has the same mean as other issues, in which instance these are also included, as is the case with CTGYM Farmers (in this case, the four final issues listed for this group are shown in the order they appeared within the questionnaire).

YUB Students	YSTJ Students
1. *Enjoyment of leisure time (1.40)* 2. *Variety of employment in Anglesey (1.60)* 3. *Quality of employment in Anglesey (1.67)* 3. *Amount of available employment in Anglesey (1.67)*	1. *Enjoyment of leisure time (1.13)* 2. *Mental health (1.33)* 3. *Variety of employment in Anglesey (1.40)* 3. *Educational, health and care services (1.40)*
YSTJ Teachers	**CTGYM Farmers**
1. *Variety of employment in Anglesey (1.20)* 2. *Social links and networks within Anglesey (1.27)* 2. *Mental health (1.27)* 2. *Amount of available employment in Anglesey (1.27)*	1. *Welsh language (1.27)* 1. *Number of Welsh speakers in Anglesey (1.27)* 1. *Mental health (1.27)* 4. *Sense of community (1.33)* 4. *Welsh culture (1.33)* 4. *Social health (1.33)* 4. *Amount of available employment in Anglesey (1.33)*

Table 20. This table shows the issues of greatest importance to each social group based upon mean scores (shown in brackets) from the 39 statements of importance/social issues

Given that both response formats have been analysed and the findings presented, I now report on the effect of format on priority-based results. When mean scores for the 39 SoI are analysed, for which equal participant numbers from each group are considered, the findings and apparent differences between groups are quite different; this is shown in Table 21 overleaf. The differences in participant responses from the different formats of questioning (Likert scale response format and issue ranking format), and how the issues of greatest importance for each group differ as a result, shown in Table 21, reflect both *deduced* group priorities (Likert and sampled) and *specified* group priorities (ranking and full group).

YUB Students		YSTJ Students	
Full group – issue ranking (n = 45)	**Sample group – mean scores (n = 15)**	**Full group – issue ranking (n = 31)**	**Sample group - mean scores (n = 15)**
Welsh language	*Enjoyment of leisure time (1.40)*	*Amount of available employment in Anglesey*	*Enjoyment of leisure time (1.13)*
Amount of available employment in Anglesey	*Variety of employment in Anglesey (1.60)*	*Ability to do hobbies or non-work activities*	*Mental health (1.33)*
Physical health	*Quality of employment in Anglesey (1.67)*	*Educational, health and care services*	*Variety of employment in Anglesey (1.40)*
Mental health	*Amount of available employment in Anglesey (1.67)*	*Welsh language*	*Educational, health and care services (1.40)*
YSTJ Teachers		**CTGYM Farmers**	
Full group – issue ranking (n = 15)	**Sample group - mean scores (n = 15)**	**Full group – issue ranking (n = 15)**	**Sample group - mean scores (n = 15)**
Physical health	*Variety of employment in Anglesey (1.20)*	*Welsh language*	*Welsh language (1.27)*
Mental health	*Social links and networks within Anglesey (1.27)*	*Physical health*	*Number of Welsh speakers in Anglesey (1.27)*
Educational, health and care services	*Mental health (1.27)*	*Amount of young people leaving Anglesey*	*Mental health (1.27)*
Welsh culture	*Amount of available employment in Anglesey (1.27)*	*Amount of people moving onto Anglesey from elsewhere*	*Sense of community (1.33)*
Welsh language		*Welsh culture*	*Welsh culture (1.33)*
			Social health (1.33)
			Amount of available employment in Anglesey (1.33)

Table 21. Social group priorities from two methods of calculation (issue ranking and calculated SoI means)

It is evident that for each group the majority of issues of greatest importance are different. However, within Table 21, some themes are also highlighted (orange) to identify which social issues are present in both calculated lists of most important issues.

The most important issue for the majority of groups is different between mean scoring and issue ranking, however '*Welsh language'* remains the CTGYM Farmers group's social priority for both formats. For YUB Students, YSTJ Students and YSTJ Teachers, the issue of greatest importance as shown by means scores is not only different to that specified by issue ranking, but the other important issues as identified by mean scores are not specified *at all* by issue ranking, other than *'Amount of available employment in Anglesey'* for YUB Students, *'Educational, health and care services'* for YSTJ Students, and '*Mental health'* for YSTJ Teachers. This highlights the differences in determined priorities according to different methods of analysis, and how the utilisation of multiple methods can be valuable in understanding issues of importance.

Considering the student groups, in regards to mean scores, the issue of *'Enjoyment of leisure time'* is the most important issue for both YUB and YSTJ Student groups. However, this issue is not included in the top four issues according to the *issue ranking* exercise. In regards to group similarities between the student groups as calculated from issue ranking, both consider *'Enjoyment of leisure time'* and the *'Variety of available employment in Anglesey'* to be of importance; however, as shown by the ranking scores the YSTJ Students consider both issues to be of greater importance than the YUB Students. However, similar to the issue ranking between the adult groups, *'Welsh language'* is prioritised very differently between the two student groups.

Considering the adult groups, in regards to *mean scores*, both YSTJ Teachers and CTGYM Farmers are matched in their response to the issue of '*mental health'* (1.27), perceiving it as important but not the most important issue. Apart from the issue of *'Amount of available employment in Anglesey'*, which is similarly the final issue included for both groups in Table 21, the two groups responded quite differently in regards to their issues of most importance. For example, the responses of YSTJ Teachers group placed the *'Variety of employment in Anglesey'* and '*Social networks and links within Anglesey'* as most and second most important respectively, whereas the CTGYM Farmers placed *'Welsh language'* and the *'Number of Welsh speakers in Anglesey'* as the most and second most important social issues to them respectively. When the *issue ranking* results are considered, priorities between the two groups share similarities and differences. For example, '*Welsh language'*, '*Physical health'* and *'Welsh culture'* are prioritised to different degrees by the two groups, whilst the remaining two prioritised issues are then specific to each group (see Table 21).

Despite these differences, there are some social issues that the mean scores from participant responses dictate as similarly important to a number of participating groups:

- **Mental health** – considered similarly important by three groups; mean scores of **1.27** (*YSTJ T*), **1.27** (*CTGYM F*) and **1.33** (*YSTJ S*).

- **Variety of available employment** – considered important by three groups but to slightly different degrees; mean scores of **1.20** (*YSTJ T*), **1.40** (*YSTJ S*) and **1.60** (*YUB S*)

- **Amount of available employment –** considered important by three groups but to slightly different degrees; mean scores of **1.27** (*YSTJ T*), **1.33** (*CTGYM F*) and **1.67** (*YUB S*)

For YUB Students, the issue *'Amount of available employment'* is present in both lists, whereas for YSTJ Students the issue of *'Educational, health and care services'* is similarly important in both cases. For YSTJ Teachers, the issue of *'Mental health'* appears in both lists, and for CTGYM Farmers, *'Welsh language'* is calculated as the most important issue for both formats of calculation.

There are several social issues that are included on numerous occasions in Table 21. A count of the number of times each social issue is included as part of the dual empirical determination of quantitative data does not in itself determine which social issues are most important for the majority of the groups. Therefore, Table 22 overleaf reports the number of times each issue is included when both methods of calculation are considered, whereas Table 23 overleaf reports the social issues that are deemed as important by *either* method of calculation for a *majority* of the participating groups, i.e. for at least three of the groups.

This shows that there are *five social issues* that are deemed to be of greatest importance by the majority (at least three) of the participating groups, thus reflecting common group prioritisation:

- *Welsh language;*
- *Amount of available employment in Anglesey;*
- *Mental health;*
- *Variety of available employment in Anglesey;*
- *Physical health.*

Social Issue	Total Count
Welsh language	5
Amount of available employment	5
Mental health	4
Welsh culture	3
Physical health	3
Variety of available employment	3
Educational, health and care services	3
Enjoyment of leisure time	2
Social health	1
Number of Welsh speakers in Anglesey	1
Quality of available employment	1
Social links and networks in Anglesey	1
Amount of young people leaving Anglesey	1
Amount of people moving onto Anglesey from elsewhere	1
Ability to do hobbies and non-work activities	1
Sense of community	1

Table 22. This table shows the number times each issue is included when both methods of calculation are considered

Social issue	Groups identifying issue as important	Number of inclusions (total, both methods)
Welsh language	All groups	5 inclusions
Amount of available employment in Anglesey	All groups	5 inclusions
Mental health	All groups	5 inclusions
Variety of available employment in Anglesey	YUB S, YSTJ S, YSTJ T	3 inclusions
Physical health	YUB S, YSTJ T, CTGYM	3 inclusions

Table 23. This table shows the social issues which are deemed as important by either method of calculation for a majority of the participating groups, i.e. for at least three of the groups.

5.1.4 Participant Comments (Qualitative data)

The final component of the questionnaire was a space for additional participant comments, representing a qualitative and commentary aspect to a predominantly quantitatively-orientated research questionnaire document. This was included to provide an opportunity for participants to note or suggest any important social issues that were *not* mentioned in the questionnaire but were deemed to be important in their opinion. The space was also utilised by participants as an opportunity to elaborate or provide greater detail on issues of social importance, some of which had constituted part of the preceding questionnaire. The comments provided by each social group are presented overleaf in Table 24.

As is evident by these responses, the number of participants who responded to this section from the YUB Students, YSTJ Teachers and CTGYM Farmers groups ranged between three and four. However, there were significantly more responses from the YSTJ Students group, where there were 13 participants that responded. This indicates an interest from all groups in the social issues affecting Anglesey, but particularly from the YSTJ Student group, responding to a significantly greater degree when provided with the opportunity to do so.

Social Group	Issues deemed to be important which were not mentioned in questionnaire
Ysgol Uwchradd Bodedern Students	*More things for young adults to do on Anglesey*
	Not much help with career planning/future decisions. Very low amount of work experience opportunities
	No.
Ysgol Syr Thomas Jones Students	*Wind turbines are an issue in my community. In my opinion they are unattractive and is a waste of tax payer's money.*
	Wind turbines are an issue in my community as a local wants one. In my opinion they are unattractive, was[t]e of tax payer's money and also make a large amount of noise is released.
	Translated – Some people on Anglesey get 'benefits' when they don't deserve them/don't go to work whilst other people work hard and receive a lower income. Not enough police going around supervising the village/town – this doesn't give people an opportunity to speak/communicate with the police.
	I think the information given to the people who's homes will be effected [affected] by new projects and to make sure they have plenty to say in what will happen to them and no information is kept from them. This is important to me because it is something my household is currently dealing with and find it unfair waiting with no final answer.
	People who qualify to be on benefits. People who are able to get a bodge for disability parking. The amount of young people on the streets drinking and causing vandalism, people feel intimidated so it would be good to make the streets feel safer.
	Facilities available for older people (OAP's) is certainly a social issue. I'm sure many elderly people feel a bit forgotten and useless and I feel that perhaps that needs to change. Anglesey is such a beautiful place, perfect for outdoor activities, I feel that this could be used far more to promote national events, e.g. marathons, triathlons, hiking etc.
	People's attitude to race and sexuality.
	1a) I feel that a lot of Anglesey will lose a lot of its language and heritage when Wylfa B arrives. I think that is when a lot of steps should be taken to keep the island how it is because of the large amount of people coming in from other countries to work there.
	There might be a need to touch on the issues facing youths and try and gauge people's opinions on the matter. Focus more on job availability [availability] and opportunities on the island.
	Welsh language because without it Wales would hardly be a country and no one would speak Welsh.
	LGBT community isn't well represented. Atheist community isn't well represented. Brain drain leaving stupid behind. Schools with no budget.
	Translation - Leisure: Need to raise awareness of local rugby clubs, big part of my life and lots of other people. Skills courses: More courses on the island leading to jobs within a few years.
	6c) Employment is a rising issue on Anglesey, people find it hard to get jobs and high paying jobs on the island without applying for a job at Wylfa or the new power station. 3a) People leave Anglesey because of a lack of employment, there is a strong link between Question (3a) and (6a, b and c).

	Events available to the public hosted on Anglesey such as music events, Marathons etc. I feel as if this would boost the sense of an active community. More volunteering opportunities for young people within the community. This will help with social issues such as vandalism and crime. It will build confidence in young people and arm them to respect their community. Elderly should be given more consideration. Facilities and groups should be built in order for them to feel of more importance within the community and live a better life. I feel as if we are too focussed on our futures and careers, the elderly should NOT be set aside or forgotten.
Ysgol Syr Thomas Jones Teachers	*Obesity in teenagers. Alcohol intake of young adults. Care for the elderly.*
	Financial provision to teaching/schools/buildings
	It appears that rules and regulations regarding locals building houses in their own villages need addressing. If young people are to stay on Anglesey and continue with traditions and the development of the language and culture, they should be allowed to build on their own land. Villages have been designated as 'non-villages'. If not a 'village' then you can't live there – yet sons and daughters have lived there all their lives. The types/designs of modern houses are not in keeping with the houses of Anglesey. Many developments across the island are large houses emulating designs in Cheshire and beyond. These developments are changing the character of the island. Although this is linked to 'different types of housing', I make the point that the system for allowing young people to build any kind of house is in need of reform.
	The house prices are high for our young people. Good 'posts' that are available to young people.
Cymdeithas Tir Glas Ynys Môn Farmers	*[Drawn images - wind turbine and a 'thumbs up']*
	The number of retired people moving into the area at the end of their working lives. They have education, time and money to influence local policy, reducing the desire for change and development needed for a young successful vibrant rural economy
	Don't need Wylfa B
	It worries me very much that our beloved young people cannot find jobs (or work) in Anglesey. These are the up and coming young people that will eventually replace those of us who are nearing pension or retiring age. They are the future residents of the island who we would love to keep and who know our way of life.

Table 24. This table presents the responses of participants from each social group from the space provided in the research questionnaire for comments and notification of issues of importance not included in the questionnaire.

	1a	1b	1c	2a	2b	2c	3a	3b	3c	4a	4b	4c	5a	5b	5c	6a	6b	6c	7a	7b	7c
YUB_S	2.47	1.93	3.00	2.07	2.07	1.80	2.80	2.53	2.00	2.60	2.80	2.93	2.27	2.07	2.00	1.60	1.67	1.67	2.33	1.73	1.40
YSTJ_S	2.20	1.47	2.33	2.60	2.40	1.93	2.80	2.80	2.20	2.67	2.53	2.53	2.33	1.87	1.33	1.40	1.60	1.47	1.80	1.47	1.13
YSTJ_T	1.60	1.40	1.40	1.33	1.33	1.27	1.53	1.47	1.40	2.87	3.00	3.00	1.47	1.73	1.27	1.20	1.40	1.27	1.33	1.40	1.33
CTGYM	1.33	1.53	1.47	1.33	1.67	1.27	1.73	2.07	1.27	1.73	2.07	2.00	1.60	1.33	1.27	1.67	1.67	1.33	1.53	1.73	2.13

Significant Differences	YUB_S / YSTJ_T		YUB_S / YSTJ_T	YSTJ_S / YSTJ_T	YSTJ_S / YSTJ_T		YUB_S / YSTJ_T	YUB_S / YSTJ_T	YUB_S / CTGYM	YSTJ_T / CTGYM	YSTJ_T / CTGYM	YSTJ_T / CTGYM	YUB_S / YSTJ_T	YUB_S / CTGYM	YUB_S / YSTJ_S				YUB_S / YSTJ_T		YUB_S / CTGYM
	YUB_S / CTGYM		YUB_S / CTGYM	YSTJ_S / CTGYM			YUB_S / CTGYM	YSTJ_S / YSTJ_T	YSTJ_S / YSTJ_T				YSTJ_S / YSTJ_T		YUB_S / YSTJ_T				YUB_S / CTGYM		YSTJ_S / CTGYM
			YSTJ_S / YSTJ_T				YSTJ_S / YSTJ_T		YSTJ_S / CTGYM				YSTJ_S / CTGYM		YUB_S / CTGYM						YSTJ_T / CTGYM
			YSTJ_S / CTGYM				YSTJ_S / CTGYM														

	8a	8b	8c	9a	9b	9c	10a	10b	10c	11a	11b	11c	12a	12b	12c	13a	13b	13c
YUB_S	2.33	2.27	2.40	2.60	2.87	3.07	1.87	2.53	2.27	1.80	1.87	2.47	3.00	2.60	2.80	2.53	2.40	1.87
YSTJ_S	1.87	2.00	2.20	2.60	3.40	2.87	2.07	2.20	1.93	1.87	1.93	2.13	2.93	2.67	2.67	1.73	1.60	1.40
YSTJ_T	1.93	1.87	1.93	3.07	2.73	2.53	2.33	2.27	2.07	1.47	2.47	1.80	1.93	1.80	2.20	1.73	1.73	1.33
CTGYM	2.20	2.13	2.20	2.13	2.20	2.53	1.87	2.33	1.87	1.60	2.47	2.13	2.13	1.93	2.13	2.00	2.07	1.47

Significant Differences				YSTJ_T/ CTGYM	YSTJ_S/ CTGYM								YUB_S/ YSTJ_T	YUB_S/ YSTJ_T		YUB_S/ YSTJ_S	YUB_S/ YSTJ_S	
													YUB_S/ CTGYM	YUB_S/ CTGYM		YUB_S/ YSTJ_T	YUB_S/ YSTJ_T	
													YSTJ_S/ YSTJ_T	YSTJ_S/ YSTJ_T		YUB_S/ CTGYM		
													YSTJ_S/ CTGYM	YSTJ_S/ CTGYM				

Figure 27. Calculated questionnaire data means for each issue/statement of importance (1a – 13c), for each participating social group, with significant differences between groups shown beneath each issue (calculated using one-way between group ANOVA in SPSS)

5.1.5 Questionnaire Means and Significant Differences

Both the calculated mean and one-way between group ANOVA results for each group are displayed in Figure 27 (previous page). The main questionnaire themes of '*Employment' (6a-c), 'Training and skills courses' (8a-c), 'Housing' (10a-c),* and *'Transport and road infrastructure' (11a-c)* were found to receive *similar* responses of importance from all groups, for all three sub-issues specified within the theme. Therefore, the findings show that social themes for which all groups felt similarly towards in regards to their importance were:

- **Employment**
- **Training and skills courses**
- **Housing**
- **Transport and road infrastructure**

This accounts for 12 of the 18 issues receiving similar importance responses, as reported in Table 25 overleaf. Therefore, the number of issues for which *significant differences* were found accounted for slightly over 50% (21), and that teachers and farmers generally considered the issues to be of greater importance than the two student groups; these findings are reported in Table 26.

Question Number	Statement of Importance (SoI) Theme
1b	Social links and networks within Anglesey
2c	Welsh language
6a	Variety of employment in Anglesey
6b	Quality of employment in Anglesey
6c	Amount of employment in Anglesey
7b	Ability to do hobbies or non-work activities
8a	Variety of training/skills courses in Anglesey
8b	Access to training/skills courses in Anglesey
8c	Amount of training/skills courses in Anglesey
9c	Taking part in community events in Anglesey
10a	Amount of affordable housing on Anglesey
10b	Different types of housing on Anglesey
10c	Condition of housing on Anglesey
11a	Condition of roads on Anglesey
11b	Reliability of public transport on Anglesey
11c	Amount of traffic on roads in Anglesey
12c	Access to and communicating with large companies operating on but not based in Anglesey
13c	Equal access to educational, health and care services/facilities on Anglesey

Table 25. This table shows the social issues which social groups responded similarly to, in regards to their importance, based upon statistical testing (between-group one way ANOVA [n = 15]) of research questionnaire SoI responses

Question Number	Statement of Importance (SoI) Theme	Significant Differences (between groups)	Greater Importance (groups)
1a	Sense of community	YUB S / YSTJ T & CTGYM	*YSTJ T & CTGYM*
1c	Trust in other local residents	YUB S / YSTJ T & CTGYM YSTJ S / YSTJ T & CTGYM	*YSTJ T & CTGYM*
2a	Welsh culture	YUB S / YSTJ T YSTJ S / CTGYM	*YSTJ T & CTGYM*
2b	Welsh heritage	YSTJ S / YSTJ T	*YSTJ T*
3a	Amount of younger people leaving Anglesey	YUB S / YSTJ T & CTGYM YSTJ S / YSTJ T & CTGYM	*YSTJ T & CTGYM*
3b	Amount of people moving onto Anglesey from elsewhere	YUB S / YSTJ T YSTJ S / YSTJ T	*YSTJ T*
3c	Number of Welsh speakers in Anglesey	YUB S / CTGYM YSTJ S / YSTJ T & CTGYM	*CTGYM & YSTJ T*
4a	Amount of crime to or in homes in town/village	YSTJ T / CTGYM	*CTGYM*
4b	Amount of crime against people in town/village	YSTJ T / CTGYM	*CTGYM*
4c	Amount of crime affecting town/village	YSTJ T / CTGYM	*CTGYM*
5a	Physical health	YUB S / YSTJ T YSTJ S / YSTJ T & CTGYM	*YSTJ T & CTGYM*
5b	Social health	YUB S / CTGYM	*CTGYM*
5c	Mental health	YUB S / YSTJ S, YSTJ T & CTGYM	*YSTJ S, YSTJ T & CTGYM*
7a	Enjoyment of time spent working/at school	YUB S / YSTJ T & CTGYM	*YSTJ T & CTGYM*
7c	Enjoyment of leisure time	CTGYM / YUB S, YSTJ S & YSTJ T	*YUB S, YSTJ S & YSTJ T*

Question Number (continued)	Statement of Importance (SoI) Theme	Significant Differences (between groups)	Greater Importance (groups)
9a	Taking part in voluntary activities on Anglesey	YSTJ T / CTGYM	*CTGYM*
9b	Taking part in local decision-making in Anglesey	YSTJ S / CTGYM	*CTGYM*
12a	Access to and communicating with local representatives in Anglesey	YUB S / YSTJ T & CTGYM YSTJ S / YSTJ T & CTGYM	*YSTJ T & CTGYM*
12b	Access to and communicating with local authorities in Anglesey	YUB S / YSTJ T & CTGYM YSTJ S / YSTJ T & CTGYM	*YSTJ T & CTGYM*
13a	Equal access to business, finance and retail services/facilities on Anglesey	YUB S / YSTJ S, YSTJ T & CTGYM	*YSTJ S, YSTJ T & CTGYM*
13b	Equal access to leisure and entertainment services and facilities on Anglesey	YUB S / YSTJ S & YSTJ T	*YSTJ S & YSTJ T*

Table 26. This table shows significant differences (based on between-group one way ANOVA [n = 15]) between participating social groups, based on their responses to research questionnaire SoI, and which group/s these social issues appear more important to.

Based upon the results presented in Table 26, the differences between groups, for a majority of the social issues, predominantly show the issues being considered *more important* by the YSTJ Teachers and/or CTGYM Farmers groups. However, for all three crime-related issues (4a-c), CTGYM Farmers were found to consider all sub-issues to more important than YSTJ Teachers; this was the only instance where one group was found to consider a theme of greater importance across all three sub-issues. According to these findings, there were also three instances where a single group considered an issue to be less important than the other three groups:

- **Mental health** – *YUB S* group considers this to be *less* important than other groups

- **Enjoyment of leisure time –** *CTGYM* group considers this to be *less* important than other groups

- **Equal access to business, finance and retail services/facilities on Anglesey** - *YUB S* group considers this to be *less* important than other groups

Significant differences were found for every theme other than themes 6, 8, 10 and 11 as detailed earlier in this section. The themes which reported significant differences on all three sub-issues within the theme include the following:

- ***Theme 3 – Population Changes***
- ***Theme 4 – Crime***
- ***Theme 5 – Health***

For the other six themes where significant differences were reported (1; 2; 7; 9; 12; 13), these were found for two of the three sub-issues within the theme. The one-way between group ANOVA data reported by SPSS are presented in Appendices 10 – 22, highlighting where significant differences are found between groups (i.e. where the probability of differences occurring by chance (*Sig.* value) are found to be less than 0.05 (i.e. less than 5%).

These findings will be discussed in greater detail in Section 6.1. At this point, I report the qualitative data from the two sets of dialogue-based sessions with each social group.

5.2 Qualitative Data - Discussion Group 1 (Social Group Session 2)

This section details the results of the qualitative aspect of the research, which were the group-based discussions which took place with each social group at different locations across Anglesey. Priority Profiles (see Section 5.1.3.) for each group provided the basis for each session, however it was discussed with groups prior to the commencement of each session that I encouraged an open group dialogue and that group members deliberated on issues which they felt were important to them based upon the ongoing discussion. Each group discussion was semi-structured, and Priority Profiles provided a *basis* for discussion as opposed to a *template*. Group discussions provided an opportunity to examine group priorities as identified by the research questionnaires, but they also served as an opportunity for group members to openly discuss and

deliberate their personal opinions and perceptions, which for some people are rare and valuable opportunities providing a platform for personal expression among peers and within familiar surroundings.

As detailed in Table 6 in Section 4.7, the discussion with the CTGYM Farmers group was conducted in Welsh, and then translated by myself during transcription, whereas all other discussions were conducted in English. The discussion theme tables (DTTs) in this section present summaries of participant comments and statements on the key issues discussed. Regarding the presentation of themes in DTTs, themes are included if:

- The theme was included the Priority Profile for the group, or
- If two or more comments or statements were made on the theme by group members.

There are a number of comments and statements within the DTTs which share two of these themes to describe their nature. For example, a potential impact or risk which was highlighted, with a potential solution to address it, would be labelled as 'I/N / O/P'.

The following DTTs (Tables 27 to 30) are presented in the order which has been used thus far in this thesis to present the results of research: YUB Students; YSTJ Students; YSTJ Teachers; CTGYM Farmers. The contents of the DTTs will be discussed in greater detail in Chapter 6.

5.2.1 YUB Students

Themes (sub themes)	Participant Comments and Statements	Analytical theme
Welsh language (learning Welsh)	*…our Welsh language'll reflect…on them and they might pick up some words and start speaking.*	***O - P***
	…if more people come in from England, Scotland, to work in Wylfa, and they bring their children along, they could learn Welsh in schools	***O - P***
	As long as they're…willing to like try and learn Welsh then I think it would be OK.	***O - P***
	…if they do bring children here and they do start families, they can learn Welsh, and their Welsh could bounce off onto the parents and they could…, pick up again, some language.	***O - P***
Welsh language (risks)	*I think with them building the new Wylfa, it'll bring more English speakers onto the island, so that'll cause us to turn into the English language*	***I - N***
	They don't get the same feel of Wales if they don't go to a Welsh school	***I - N***
Employment and training (opportunities/skills development)	*…you'd like to see it go to…local people, but obviously they're gonna give it to the people with the better skills, so yeah…maybe with colleges…prepare them for the work that's available*	***O - P***
	I think it's important to give everyone a chance, because if they don't have that certain skill now, they might develop it as they're working in Wylfa.	***O - P***
	Wylfa is allowing younger generations to come in for work experience during the schools weeks and…they're offering apprenticeships and summer placements for people there aswell.	***O - P***
	They offer different roles to apply for in the summer placements aswell…	***O - P***
Employment and training (awareness)	*I think there are opportunities available, people just don't know about them. Maybe they're not advertised enough, or…schools don't really present them as much*	***O - P***
	[visit from Horizon representative two years prior] he gave us a presentation about what was to come with Wylfa B, and what's available with Wylfa, but we haven't had anything since then, so, we're just getting whatever we see in the newspapers.	***I - N***
Employment and training (personal knowledge/ experience)	*…my friend has got an apprenticeship with Wylfa, and he was unexperienced and unskilled at the start, but obviously he's…gained the skills and he's developed them*	***O - P***
Health (negative/risk)	*I think it's going to have…a negative effect on health for the people who work there, because obviously it's going to be radioactive and stuff, there's always a risk that they'll…get sick or something*	***I - N***
	Might be a risk to the people who live close aswell	***I - N***
Health (awareness)	*I think…whoever's controlling it should…outline the possible risks clearly, so that people can actually have a view on it.*	***O - P***
	But it important that we're prepared for it, if it does happen, it's important that we're prepared for the consequences of what's going to happen	***O - P***
	…as long as people know that there's a risk of it and that they're aware then it's fine	***O - P***
Leisure Time (personal)	*…say if I got an apprenticeship with Wylfa and I made new friends, my social life and my leisure time would be spent differently*	***O - P***

Leisure time (younger people)	*I think it's gonna be good for younger children aswell coz' they'll be going on all their school trips there.* *...the younger children at school...they'll be going to visit and...it'll be good for them to...see new things, see how the island is developing*	***O - P***
Amount of traffic on roads (people commuting to work on Anglesey)	*At the minute, we don't really have traffic problems as such, only, like, near the bridge on peak times, but maybe if there were more people commuting to Anglesey to work in Wylfa then it would become an issue*	***I - N***
	If jobs go to more local people then it wouldn't...become an issue, but if...they're gonna go to people commuting from, I don't know, over from England or Gwynnedd County, then, yeah it would probably be a problem	***I - N***
Amount of traffic on roads (people commuting to work off Anglesey)	*...if local people can get a job...on the island, then they'll be commuting less to the Gwynnedd areas for their jobs aswell so it'll be less people moving away from Anglesey for work...*	***O - P***
Amount of traffic on roads (personal relevance)	*...we are coming to the age now, like in this next year, all of us will be 17 so it will become an issue for us if the traffic does go up*	***I - N***
	...most of us have got part time jobs, like if you're gonna be late for your job, that does affect your life	***I - N***
Different types of available housing (prioritisation)	*If...people from England from people are coming here and they want a house, I think...local people should be prioritised because we've lived here all our lives, and they haven't...* *why should they be prioritised if they're just moving here for a job...*	***RW (e)***
Different types of available housing (council properties)	*The council housing list is...long enough as it is already, without adding people that are coming over to work onto it, and prioritising them* *...but people working in Wylfa, I don't think they'll be wanting council houses because...they'll be on a...bigger income so they won't be looking for council houses*	***I - N***
Communicating with large companies (importance of being able to communicate)	*...because we're local people, if we have a problem then we can tell them about it*	***O - P***
Communicating with large companies (form of communication)	*Well they could, you know, provide...meetings with one of their bosses or head of departments and then, you know people who are concerned and have questions can ask them for answers, Q&A's, you know...*	***O - P***
	I think it's important to have people come into schools, and tell what's happened...	***O - P***
Communicating with large companies (importance of receiving information)	*People don't realise that we wanna know just as much as adults wanna know what's happening in our communities with the bigger...companies coz...after all it's us that's gonna be looking for work in the next couple of years...* *...I think it's important for us to be able to get the communication that we need from the bigger companies in order for us to know what we're gonna do and what's gonna happen.*	***O - P***

Table 27. Thematic analysis results of the first dialogue-based workshop with YUB Students

5.2.2 YSTJ Students

Themes (sub theme)	Participant Comments and Statements	Analytical theme
Welsh language (risks)	*I think it'll impact on the Welsh language, because there'll be alot of…English people moving here to work* *'Coz the Welsh language will be like, dying…*	***I - N***
	…suppose they were English and they just didn't bother to learn the language it could have negative effects on Welsh language	***I - N***
	…'cause the Welsh language is already, sort of, struggling already so, wouldn't be helpful if there was less and less people speaking Welsh	***I - N***
	The only thing that I think would really suffer would be the Welsh language. I think that people who live here who speak Welsh would be intimidated by the amount of people coming here	***I - N***
Welsh language (learning Welsh)	*…if it was in like a foreign country, say if we were moving to Italy to work or something, we'd have to learn how to speak Italian to communicate with them. But because we're a bilingual country, people just won't bother learning the language*	***I - N***
	…around 80% of the jobs are gonna be Japanese people from the company that are making the power station. From English to Welsh might not be as difficult but Japanese to Welsh I imagine would be quite difficult	***I - N***
Welsh language (compulsory learning)	*I don't think you could probably make it compulsory* *Yeah, I don't think that either.* *I don't think you could get away with that.*	***RW (e)***
	I mean you can't force them to learn a language because they probably won't use it anyway	***RW (e)***
Employment (opportunities for Japanese)	*The company Hitachi are bringing most of the workers over with them…*	***I - N***
	They'll all go to like, foreign people I think, like the Japanese and everything, so I don't think there's much hope for us here	***I – N***
	Because we can't do the jobs and they can…	***I – N***
	…if they've stayed here to build the power station…they may think, well, I might as well stay here…	***I - N***
Employment (opportunities for Welsh/Anglesey residents)	*…local business might benefit…*	***O - P***
	I think it'll benefit local businesses	***O - P***
	I think alot of local people can, will benefit from building it aswell. It might not be like all the complicated stuff, but you know definately, what's the point in bringing people over to build a wall or something…	***O - P***
	…when you've got all these people coming through, like foreigners, they're going to need places to go aswell, so I do think local businesses will benefit from that	***O - P***
	I think people are gonna be shocked, I think Wylfa are gonna hire more local people…than foreigners, because, you may aswell make use of the resources available…	***O - P***
Employment (doubt in local opportunities)	*But what's the chances that the top dog in Wylfa's gonna be Welsh?*	***Q/NS***
	…but what's the chances that we're gonna get the job after it, after we do the course or whatever?	***Q/NS***
	I knew that there was like apprenticeships and stuff, in…Wylfa but I didn't know if that would go anywhere	***I - N***
Activities for young people (more facilities)	*If people just…come here to live the population will just go up, so…they might put more things to do for young people, you know what I mean, like bowling* *For us to do of a day…*	***O - P***
	Yeah. 'Cause we've only got one cinema	***O - P***
	I think young people would like it. Maybe it would stop them from going away aswell.	***O - P***

Educational, health and care services (future of the school)	*…we're the least populated school on Anglesey. So if there were ever a time…to shut down a school or something I think we'd be in serious contention for that. I think more people coming would help…*	***O - P***
Educational, health and care services (school as resource for future workforce)	*Benefit I think. Especially a school so close to Wylfa… I don't think you could have any better way of setting someone on the right path than from school.*	***O - P***
	Have the experts train people from, here, then eventually they'll be run by, us. So it'll be the people that live around here.	***O - P***
	The first Welsh site manager of Wylfa B probably isn't even born yet	***O - P***
	…if you start it early off, or if you put someone on the right path from school, then they're more likely to want to stay here and think 'yeah, I'd like to do that job here', rather than move away	***O - P***
Communication with large companies (information on development and opportunities – type)	*I'd like to hear more about it, I'm sure alot of other young people would aswell*	***O - P***
	…if it was the difference between staying here and having a job in Wylfa or move away somewhere, when you'd prefer to stay at home, I'm sure alot of people would like to be made aware of what's happening	***O - P***
	If they came to school and talked to us about what the plans were or something like that… *That would be quite helpful because we'd all be there and get the information directly*	***O - P***
	I think just more general info on the jobs I think, because alot of people from, i know I did, from a young age, just think that you had to be as smart as Stephen Hawking just to get a sniff in at a job in Wylfa, but it's not the case…	***O - P***
	I think they don't realise that they could potentially move onto a job in Wylfa even if they haven't got the best A levels or the best GCSE's, which is something I think needs to be realised by alot of people…	***O - P***
Communication with large companies (information on development and opportunities – timing)	*I think we should be made aware of what's happening before sixth form, because in sixth form we have to make an awful lot of important choices…so I think we should be made aware of them well before sixth form so we have time to think about them properly.*	***O - P***
	Earlier, earlier	***O - P***
Population changes (people moving onto Anglesey)	*More people, there's more things to do, there would need to be more jobs, there needs to be more houses, there needs to be more of everything really. The more people there are, the more of everything.*	***O - P***
	I think that people who live here who speak Welsh would be intimidated by the amount of people coming here	***I - N***
	It'll be Cemaes, it'll be full of Japanese people	***I - N***
Population changes (impact on economy)	*…the economy would benefit, but then you'd have an economy on a Welsh island that isn't being used by people that were born here, were brought up here.*	***I - N***

Table 28. Thematic analysis results of the first dialogue-based workshop with YSTJ Students

5.2.3 YSTJ Teachers

Themes (sub theme)	Participant Comments and Statements	Analytical theme
Employment (importance and impact)	*I firmly believe that without employment you've got nothing else… So all the other things that you list, I think they are corrolaries that flow directly from increased employment* *And that's just not, not just an economic thing but in terms of a poverty of aspiration that can take root when there is generational unemployment within families… Generational unemployment breeds poverty of aspiration*	***I - N***
Employment (prioritisation)	*Are we willing to, and this is the extreme view now, to sell ourselves perhaps for employment, which I totally agree with is the crux of all things…* *…we are in a catch 22 situation - are we going to accept everything for the sake of employment and sell ourselves really, culture wise and perhaps health wise aswell…*	***I - N***
	I accept completely that jobs are needed, but it concerns me at what cost to the environment?	***I – N***
	And the knock-on impact on the other big economy in Anglesey, tourism aswell…that's why they come here, for the natural beauty	***I - N***
Employment ('local' employment and retention of young people)	*I think it's important to keep…young people from the island who've been educated in local schools…So we've got a number of examples who've left sixth form here, who've gone to university, have come back to be directly employed by Wylfa, and working on the Wylfa Newydd project.*	***O - P***
	That's helping to stem the 'brain drain'…but more needs to be done still, I think.	***O - P***
	It has got fantastic opportunities but we must make totally sure that those opportunities are given to our pupils from this school and local people in Anglesey… *...we've got to make sure that the jobs are for real local people…*	***O - P***
Employment (type of jobs for local people**)**	*The question is what kind of jobs?*	***Q/NS***
	…it seems the higher up the ladder you go, yeah, the fewer local people you find, that seems to be the pattern in Wylfa doesn't it?	***I - N***
	I think we need be prepared and have the assurance that if we train people and send people to good universities that they will have the security that they've got the top jobs aswell back home	***O - P***
	…they have developed courses in Coleg Menai but they tend to be at the middle level of employment and the middle level of skills.	***I - N***
Employment (student knowledge of opportunities)	*…they need to be more aware of the job opportunities that are there…*	***O - P***
	Children really aren't aware, you know, you need to be guided, and the careers facility is much less now	***I - N***

	than it was…and the children are just not getting information	
Communication and collaboration with large companies/organizations (with schools and students)	*Personally I don't think there's enough of a link between Wylfa and the school...I'd like to see more graduate placement students come in and have a chat with the kids, Sixth Form, Year 11. This happens down south, with Tata Steel and that kind of thing…but we don't have anybody.*	***I – N / O - P***
	…there needs to be a better relationship, a better educational partnership perhaps between Wylfa and the school.	***I – N / O - P***
	We've had a little bit of communication but not enough…	***I - N***
	I think they don't sell themselves enough to the school, we have to go there and get information… *…they don't do enough for communicating, and the Japanese company from Horizon was supposed to come in Skills Week last year, but that didn't happen either, so, you know, they need to sell themselves...*	***I - N***
	They're very good with work experience, that kind of thing, we often have placements in Wylfa and Year 13 have some school placements, but they're getting few and far between…	***O – P / I - N***
Physical health (uncertainty)	*I'm not against Wylfa, but nobody can be 100% certain that it is 100% safe…*	***I - N***
	…there are dangers in creating nuclear power that we're not totally aware of, so it does worry us because the rate of different types of cancers in this area is quite high	***I - N***
Mental health (link to employment/unemployment)	*Generational unemployment breeds poverty of aspiration, contracted horizons. So, you know, if I go to school and my dad hasn't been in work for twenty years, I fully expect to leave school and fall into the same pattern…* *Which can have a knock on effect to mental health, physical health...*	***I - N***
	…if you haven't got employment you've got your brain drain and you've got…as the lady over there was saying, mental health issues.	***I - N***
Sustainability-related suggestions	*Yeah, Magnox…has been quite good at sponsoring different cultural groups…throughout the years…there's a pot of money really, and you can just make an application and you'll get a few hundred or perhaps a couple of thousand straight away and…that…helps community activities*	***O - P***
	…with the language, there needs to be a social plan and a working action plan, what exactly, how are we going to cope with it	***O - P***
	And things like the construction workers on the developing the new site, there are stories that they're going to come from the outside, well that in the long term isn't going to help us at all on the island…that isn't sustainable at all	***I - N***
Population changes (people moving onto Anglesey)	*If you've got workers coming from the outside, what tends to happen, because we've seen it happening here, is they bring their extended family with them. So…you've got other social problems then...because they tend to drain the social services and the health departments…*	***I - N***

	…children from the outside, children who are unable to communicate in either Welsh or English, they're going to bring their own social problems aswell	***I - N***
	…do we have a plan, a working plan, does the council have a working plan to make sure that the influx of non-Welsh speaking people and children to the, to the island will be dealt with properly?	***Q/NS***
	I suppose what maybe worries some of us is perhaps the time lag which would happen. I mean the influx is gonna happen, would the development of the services happen at the same time? Probably not. It would lag afterwards.	***I - N***
	I'm abit worried…that we'll have this thing which will come from the outside and we'll have a two layered community sort of thing really, that we'll have our local people…and then you'll have another layer of society, the people from the outside, who come here, work in Wylfa… *…a two layered society, then, and that the people who are living here on the whole…won't really benefit from this new society which is building on top of the old society.*	***I - N***
	…this perceived two tier system, that's definately not what any of us want to see here on Anglesey	***I - N***
Population changes (impacts on local economy)	*…even just the service industry…and knock on things like hairdressers, shops…and restaurants and so on, it's bound to be positive in that aspect isn't it?*	***O - P***
	In a large sense, it's up to us what we make of that, of the opportunities…that would flow from that	***O - P***
Decision-making and consultation (perceptions of influence)	*I think there have been drop in clinics to talk about the phases of Wylfa Newydd…but there hasn't been any consultation with the local people and their opinion…should it be here or not, you know…*	***I - N***
	Whether there were any, at all…it's already decided	***I - N***
	You could voice your opinion but I don't think they would listen.	***I - N***
	It's already happening from what we saw…that day we went…I was quite shocked really	***I - N***
	…it's seems like all the decisions have been made above us…and it's been rubber stamped…by the council.	***I - N***
	…this is so big, perhaps we do need a voice but we don't have the certainty that that voice…would be listened to…	***I - N***

Table 29. Thematic analysis results of the first dialogue-based workshop with YSTJ Teachers

5.2.4 CTGYM Farmers

Themes (sub theme)	Participant Comments and Statements	Analytical theme
Welsh language (link to development/employment)	*…they've said already that they're not going to put anything in Welsh are they, this Hitachi are they?* *…signs in the new Wylfa, and things like that, yes. There's no bilingual intended, no Welsh as it were.*	***I - N***
	One way of looking at the language issue is, what it'll do to the language; without this work, there will be no language, they'll be leaving here. There's no point in them staying	***O - P***
	I've been doing work for someone there, and he goes there to teach Welsh to the police who are looking after the place now. They're trying to do something aren't they?	***O - P***
	…they're random police, and they seem to all have come from the Wirrall, and they can learn Welsh.	***O - P***
Welsh language (amount of spoken Welsh)	*It is going down on Anglesey now, it shows that there are so many English people are coming in here, you know. The language is losing out a bit here in Anglesey, that's important isn't it?*	***I - N***
	The figures are showing that the language is weakening.	***I - N***
	The truth is that we as Welsh, we turn to English too easily, too easily, and that's the truth	***I - N***
	Everybody turns to English too quickly here in Wales, don't they?	***I - N***
Welsh language (impact of immigration)	*…that comes with the people that have immigrated in, it weakens things doesn't it? Like somebody English marrying somebody Welsh, it weakens it doesn't it?*	***I - N***
	It's a lot to do with the immigrants, isn't it? What happens afterwards, I know it happens: mother and father, one Welsh, one English, they tend to speak English don't they? And then the children, then they speak English - I know now of people doing that.	***I - N***
Employment (employment for local people - future)	*How much work will there be for our boys?*	***Q/NS***
	You have to tie them to that, that the work is offered locally first.	***O - P***
	Local people getting work first.	***O - P***
	That's what's important. For work based in Anglesey.	***O - P***
	…they were building the bridge in Holyhead from the harbour to the middle of the street, and an Italian got the job. And all the main workers in were Italians, only the labouring and those running about did the Welsh get, and I suspect that it'll be the same with Wylfa.	***I - N***
	600 jobs isn't a lot for Anglesey… *… but chances are that half of those will be coming in, but at least there'll be some.*	***O - P***
	The only thing I'd like to see is if the electricity is getting produced in Anglesey, that there's some use of it in Anglesey to get work in as well, as happened with Anglesey Aluminium…	***O - P***
	There's a girl from Llanfwrog, she's now in Sizewell, and she hopes to come back to Wylfa when it opens	***O - P***

	The most important thing is that local people get work, isn't it?	***O - P***
	Health is the most important thing, and everybody getting work…	***O - P***
	We haven't talked about us as farmers either not being able to get people to work on the farm when Wylfa comes along. They'll be paying good wages and competing against us.	***I - N***
	Competition for labour and we won't be able to compete against them, that's for certain	***I - N***
Employment (employment for local people - present)	*Up to now, they've been very good, employing local people…*	***O - P***
	[regarding employment of non-Welsh security for development] What was the matter with using someone local from North Wales already? *It would save having to pay to teach them…*	***O - P***
Employment (impacts on population change)	*There'll be immigration won't there...*	***I - N***
	That's what happened before isn't it, with the other Wylfa, immigration	***I - N***
	It is a pity to see the young people going away from the island looking for work isn't it?	***I - N***
	If it keeps young Welsh people in Wales, stops them from leaving, but if the English want to leave then it strengthens the Welsh, doesn't it?!	***O - P***
Employment (experience of previous Wylfa development)	*That's what happened before isn't it, with the other Wylfa, immigration*	***I - N***
	There were lots of Welsh coming you know, from Caernarfon and further away… *…there was lots of work for the Welsh at that time.*	***O - P***
	…I'd say there was more Welsh than anyone else.	***O - P***
	Competition for labour and we won't be able to compete against them, that's for certain, that's the way it was last time, wasn't it? *Yes, it was terrible*	***I - N***
Communication (information from developer)	*Up to now it's been very good hasn't it? There's a newsletter that comes out…*	***O - P***
	Yes, but they're not talking about when it's going to start, nothing at all, they keep all that to themselves, don't they?	***I - N***
Communication (with large companies)	*If you could speak to someone straight away…speaking on an automated line, that drives me crazy…I just want to speak to someone!*	***I - N***
	As farmers, there isn't a lot of reason why we would want to ring Horizon…	***Q/NS***
	The only time will be with these pylons *If they go across your land…it's things like that where you would want to contact them isn't it?*	***Q/NS***
Physical health (catastrophe)	*If it blows up, you won't have to worry about your health will you?!*	***I - N***
	The most dangerous thing is if there was a war, it would be the first place to be bombed. That's the biggest concern I think	***I/N***

Physical health (radiation-related illness)	*Is the cancer rate higher in North Wales?* *I don't think so…There is Leukemia around Sellafield, about 70 miles from around there…Leukemia's higher there than in the rest of the country…isn't it, that's a fact.*	***Q/NS / I/N***
	…if we're going to have Wylfa here, there should be better facilities in Ysbyty Gwynedd [local major hospital] for cancer and things.	***RW (e)***
	The company should put money towards facilities in the hospital for cancer	***RW (e)***
	Ask them to sponsor a bit on that stuff, yes, that's the way, I do feel strongly about that.	***RW (e)***
Physical health (associated developments)	*What I've got to say about physical health is that if we have to live with Wylfa here is that the least they can do is take the electricity away from here, through the sea or under the ground.*	***RW (e)***
	It's not us that needs the electricity here. Well, if we have to live with Wylfa here, the least they can do is take it from here…	***RW (e)***
	There was a doctor, he did a locum for a year in Llanerchymedd [local village] coming from Australia, he didn't like these pylons across the island. He found that in the year that he was here that lots of people who lived relatively near to these pylons suffered from some sort of cancer.	***I/N***
Physical health (importance)	*Health is the most important thing…Without health, you'll have nothing, everything's finished*	***Q/NS***
Safety (potential for catastrophe)	*No matter how safe they say it is, those in Fukushima thought it was completely safe didn't they?*	***I/N***
	…it doesn't matter, look at Chernobyl! What happened there?	***I/N***
	It's not impossible for a tsunami to come here, it's not impossible	***I/N***
Safety (risk inequity)	*If it was 100% safe, they'd build it in England wouldn't they?* *In the middle of London and Birmingham and Manchester*	***I/N***
	The most dangerous thing is if there was a war, it would be the first place to be bombed. That's the biggest concern I think	***I/N***
Local benefits from developments (beyond employment)	*Anglesey should get something out of it other than work… there's not a heighpenny being invested in Anglesey…there's no investment is there? There should be something in it that benefits Anglesey.*	***RW (e)***
	The local places do benefit from these windmills, these big pylons, they pay…the local community don't they?	***O/P***
	It's like Shell, they gave money to Anglesey… *The fund's still for them in Anglesey here isn't it?*	***O/P***
Training and skills development (opportunities)	*[nuclear industry/developers] I hope they're going to take apprentices here afterwards after they've come here*	***O/P***
	But without going to college you can't switch on, without it there's no hope of getting into Wylfa then, is there?	***O/P***
Training and skills development	*But the problem is they have a few weeks training there and then they go out to look for work…*	***I/N***

(training-experience gap)		
	[drivers for digging machinery] …there are no drivers around with experience - you can't put a young lad straight from Pencraig after a few weeks of training on site can you?	***I/N***
	It's about getting some experience isn't it?	***Q/NS***
Welsh heritage and culture (language)	*To me, heritage is our language isn't it?*	***Q/NS***
Road infrastructure on Anglesey (impact on traffic)	*It'll be more important, especially how much traffic there will be on the roads*	***I/N***
	I'd say the most immediate problem now with the road and the big lorries is the bridge, isn't it? *That's where the bottleneck is now…*	***I/N***
	Negative to start with but after Wylfa has been built it'll be positive won't it? It'll be a better road and less traffic.	***I/N / O/P***
	There'll be traffic, you're talking about terrible traffic…and think of those people going to work in the morning and coming back from work at night, not to mention the lorries.	***I/N***
	The more traffic you've got on the roads, the more accidents you'll have too.	***I/N***
	If there's a lot of traffic, the Ministry (of Transport) will be pulling people up regularly for something, causing delays all the time.	***I/N***
Decision-making and consultation (energy-related developments)	*Like with the pylons, it doesn't matter whether we're for or against, we haven't got any choice have we?*	***I/N***
	…and if they've decided, it's compulsory purchase and there you go	***I/N***
	We're not happy at all with the way the National Grid has treated us in Anglesey, at all, we don't listen to a word they say to us.	***I/N***
	…we don't have a say, do we?	***I/N***
	[proposed pylon routes in Anglesey] They gave us three routes didn't they?...Everybody wanted Route A and B, well C was the one, that's where the original one went - it was just some PR stunt, wasn't it.	***I/N***

Table 30. Thematic analysis results of the first dialogue-based workshop with CTGYM Farmers

5.3 Qualitative Data - Discussion Group 2 (Social Group Session 3)

Following the second dialogue-based group sessions, the audio recorded dialogue was transcribed using NVivo software and analysed through a two-stage thematic analysis, identifying main themes and sub-themes of the group dialogue, as detailed in Section 4.7.1. These are reported here in Tables 31, 33, 35 and 37, for the YUB Student, YSTJ Student, YSTJ Teacher, and CTGYM Farmer groups respectively.

Sustainability criteria were then proposed for each group in the form of group-specific indicator sets (GSISs). These are reported here in Tables 32, 34, 36 and 38, for the YUB Student, YSTJ Student, YSTJ Teacher, and CTGYM Farmer groups respectively.

These are now detailed for each group, followed by an overview of inter-group common themes. The results are then discussed in Chapter 6.

5.3.1 YUB Students

Themes (sub theme)	Participant Comments and Statements
Employment (amount)	*Just the number of jobs that people on Anglesey are getting, it's better getting the job and…knowing that you've got a job than worrying what sort of job you've got*
	…if they're not the best one for the job they shouldn't get it
	The number I'd say is more, more important than what the actual job is.
Employment (type)	*I think the actual job's more important than the numbers because unless people can go to a place where they actually wanna do something, like the field they wanna do something in, there's no point in doing it…*
Health and safety (radiation - levels)	*…if radioactivity is, admitted from Wylfa*
Health and safety (radiation - events)	*…maybe they could give information on if something does go wrong like…what would we have to do…what would happen if something did go wrong, like with the radioactivity*
Information and communication (format)	*Yeah, online, something like that*
	It's…older people, who'd want…a leaflet
	I think information'd go over better if someone is speaking to you, coz' you listen more to someone that speaks to you than what you read, usually
Awareness of opportunities (need)	*It's better that we know what's happening, rather than just being in the dark about everything that's, that's happening over at Wylfa B.*
Awareness of opportunities (timing)	*It's better knowing before we make choices for sixth form, coz…some of us that might want to work in Wylfa have then gone and chosen different subjects that won't actually fit in the criteria to go in and work there.*
	Year 9
	I think it's important to do it in Year 9, just so they know the options and they know what they need to do to get to where they wanna be.

Table 31. Thematic analysis results of the second dialogue-based workshop with YUB Students

In summary, the main social sustainability themes for YUB Students are:

- *local employment opportunities;*
- *local training opportunities;*
- *physical health;*
- *communication between industry and young people;*
- *information provision from industry to residents; and,*
- *road traffic activity.*

Taking into account the themes above, a total of seven social sustainability indicators were developed to reflect group priorities, presented in Table 32 below.

Group	Draft Indicators
YUB Students	*Number of Anglesey residents employed directly by the development (as a percentage of total)*
	Number of development-related employment opportunities for Anglesey residents
	Number and type of development-related placements available to Anglesey residents
	Number of school visits by nuclear industry – development and employment information (focus on 'pre sixth-form')
	Measured levels of radioactivity around the local area (linked to health impacts)
	Amount and variety of information provided on nuclear-related impacts (i.e. format), and level of public awareness
	Road traffic activity during development periods (particularly traffic coming onto Anglesey)

Table 32. Social sustainability indicators for YUB Students (Group-Specific Indicator Set) in regards to the assessment of a new nuclear power development

5.3.2 YSTJ Students

Themes (sub theme)	Participant Comments and Statements
Employment (local vs Welsh speaking)	*I think it's more important that we get local firms to come, because if local firms do do it, not firms from like England or somewhere, they're more likely anyway to speak Welsh*
	I don't think it should be one or the other, no, I think everything should be taken into account.
Employment (type)	*obviously there's not many local people here really that go into physics as much, like maybe not as many nuclear physicists come from…Anglesey.*
	especially for the not so specific jobs, more the technicians stuff
Welsh language (courses)	*they should be encouraged to if they want to speak Welsh, it should be a nice environment, not a forced environment.*
	It should definately be offered, and be…easily available, but it shouldn't be compulsory
	…it'd be a waste of money if they don't do it at home.
	There isn't any more you can do other than that, everybody has the option then
Leisure facilities (amount)	*It's gonna create more local jobs aswell…if you've got a busy…leisure facility, you're gonna have workers there working*
Leisure facilities (location)	*Don't think it matters*
	I think it could bring pressure on the infrastructure, of the roads and stuff, if you had everything in one place
	…it'd give different areas a chance to prosper aswell
Communication (opportunities for young people)	*If they're aware of what was happening before they got to sixth form stage…before they get the chance to decide on something else*
	I'm not sure that it'll directly affect us as much as say, people five years younger than us. Say they're still gonna be around when things start happening
Communication (from large companies and colleges – employment)	*And knowing what kind of jobs are going to be available aswell, and what…that job description might entail…so then they know then what training they need*
Communication (from large companies)	*I think the further away you get from where it's happening…the less it'll be talked about, the less opportunities you'll get*
	Magnox have, have come to see us, like maybe in Form 4 or 5, I think they came once or twice with…booklets, but apart from that…there's not been much especially for people…outside of the exact area of where it will be
Participation (advertising for consultations)	*There has been…but not enough*
	the advertisement of them has been poor aswell coz we haven't been made aware of any, and the only reason I found out is because I drove through the village where the meeting was.
	outside the direct area, there's been basically nothing

Participation (public comment)	*…there's not much point asking for public opinion, after it's already started building, and they've already had the planning permissions and everything.*
	…they've had to take down an awful lot of houses that people still live in, for this Wylfa. My auntie's house is one of them, and they were only made aware of this because Wylfa got the planning permission, and the planning permission, the red area highlighted in was directly over their houses. They weren't told until the planning permission came out

Table 33. Thematic analysis results of the second dialogue-based workshop with YSTJ Students

In summary, the main social sustainability themes for YSTJ Students are:

- *local employment opportunities;*
- *Welsh language;*
- *infrastructure development (leisure);*
- *communication and interaction between industry & colleges and students; and,*
- *participation.*

Considering the themes identified in the two group dialogue sessions with YSTJ Students, seven social sustainability indicators were developed to reflect group priorities, presented in Table 34 below.

Group	Draft Indicators
YSTJ Students	*Number of Anglesey residents employed directly by the development (as a percentage of total), and the number employed indirectly (during construction)*
	Number of Welsh courses available to undertake in Anglesey during development period
	Number of leisure facilities developed during construction and operation phases, and their geographical distribution
	Number of school visits by colleges – skills and training courses information (focus on 'pre sixth-form')
	Number of school visits by nuclear industry – development and employment information (focus on 'pre sixth-form')
	Number of opportunities for young people to become involved in public events and decision-making
	Geographical distribution of advertising for public events (public awareness assessment)

Table 34. Social sustainability indicators for YSTJ Students (Group-Specific Indicator Set), in regards to the assessment of a new nuclear power development

5.3.3 YSTJ Teachers

Themes (sub theme)	Participant Comments and Statements
Employment (opportunities for young people)	*Personally I think with the type of jobs for the Anglesey people, I'm wondering about the high end, whether Anglesey people are qualified, equipped for that kind of career in Wylfa Newydd?*
	...we haven't guided our pupils at all to the higher level of managerial posts, or our accountants, lawyers and so on, which will also most probably be needed in such a development
	...if you were to realise that all the top level jobs at Wylfa, not a single person from Anglesey was employed in them...you'd feel betrayed wouldn't you?
Communication with young people (opportunities)	*I just feel that Wylfa perhaps should be targeting the lower end, the sort of Year 7/ Year 8s now, and moulding them to thinking this is the kind of thing you could be doing in four, six, seven years time...*
	...they could give them graduate placements, that kind of thing.
	Sponsorships aswell...you identify and enable talented people early on in secondary school and you sponsor those people
Physical health (radiation and health risk)	*I'm sure it's not the sort of thing that the nuclear industry as a whole would like to be widely reported.*
	I'm operating on the assumption that you do have a marginally higher chance, sorry, you know, more likely, you're more likely to contract cancer if you are living [nearby]... But I don't have any data...I'm founding that purely on...myths that take root...you know, it's hear say
	...if you have a certain number of nuclear power stations around the world, and the same thing seems to be happening in all of them, I think it becomes statistically significant over time
	An independent body on behalf of the World Health Organization...not being leapt on by Horizon or anyone else, is that too much to ask, is it?
	Because at the moment it's only hear say
	I think we've been guided, and almost brainwashed, by the employment factor, that it's not popular in this area to really raise the question of the health dangers.
	What will...the medical impact be, the impact on health be?
Mental health	*I wouldn't rate this one as being, for me personally, one of the most important ones*
	It's the hardest to quantify possibly
	It'd be very interesting to find out actually how unemployment does affect it, how many are affected, and whether it is totally related
Impact of development (on schools and funding)	*I feel that we've been almost bribed to think that this Wylfa Newydd's going to save your school, you're going to have new pupils and money's going to flow into the school. As yet, we haven't seen any effect at all of the development...it won't effect schools, at all.*

	If the building started there, and it has, or at least the preparation of the site has started, there isn't a preperation of this site, things haven't happened here, so it'll be late in happening…and the funding for per head, as school is funded per head, it'll be a year too late
	[origin of funding] I think that's a major one
Impact of development (health and care services)	*Well the health service, because they're overstretched as they are, so that's going to be massive, and care services aswell*
Impact of immigration (on schools - language)	*Well if they do come in it's going to affect the culture, definately…it's going to effect language*
	the effect…if it happens - incoming pupils - on the language and culture, and the language within the school, is going to be devestating really, if a plan isn't put into place before it happens
Impact of immigration (pupil numbers)	*Too many pupils is not going to stretch us, because if you take a walk around this fantastic building, we've got so many empty classrooms and we've got so many unemployed teachers, we could cope with the quantity.*
	in terms of coping with the numbers, with you saying that we potentially could be able to, I'm not sure in the short term because in a situation like that I think population numbers could rise very quickly because building will start, so people will come in very quickly, so you could have a situation where pupil numbers rise very quickly and responding to that will take time.
	I think there'll be a time lag, there'll be a one step behind effect, and schools could potentially struggle in the short term to cope
Communication (visits from industry)	*The only amount of visits that I know of are linked to career fairs, which is once a year. One person.* *…the person was sitting behind a desk, it was up to the pupils to go to that desk. If they weren't interested, they wouldn't have any link at all.*
	…we do have tenuous links with Wylfa, we do have speakers under the sustainability component…and to the best of my knowledge it doesn't happen pre-sixth form
	Not early enough in Key Stage 3 either
	I don't know whether Wylfa think they're too close, and that we know what's happening, but we don't get anything to the school, and the only thing that we do have, and that's again Key Stage 5, is the summer placement.
	I think Coleg Menai's got more of a link with them than school-based.
	I think it would help greatly if they had a sort of mentoring process like we mentioned before, when they came in and talked to pupils earlier, or lower down the school
Housing (development-related accommodation)	*…holiday villages, how many are we talking about?*
	Well there's definately one on the cards in Rhoscoch…and the idea behind that is going to be a village for workers. Will that be self-contained? Will they have their own shops and social club and so on in that village?

	There are a number of people on Anglesey who've converted outbuildings, that kind of thing…and lots of rented accommodation, it would be a big boost for the island if they…looked into that more
Development-related consultation (awareness)	*There has been some consultation, online consultation…before Christmas. Ynys Môn had a public consultation, but…there wasn't hardly awareness at all of that consultation*

Table 35. Thematic analysis results of the second dialogue-based workshop with YSTJ Teachers

In summary, the main social sustainability themes for YSTJ Teachers are:

- *local employment opportunities;*
- *local training opportunities;*
- *communication and interaction between industry and schools and students;*
- *physical health;*
- *impacts on educational, health and care services; and,*
- *immigration.*

Resulting from the two group dialogue sessions with YSTJ Teachers, nine social sustainability indicators were developed to reflect group priorities, and are presented in Table 36 below.

Group	Draft Indicators
YSTJ Teachers	*Number of development-related employment opportunities available to Anglesey residents*
	Number of medium and highly skilled development-related positions occupied by Anglesey residents (as a percentage of total)
	Number of training placements for young people on Anglesey for 'higher level' development related employment
	Number of industry sponsorships of young people on Anglesey
	Number of visits by nuclear industry – development and employment information (focus on 'pre sixth-form')
	Provision of information from studies relating to health impacts linked to radioactivity from power stations; awareness of independent studies and findings
	Changes in pupil intake and funding for schools during development periods
	Changes in health and care services on Anglesey during development periods; person-usage and construction of infrastructure
	Number of people moving onto the island for development-related employment

Table 36. Social sustainability indicators for YSTJ Teachers (Group-Specific Indicator Set), in regards to the assessment of a new nuclear power development

5.3.4 CTGYM Farmers

Themes (sub theme)	Participant Comments and Statements
Employment (local people)	*It's important that as many of us, from Anglesey residents, get work there, before other people.*
	If the skills are on Anglesey, well use them first.
	That they get the right person for the right job, don't they, that's what we want, and that they're local.
	I just hope local people do get the work, because that's the only reason we're taking it I think…everybody who supports it says work for local people
Employment (communication on training and skills requirements)	*…it is important isn't it that they say which training is needed to start this work, to give people a chance to train.* *…information is needed of which work they need the most in order to keep the guys here, to go there to work*
	Do you want work or training for construction people, or training for people running it? *…you need someone in maintenance whatever the case, and to work it too, don't you?*
	…yes, what to study yes, to pursue it.
	Experience, it's easy enough to go to college but you need experience too don't you?
	That's important isn't it, that you start at the grass roots, so that people know what's going to be there
Employment (importance of specific experience)	*It's important, experience working with modern technology, to help run a place like that*
	The CSCS card, as I understand, allows you to go on to the site, and nobody had one, and there were loads of lads wanting to work, and not a single one could go on site to work. *They wouldn't even entertain them…*
Employment (moving from agriculture)	*Yes, contractors have to compete against Wylfa don't they? If they're on good salaries, you've got to increase the rates to keep them*
	Somebody who worked for me for 8 years who said he was perfectly happy with me, but the wages he was being offered at Wylfa were huge…Nobody can compete with wages
	They've said there's open meetings you can go to, for people to find out more, it just touches on things to let you know what's going on isn't it? But if you're too lazy to go after it, then there you are, they do give you the opportunity to go.
Health (radiation-related testing/results)	*Do you get to know the results then? [no] Well that's no good then is it?*
	If you can't provide the results, what's the point in testing?
	Independent testing... *…what you'd like is an indepedent wouldn't you?*

	Their own testing, they can hide whatever they like with the figures…
	It makes you think why they don't give it out to everyone, doesn't it? Why, have they got something to hide?
	[provision of results] it would put people's minds at rest, wouldn't it?
	Make it public to everyone, yes? Out every week, in the newspaper.
Welsh language (impact of development)	*they talk about needing space for 4000 people to stay, well, it's going to dilute things down for everyone then isn't it?*
	…if most of them spoke Welsh, it'd be OK wouldn't it?
	I'd say that the signs have to be bilingual, you know, you're in Wales aren't you? *We're in Wales…the signs should be in Welsh and English*
	If it was up to me, everyone who came to work in Anglesey would have to learn Welsh. That's not going to happen, but if was up to me, everyone would have to speak Welsh!
	If everyone here just respected the language…It's part of our culture
Road traffic on Anglesey (amount)	*There's an issue with this bridge all the time isn't there?*
	You have to admit, the traffic's going to double if all these people are going to come
	Do you know what? I'll want to cross the road…at 5 o'clock, in the evening, and they'll be coming in one row, one after the other
	You come out early in the morning and the traffic's terrible
Road traffic on Anglesey (solutions)	*They're doing park and ride aren't they?*
	There won't be any cars will there? Everybody will park in Dalar, won't they?
	[Park and Ride scheme] Oh yes! Positive! *It's better than everyone running a car isn't it?*
Communication (format and information type)	*We've said already haven't we about getting results, someone needs to tell us what they are don't they?!*
	you don't want to get passed from one person to another, you want someone that you can get an answer from
	…it's important to have one number, and get an answer!
	Is this something that the unions, like the FUR and the Farmers Union of Wales, could press a bit more to get more information, on the behalf of the farmers? *And not just the farmers, but the local people as well yes?*

Table 37. Thematic analysis results of the second dialogue-based workshop with CTGYM Farmers

In summary, the main social sustainability themes for CTGYM Farmers are:

- *local employment opportunities;*
- *local training opportunities;*
- *communication between local people and industry/FE institutions;*
- *Welsh language;*
- *physical health, and*
- *road traffic activity.*

Following two group dialogue sessions with CTGYM Farmers, draft social sustainability indicators were developed to reflect group priorities, which are presented in Table 38 below.

Group	Draft Indicators
CTGYM Farmers	*Number of Anglesey residents employed directly by the development (as a percentage of total)*
	Number of people moving from agricultural-related employment to development-related employment
	Number and cost of development-related training and skills courses available to Anglesey residents, with work experience/in-work placements
	Amount of communication between industry & local colleges and Anglesey schools on development-related training requirements and opportunities
	Number of people moving onto the island for development-related employment, and percentage who speak Welsh
	Number of people during development periods learning Welsh/ taking up Welsh courses
	Percentage of development-related signage which is bi-lingual
	Transparency and communication of radiation testing done on the island (e.g. on milk, soil)
	Road traffic activity during development periods (e.g. number of vehicles coming onto Anglesey via bridge, number of Park and Ride facility users)

Table 38. Social sustainability indicators for CTGYM Farmers (Group-Specific Indicator Set), in regards to the assessment of a new nuclear power development

5.3.5 Sustainability Indicators - All groups

In this section, I collate the social sustainability indicators for all four groups, reporting them collectively in Table 39 as 'group specific indicator sets' (GSISs). There are several indicators which are shared between multiple groups, and also several which are specific to groups; these are reported in Section 5.3.6.

YUB Students	YSTJ Students	YSTJ Teachers	CTGYM Farmers
Number of Anglesey residents employed directly by the development (as a percentage of total)	*Number of Anglesey residents employed directly by the development (as a percentage of total), and the number employed indirectly (during construction)*	*Number of development-related employment opportunities available to Anglesey residents*	*Number of Anglesey residents employed directly by the development (as a percentage of total)*
Number of development-related employment opportunities for Anglesey residents	*Number of Welsh courses available to undertake in Anglesey during development period*	*Number of medium and highly skilled development-related positions occupied by Anglesey residents (as a percentage of total)*	*Number of people moving from agricultural-related employment to development-related employment*
Number and type of development-related placements available to Anglesey residents	*Number of leisure facilities developed during construction and operation phases, and their geographical distribution*	*Number of training placements for young people on Anglesey for 'higher level' development related employment*	*Number and cost of development-related training and skills courses available to Anglesey residents, with work experience/in-work placements*
Number of visits by nuclear industry – development and employment information (focus on 'pre sixth-form')	*Number of visits by colleges – skills and training courses information (focus on 'pre sixth-form')*	*Number of industry sponsorships of young people on Anglesey*	*Amount of communication between industry & local colleges and Anglesey schools on development-related training requirements and opportunities*
Measured levels of radioactivity around the local area (linked to health impacts)	*Number of visits by nuclear industry – development and employment information (focus on 'pre sixth-form')*	*Number of visits by nuclear industry – development and employment information (focus on 'pre sixth-form')*	*Number of people moving onto the island for development-related employment, and percentage who speak Welsh*

Amount and variety of information provided on nuclear-related impacts (i.e. format), and level of public awareness	*Number of opportunities for young people to become involved in public events and decision-making*	*Provision of information from studies relating to health impacts linked to radioactivity from power stations; awareness of independent studies and findings*	*Number of people during development periods learning Welsh/ taking up Welsh courses*
Road traffic activity during development periods (particularly traffic coming onto Anglesey)	*Geographical distribution of advertising for public events (public awareness assessment)*	*Changes in pupil intake and funding for schools during development periods*	*Percentage of development-related signage which is bi-lingual*
		Changes in health and care services on Anglesey during development periods; person-usage and construction of infrastructure	*Transparency and communication of radiation testing done on the island (e.g. on milk, soil)*
		Number of people moving onto the island for development-related employment	*Road traffic activity during development periods (e.g. number of vehicles coming onto Anglesey via bridge, and number of Park and Ride facility users)*

Table 39. Group-specific indicator sets (GSISs); social sustainability indicators for four Anglesey-based social groups, developed in the context of a new nuclear power development.

5.3.6 Inter-group similarities and differences

The GSISs presented in Sections 5.3.1 – 5.3.4 demonstrate the differences between groups in regards to their social priorities; out of a total of 32 indicators, 27 of these were individual to participating groups. The results also highlight inter-group similarities, with five indicators being identified as important for more than one social group:

- **Number of Anglesey residents employed directly by the development (as a percentage of total)** – *YUB Students; YSTJ Students; CTGYM Farmers*

- **Number of development-related employment opportunities for Anglesey residents** – *YUB Students; YSTJ Teachers*

- **Number of people moving onto the island for development-related employment** - *YSTJ Teachers; CTGYM Farmers*

- **Number of visits by nuclear industry – development and employment information (focus on 'pre sixth-form')** - *YUB Students; YSTJ Students; YSTJ Teachers*

- **Road traffic activity during development periods** - *YUB Students; CTGYM Farmers*

Conversely, the indicators which were specific to each group are also reported below:

YUB Students

- *Number and type of development-related placements available to Anglesey residents*
- *Measured levels of radioactivity around the local area (linked to health impacts)*
- *Amount and variety of information provided on nuclear-related impacts (i.e. format) and level of public awareness*

YSTJ Students

- *Number of Welsh courses available to undertake in Anglesey during development period*
- *Number of leisure facilities developed during construction and operation phases, and their geographical distribution*
- *Number of visits by colleges – skills and training courses information (focus on 'pre sixth-form')*
- *Number of opportunities for young people to become involved in public events and decision-making*
- *Geographical distribution of advertising for public events (public awareness assessment)*

YSTJ Teachers

- *Number of medium and highly skilled development-related positions occupied by Anglesey residents (as a percentage of total)*
- *Number of training placements for young people on Anglesey for 'higher level' development related employment*
- *Number of industry sponsorships of young people on Anglesey*

- *Provision of information from studies relating to health impacts linked to radioactivity from power stations; awareness of independent studies and findings*
- *Changes in pupil intake and funding for schools during development periods*
- *Changes in health and care services on Anglesey during development periods; person-usage and construction of infrastructure*

CTGYM Farmers

- *Number of people moving from agricultural-related employment to development-related employment*
- *Number and cost of development-related training and skills courses available to Anglesey residents, with work experience/in-work placements*
- *Amount of communication between industry & local colleges and Anglesey schools on development-related training requirements and opportunities*
- *Number of people during development periods learning Welsh/ taking up Welsh courses*
- *Percentage of development-related signage which is bi-lingual*
- *Transparency and communication of radiation testing done on the island (e.g. on milk, soil)*

The results from this section and my reflective experiences during the facilitation of group dialogue sessions will now be discussed further.

6.0 Discussion

This chapter discusses the empirical findings of my research across Anglesey with four social groups. The chapter is broadly structured around the four research question sets detailed in Section 1.6.4:

1. What are the main social priorities of select social groups in Anglesey, are there significant differences between the social priorities of social groups overall, and what are the implications for stakeholder engagement and decision-making strategies?
2. What are the key themes emerging from first group-based dialogue with social groups, what are the similarities and differences between them, and what are the implications for future stakeholder engagement?
3. Which social issues are prioritised, by each group, for the purpose of early stage sustainability indicator development, and reflecting upon the process, how does this inform future indicator development processes?
4. What are the implications of the research findings for public stakeholder engagement and decision-making at the local scale? How do they inform a public stakeholder engagement and dialogue strategy for nuclear decision-making?

In the context of the proposed new nuclear power development in Anglesey, a strategic approach to stakeholder engagement is conceptualised. Constructive proposals are made regarding processes of sustainable indicator development, particularly those involving local experts and public stakeholders, in order to assess the sustainability of nuclear power developments and manage their impacts, from an early stage and a social perspective. I will also discuss how the process of indicator development can assist local stakeholder engagement and development efforts, as priorities and concerns are revealed through *collaboration*, *information sharing* and *deliberation*.

Throughout this chapter, I refer to the work of Rawls (e.g. 1971, 1999), Young (e.g. 1990, 2000) and Habermas (e.g. 1984, 1987, 1996), to provide philosophical and theoretical context and perspectives to discussions, in conjunction with other theoretical perspectives from authors such as Fiorino (1990), Funtowicz (Funtowicz and Ravetz, 1993a) and Ravetz (2004, 2006), work previously discussed in Chapters 2 and 3.

The chapter addresses each research question set in turn, and also provides reflective commentary at various points. These are primarily associated with reflections on experience and practice during the research process in order to identify challenges and areas of potential improvement, as is common in Action Research processes in the pursuit of best practice. Research questions are discussed based upon an interpretivist ontology, on the understanding that reality is the creative construction of human beings (Jackson, 1991), and that it is based upon the

construction of their interpretation of life experiences (Whitton et al., 2015). This is particularly relevant in the context of energy-related infrastructure developments such as nuclear power, due to the pluralistic nature of their impacts on society and communities, both present and future.

6.1 Research Question Set 1

What are the main social priorities of select social groups in Anglesey? Are there significant differences between the social priorities of social groups overall? What are the implications for stakeholder engagement and decision- making strategies?

In order to address these questions, I consider the findings reported in Section 5.1. They show that the social issue which is considered important by *all four* groups is 'Welsh language'. The issue of 'physical health' is considered important by *three* of the four groups, whilst the issues of 'Welsh culture', 'mental health', 'amount of employment' and 'educational, health and care services' are considered important by *two* of the groups. The issues of 'ability to do hobbies or non-work activities', 'amount of young people leaving Anglesey' and 'amount of people moving onto Anglesey from elsewhere' are each included by a *single* group only.

These differences in social priority appear to indicate the social heterogeneity (Young, 1990) and pluralism (Chambers, 1983; Li, 1996) found in communities by others. More specifically, the towns and villages of rural Wales are described by some scholars as socially and culturally diverse (Gardner, 2011). This supports the notion that Anglesey is indeed a society that is diverse and complex, and thus my decision to engage with different social groups on Anglesey to understand their diverse social priorities.

These findings demonstrate that whilst it is possible to identify a number of core social issues which different groups are likely to deem as important, thus making a broad community-wide approach appear possible, there are in fact significant differences between groups in regards to their social priorities, reflecting social and cultural complexities and priorities which current engagement processes do not acknowledge. This concurs with Butler and Simmons (2013), who argue that engagement procedures can be susceptible to the 'imposition of a narrowing framing" (p. 151), whereby the perspectives, concerns or needs of 'less powerful actors' are effectively excluded (Chilvers and Burgess, 2008). Natcher and Hickey (2002) note the different values and perceptions found within sites of pluralism, where collectives of communal factions are found, observations echoed by the current study. As Young (1990) argues, differences between groups should not be resisted but welcomed and protected, particularly in the interests of social justice. Rawls' (1971) theory of 'justice as fairness' also argues that justice – which in the context of this research is concerned with procedural justice – is crucial in our efforts to attain a *fair* society, which I argue is also crucial for a *socially sustainable* society to be realised. Therefore,

I argue that procedural justice, via fair and inclusive process (i.e. decision-making), contributes to a concept of social sustainability at the local level, and the enhancement of development-related sustainability associated with such fair and 'just' processes. The findings of the research will be of value to future processes of public and stakeholder engagement with residents of Anglesey, in that there is an indication of sufficient difference between groups to warrant a more strategic and group-focussed approach. The research acknowledges that there are a number of common social issues which the broad collective of the 'Anglesey community' value to a similar degree, and should be considered and incorporated in local nuclear-related decision-making processes. The implications of these findings are relevant to future processes of stakeholder engagement and dialogue, and decision-making. This relevance exists in a broad sense for wider community-level energy decisions, and in a more focussed sense for specific energy developments such as new nuclear power developments.

The findings indicate a number of issues that may be pivotal in affecting the 'conditional support' of stakeholders, particularly those prioritised by the majority of groups. Bickerstaff *et al.* (2008) have shown that nuclear developments receive tentative, conditional support from people when nuclear power is framed as a method of combating climate change, leading to a 'reluctant acceptance' of the technology (*also see* Pidgeon et al., 2008). Similarly, it is argued by Truelove and Greenberg (2013) that people are more supportive of new nuclear developments when framed as helping to combat the risk of climate change, whereas Corner *et al.* (2011) show that a similar positive response to support is expected when nuclear power is framed as improving energy security. Poortinga, Aoyagi and Pidgeon (2013) report significant differences in 'conditional support' for nuclear power between British and Japanese publics following the Fukushima accident, finding that public support has collapsed in Japan whilst it has remained 'remarkably robust' in the UK. I argue that in the context of the current research, the social issues for which all or several groups consider important (*see* Chapter 5) represent issues for which new nuclear developments would gain or lose support should the development be perceived to be impacting positively or negatively, respectively, on matters related to such important issues. In this sense, I argue that the support of stakeholders is likely to be *conditional* upon these issues, issues that reflect the social priorities of multiple stakeholders groups. Therefore, in this context of stakeholder support for new nuclear developments, I consider these to represent 'conditional support issues' for the four participating social groups; the findings indicate that *Welsh language* and *physical health* are examples of such. The importance of Welsh language to Welsh people and indeed Welsh culture is highlighted by authors such as Day (2002) and Nguyen *et al.* (2013); the latter authors note that Welsh language is an incredibly important aspect "of the Welsh lifestyle" (*ibid:* 4), whilst Day (2002) states that the Welsh language is "the only obvious remaining symbol of Welsh difference and identity" (p. 172).

Further to the notion of conditional support issues, I argue that for the four social groups, any

perceived *negative* impacts to the Welsh language during the development period are likely to be met with resistance and opposition to decision makers and those responsible for the development, and that stakeholder engagement on these matters, particularly with stakeholder groups which are known to have prioritised this issue, are likely to be made more difficult and be perceived more sceptically. In the same sense, Bickerstaff *et al.* (2008) suggest that support would likely decrease if nuclear power was shown to have little impact on combating climate change. Conversely, any effects of the development which are perceived as having a *positive* impact on Welsh language, or if decision makers and project managers are seen to make concerted efforts to maintain or protect the Welsh language, it is argued that this would likely generate greater support for the development from these stakeholders groups. The same is argued, albeit with less confidence, for physical health, which is prioritised by three social groups (all except YSTJ Students) rather than four. The importance of Welsh language can be understood not only in a cultural context, but also in an ideological sense; on language, De Schutter (2007) argues that it can be considered to have constitutive, instrumental and intrinsic value. The author states that language can be considered as constituting a person's identity, whereby language and identity are "inextricably intertwined" (*ibid*: 8); or as an instrumental tool by which a person is capable of performing "non-linguistically defined things" (*ibid*: 9); or that languages are themselves "morally valuable…independently of the value their speakers attach to them" (*ibid*: 10). The results of this study, particularly considering the qualitative data, indicate that several participants accord constitutive value to Welsh language. This suggests that impacts on Welsh language will be perceived by those who demonstrate such constitutive valuing as an impact on their own identity. This should be recognised and considered by project operators and others involved in local stakeholder engagement as a potential source for increased support, or criticism and conflict.

YUB Students		YSTJ Students	
Full group – issue ranking (n = 45)	**Sample group – mean scores (n = 15)**	**Full group – issue ranking (n = 31)**	**Sample group - mean scores (n = 15)**
Welsh language	*Enjoyment of leisure time (1.40)*	*Amount of available employment in Anglesey*	*Enjoyment of leisure time (1.13)*
Amount of available employment in Anglesey	*Variety of employment in Anglesey (1.60)*	*Ability to do hobbies or non-work activities*	*Mental health (1.33)*
Physical health	*Quality of employment in Anglesey (1.67)*	*Educational, health and care services*	*Variety of employment in Anglesey (1.40)*
Mental health	*Amount of available employment in Anglesey (1.67)*	*Welsh language*	*Educational, health and care services (1.40)*
YSTJ Teachers		**CTGYM Farmers**	
Full group – issue ranking (n = 15)	**Sample group - mean scores (n = 15)**	**Full group – issue ranking (n = 15)**	**Sample group - mean scores (n = 15)**
Physical health	*Variety of employment in Anglesey (1.20)*	*Welsh language*	*Welsh language (1.27)*
Mental health	*Social links and networks within Anglesey (1.27)*	*Physical health*	*Number of Welsh speakers in Anglesey (1.27)*
Educational, health and care services	*Mental health (1.27)*	*Amount of young people leaving Anglesey*	*Mental health (1.27)*
Welsh culture	*Amount of available employment in Anglesey (1.27)*	*Amount of people moving onto Anglesey from elsewhere*	*Sense of community (1.33)*
Welsh language		*Welsh culture*	*Welsh culture (1.33)*
			Social health (1.33)
			Amount of available employment in Anglesey (1.33)

Table 40. Social group priorities from two methods of calculation (issue ranking and calculated SoI means)

Based upon specified group priorities resulting from social issue ranking the findings show that the social groups participating in this research do have different social priorities, but they also share some social priorities. 'Welsh language' is clearly an important issue for all groups (*see* Table 40), albeit to varying degrees. Such prioritisation of the Welsh language by Welsh people is supported by the observations of Day (2002) and Nguyen *et al.* (2013). Comparing these PPPs, out of the 9 social issues which are presented, 6 of these issues are shared by at least one other group. The only other issue deemed important by the majority of groups (i.e. three of four) is 'physical health'; due to only 2 of the 9 issues presented being similarly associated as a priority by three or more groups, I argue that a *group-based approach* would lead to more accurate conceptualisation of broader 'community priorities'.

In regards to between-group similarities, both student groups consider 'Welsh language' and the 'amount of available employment on Anglesey' to be of great importance, but the students from Ysgol Uwchradd Bodedern deem Welsh language to be of higher priority than the students at Ysgol Syr Thomas Jones. This result is not unexpected given the cultural nature of the two schools, with Ysgol Uwchradd Bodedern being renowned in Anglesey for striving for Welsh to be spoken and written whenever possible. Indeed, the school's website (YUB, 2016) states that:

"…considerable attention is given to the use of the Welsh language as a medium of instruction. The school has a natural Welsh ethos."

This is also reflected by my experience at the school, where it was requested by the Head of Sixth Form that for the first session, when communicating with 45 sixth-form students, it would be preferable if the session could be delivered predominantly in Welsh, whereas the same request was not made at Ysgol Syr Thomas Jones, despite Welsh being spoken and taught proficiently at the school. This reflects a desire from Ysgol Uwchradd Bodedern to promote and maximise the utilisation of the Welsh language during communication with and between students. Such findings and experiences reinforce the notion of the importance of the Welsh language in Anglesey, for both the current and the next generation, and that it represents a conditional support issue, particularly for YUB students.

Representing the adult groups, the YSTJ Teacher and CTGYM Farmer groups both consider Welsh language, Welsh culture, and physical health to be high importance. These shared priorities potentially reflect the nature and demographics of group members, given their stage in life and given their professions; both groups include adults between the ages of 30 and 70, who have chosen to remain or continue to live on Anglesey, and speak Welsh proficiently on a daily basis.

In research commissioned by BBC Cymru Wales, S4C and the Welsh Government, a mixed-methods study of almost 500 Welsh speakers, conducted by Beaufort Research to "explore the behaviour, attitudes and aspirations of Welsh speakers in terms of their use of Welsh in a range of everyday settings" (Beaufort Research, 2013: 4), found that 'key life stages' may impact people's use and perception of the Welsh language. The study stated that "having children or moving to work in an environment where Welsh was regularly used *sometimes* [italics added] had a significant impact on usage and perceptions" (Beaufort Research, 2013: 5). Such studies provide an indication that the shared priorities of both adult groups, particularly Welsh language and culture, may be related to their stage in life and experiences. I propose that further research be conducted on this subject to test such indicative findings and relationship between life stage and particular socio-cultural perceptions and priorities.

Alternatively, YUB Students and CTGYM Farmers, based on PPPs, both consider *'Welsh language'* and '*physical health'* to be important and to similar degrees; i.e. both consider 'Welsh language' to be the most important social issue. Despite their differences in age and life experience, I suggest that this could reflect the reinforcing effect of their social networks on language, in that in for both groups the Welsh language is at the core of their everyday communication with friends and peers, and that this will reinforce perceptions of its importance and cultural necessity among group members. I also suggest that this could reflect the existence and impact of 'dense and multiplex social networks' within these groups, in the sociolinguistic context of the social network model (Llamas, Mullany and Stockwell, 2007). The social network model focusses on speakers' social ties with one another and the impact of this on their linguistic usage. In dense and multiplex social networks, whereby the individuals in your social network also interact with one another (dense), and individuals within the network know each other in numerous capacities (e.g. work colleagues and sports club members; multiplex), "localised linguistic norms" are commonly supported, functioning as a "norm reinforcement" method (*ibid*: 87). I suggest that the prioritisation of Welsh language by both of these groups over other social issues reflects such norm reinforcement processes in the social networks of these groups, the norm in this case being Welsh language. I recommend that this is considered and explored further in future research.

Finally, the groups with the most visible differences in their social priorities, according to issue ranking, are the YSTJ Students and the CTGYM farmers, who share only a view of Welsh language as important, but to very different degrees (i.e. most important for farmers and fourth most important for students). This indicates that undertaking different strategies for both stakeholder engagement and decision-making, by engaging bodies such as industry or government-related groups for these two groups, may be beneficial given their differently stated priorities. I argue that the employment of *flexibility* during engagement processes may result in more appropriate and effective procedural outcomes, and that rigidity in procedure that ignored or

did not appropriately address such priority differences could generate feelings of stakeholder frustration, of not being heard or included. As a result, this may impact upon assessments of procedural justice and fairness, and thus the willingness of such groups to participate in future processes of engagement, which by their experience fail to acknowledge inter-group difference and community-level pluralism.

6.1.1 Comparing methods of social priority calculation

The notion that methods can influence outcomes is supported by this research. The findings of highlight that different methods of calculation can produce quite different results. The results demonstrate that this may be the case whether sample sizes are different in both scenarios of calculation or not. To demonstrate, sample sizes are different for the student groups, but they are not different for the teachers and farmers groups, and yet the results – group priorities are different in both cases, other than for one issue per group – show that the resulting differences in apparent prioritisation are very similar. Such findings hold value for future processes that deal with groups and are concerned with identifying their priorities, social or otherwise. They demonstrate that one method may generate a significantly different result to another method, and that reliance on a single method may be insufficient, in that it may be vulnerable to missing important details. For the processes of identifying social priorities for multiple groups, local context might be more accurately revealed by a combination of techniques. The results also highlight the issue of determining 'public priorities' which include multiple groups; the results here demonstrate that individual group priorities can differ greatly when compared to overall 'public priorities'.

I argue that in an approach that treats stakeholder engagement as 'public' engagement, by employing a uniform engagement approach across different localities, is inappropriate due to local context and community-level pluralism. There exists sufficient difference in and between communities to cause such approaches to be problematic, and in the long-term, unsustainable. I argue this is particularly the case when attempting to engage in dialogue with a diverse community membership in an attempt to identify issues that may facilitate social acceptance of decisions or developments. I echo the assertion of Dore and Lebel (2010), in which they argue that participative processes must be aware of and appreciate various values and beliefs that may exist within social bodies, particularly regarding large-scale developments that can affect a large and diverse range people in different ways. If such approaches are not adopted, and local differences continue to not recognised whilst the public is considered and approached as one entity (i.e. 'the public'), the outcomes of engagement are likely to be unjust and illegitimate. This will more likely lead to decisions exhibiting knowledge deficits, due to them being based on information that has not sufficiently taken into account local social and cultural diversity, as in cases such as Anglesey.

I propose that an approach which engages social groups independently, considering how they

differ socially and prioritise different social issues, provides greater opportunities to highlight both the differences and similarities between groups, which it has been argued should be embraced and seen as positive and constructive knowledge (Young, 1990). These can then be discussed deliberatively and explored if groups or group representatives are then brought together to engage in deliberative dialogue at a later stage, discussing their priorities and identifying areas of social commonality. In such cases, resulting decisions are likely to be perceived as democratic, informed and legitimate, demonstrating equality and procedural justice by enabling different groups to identify what they deem to be important, enabling all groups to 'have their say' in a deliberative forum. This concurs with one of the main reasons put forward by Breukers and Wolsink (2007) for supporting collaboration during decision-making, that of increasing the democratic legitimacy of processes and outcomes.

I promote engagement with stakeholders that is more strategic in nature, to more accurately inform decision-making processes, through what I term *socially strategic stakeholder engagement* (SSSE). A more targeted stakeholder engagement approach presents opportunities to engage with communities in a more group-focussed, socially reflective manner, so that decision-making is socially informed and more socially sustainable. I argue that this would be significant for decision-making for SECTs (Cotton, 2014), such as NNB, in providing opportunities to more accurately identify social values, needs and priorities at the local scale, with the possibility of informing decisions which are to affect local communities with a social understanding able to assist in mitigating future social problems, potential delays to developments, and barriers to local development. As Breukers and Wolsink (2007) suggest, collaboration during decision-making has been found to contribute towards the realisation of facilities and mitigation of delays, whereas processes perceived to be unfair, i.e. lacking opportunity to participate, can suffer from reinforced negative attitudes towards the associated development.

In regards to the appropriate *methods* to identify issues of social priority, the method of participants identifying and ranking issues of social importance utilised in the current study enables the future engagement of the group to be based on *specified* as opposed to *deduced* data, such is the case when calculated means are utilised. Mean scores are demonstrated as useful in that they can be analysed to show the existence of significant differences *between groups* as shown in this research, but are less precise than participant-specified responses on accurately reflecting individual and group priorities.

As discussed in 2.5.1, there are increasing calls for the further inclusion of young people in planning and decision-making (e.g. Frank, 2006; Matthews, 2003; Sinclair and Franklin, 2000). The findings of this research demonstrate that young people *do* have suggestions, ideas and potential to contribute to such processes, as well as adults, and that the concerns of young people mirror adults on some issues. An example of this is provided by participants from the YSTJ Student and, to a lesser extent, YSTJ Teacher groups, both proposing greater consideration of the elderly.

Such findings echo those of the 'The Wales We Want' Report (TWWW, 2015), a sustainability-based report on the publically desired future vision of Wales by 2050. 'The Wales We Want' is the result of a Welsh Government initiative, delivered by the Commissioner for Sustainable Futures Peter Davies and managed by Cynnal Cymru (Sustain Wales). A 'National Conversation' was undertaken from February 2014 to 2015 to identify the long term goals of members of the public and communities in Wales, the results of which were published in the 'The Wales We Want' (TWWW) report in March 2015. The project involved engagement with approximately 7000 Welsh residents over this year-long period, where key well-being issues were raised and people's priorities to help build a collective vision of a desired future were reported (TWWW, 2015). Within this report, a common priority was the further consideration of the older and elderly populace due to the continued importance of the social sustainability-related issues of health (e.g. mental) and well-being:

"With loneliness and associated mental health problems a growing problem within the older population, closures of community centres and services can exacerbate the problem. We need to create 'age-friendly communities' that are built with the communities and the demographics in mind" (ibid: 9)

"Greater focus also needs to be given to people aged 85+ since this group tends to be more acutely impacted by the health and well-being issues" (ibid: 15)

The findings of the current study also demonstrate societal care and recognition from a young age, as YSTJ Students demonstrate a social awareness and consideration for others in their community that other adult participants had not raised in their comments. An example of these are suggestions for the further consideration of the GLBT (Gay, Lesbian, Bisexual, and Trans-sexual) and elderly communities on Anglesey; whilst care for the elderly is also an issue raised by one of the participant teachers, the elderly community is mentioned on several occasions by YSTJ Students. The comments reveal a diversity of concerns, including the development of wind turbines and the proposed Wylfa Newydd development, showing that energy-related issues are a concern to some, but were not mentioned by so many group members that they resemble a primary concern for groups as a whole. Alternatively, energy-related developments may not be considered as having sufficient social connotations to be mentioned in the context of social issues on Anglesey, whereas an environmentally focussed document may have generated more responses regarding such developments. The responses also demonstrate that whilst the questionnaire sought to examine key themes, there remain localised issues that require further examination and exploration through group-based dialogue if social sustainability and social development is to be legitimately pursued in these communities. The responses from participants highlight the value of this component of the document in revealing not only issues of local concern and

importance, but indicating to which group these issues are of greatest concern, and therefore, holds informative value for future local engagement strategies.

I now move on to address the second research question set, which relates to the dialogue-based stage of this study's mixed-method approach.

6.2 Research Question Set 2

What are the key themes emerging from the first group-based dialogue with social groups, what are the similarities and differences between them, and what are the implications for future stakeholder engagement?

The second round of group sessions involved a series of dialogue-based group discussions with each social group, building upon the findings of research questionnaires from previous sessions. At this point, each group is considered in accordance with the findings of the first round of group discussions, followed by a discussion of the similarities between groups, and the implications for local stakeholder engagement.

6.2.1 YUB Students

According to the group's Priority Profile based upon the questionnaire issue ranking exercise, the group prioritisation of social issues were as follows:

Most important	Least important
Welsh language	**Amount of traffic on roads in Anglesey**
Amount of employment	**Different types of housing**
Physical health	**Access to large companies who operate on but are not based in Anglesey**
Mental health	

These and other social issues were then discussed with a sample of sixth-form students in the context of a proposed new nuclear power station being developed on Anglesey. As a result of this group dialogue, the following themes and sub themes were identified by participants as important:

- **Welsh language** (learning Welsh; risks)
- **Employment and training** (opportunities/skills development; awareness; personal knowledge/experience)
- **Health** (risk; awareness)
- **Leisure time** (personal; younger people)
- **Amount of traffic on roads** (people commuting to work on Anglesey; people commuting to work off Anglesey; personal relevance)
- **Different types of housing** (prioritisation; council properties)
- **Communication with large companies** (ability to communicate; form of communication; receiving information)

Thematic analysis of the group discussion also highlighted which of these themes were perceived by participants as presenting social opportunities or risks. Leading into the session, the group perceived 'Welsh language' as the most important social issue. Whilst they were wary of the amount of predominantly English-speaking people that might come on to the island with the development of a new nuclear power station, they were also relatively optimistic about the impact of this on Welsh language, seeing the potential opportunities for people to learn small amounts of Welsh. A number of participants were hopeful that Welsh would be learnt by younger incomers, and that young people would be influential in assisting Welsh to be spoken by their parents. They were also relatively optimistic about the opportunities for development-related employment. This was based in a desire to see as many local people receive employment as possible, but that those with the greatest capabilities to suit job roles would be successful, and that this was appropriate. It is proposed in the rural sociology literature by Watkin (2010) that young people in rural areas are presented with very few opportunities to "access meaningful and sustainable employment and training" (p. 136), and that in the context of the economic recession, the current scene in which more young people remain in full-time education due to a lack of entry level jobs (Bradley and Hickman, 2004; Kemp, 2005) is likely to continue in rural areas. This highlights the importance of these potential opportunities associated with the Wylfa Newydd development to this group of young people in Anglesey.

In addition, participants wanted to see the provision of opportunities to young people on Anglesey, through industrial summer placements and college courses. However, they made it clear that *awareness* of opportunities was an area in need of improvement, that their knowledge of these opportunities was limited. One participant noted that it had been two years since a representative from the new nuclear developer had spoken to them and their peers regarding employment opportunities for young people, and were reliant on newspaper updates. This suggests

that much more needs to be done in regards to community-level engagement from industry and local government on development-related opportunities.

It was perceived by a small number of participants that public health would be impacted by the development, and that illness was a potential result of working at the facility. Conversely, the view was put forward by a number of participants that if there were risks associated with public health, rather than this constituting the closure of the facility, any potential risks to public health should be discussed with and made clear to local people, and that public awareness was a necessity. This is highlighted by the statement of one participant: *"…as long as people know that there's a risk of it and that they're aware then it's fine".* The findings indicate that no participants from the group knew of the published research that has been conducted looking into public health impacts from such developments. These include the reports by the Committee on Medical Aspects of Radiation in the Environment (COMARE), on the subject of childhood cancer leukaemia incidences around UK nuclear power stations (COMARE, 2005, 2006, 2011), or the peer-reviewed study by Steward, White and Reynolds (2008) studying other research into leukaemia clusters linked to low-level radiation in Anglesey and North Wales. I suggest that there is an opportunity, given that this research exists and that risks to public health have been identified as an important issue, to make young people aware of this as part of a balanced process of dialogic engagement in schools. I propose that this could form part of a 'first step' response to the findings of this research in schools, demonstrating a direct, informed response to the specified priorities of young people in Anglesey regarding NNB.

Linked to this was a need for public preparedness, further reflecting a belief in the group that there was a notable possibility of an accident or incident of some description in the future, and yet perceiving this issue as an opportunity for communication and openness. On this issue of the effect of the development on the leisure time of young people, it was less apparent to participants how the development would influence it. Rather than directly impacting their ability to enjoy their leisure time, it was considered that new social networks may be created in the instance that an industry apprenticeship was undertaken by a young person. It was also suggested that the site may act as a destination, not for young people of their age but for younger school children, that the site would be utilised for the purposes of school trips; again, this theme was primarily considered an area of opportunity.

However, for the theme of traffic on Anglesey roads, the proposed development was perceived as likely to contribute negatively, with risks of greater traffic due to incoming, non-Anglesey based workers, central in participant dialogue, with Menai Bridge, connecting Anglesey with the mainland, being identified as a potential site of delays. It was highlighted by one participant that this may be remedied by greater employment of Anglesey residents, who would have less need to use personal vehicles. It was an issue perceived by a number of participants as 'of the future', with a realisation that whilst it was not an issue affecting them currently, there was potential for

it to become of greater impact to their lives in the next couple of years should they learn to drive. On the issue of housing, it was argued by one participant that people moving onto Anglesey for reasons of development-related employment should not be provided with council housing, and that local residents should have priority in this instance. This point was questioned by another participant, suggesting that development-related employees would not wish to live in council properties. There was uncertainty around this subject, as to where incomers would be housed, in what type of housing, and how this may impact upon the allocation of housing to Anglesey residents. Finally, with regards to communication with large companies, opportunities were envisaged by participants, and whilst it was perceived that more could be done to inform young people of opportunities and plans associated with a new nuclear development, participants took to suggesting how this could be communicated to them, such as Q&A sessions and school visits, and why this was important. One group member pointed out that it was not appreciated that young people also had a desire to know more about the development and the potential associated opportunities:

"People don't realise that we wanna know just as much as adults wanna know what's happening in our communities with the bigger…companies coz…after all it's us that's gonna be looking for work in the next couple of years…"

Reflective Commentary

The first group-discussion with YUB Students generated a good amount of dialogue between participants and researcher, although it was at times challenging to generate a discussion between group members on some issues. It was evident that some group members were more confident at speaking in groups than others, and despite attempts to involve all group members, some appeared reluctant to contribute, which was somewhat surprising given the voluntary nature of the session This proved one of the main challenges in working with younger participants. For some participants, they seemed to have opinions and views on some issues but not on others, which they would be reluctant to become involved in the discussion. To address this, I took to asking questions with responses displayed with the raising of hands, to secure some form of response. It was also noticeable that a number of participants were wary of continuing with points which received some disagreement or challenge from other participants. Despite having conducted a session previously with the students, albeit a larger group, it is suggested that unfamiliarity with myself, the forum and some of the discussion topics may have contributed to some of the visible reluctance to contribute for some participants.

6.2.2 YSTJ Students

According to the group's Priority Profile based upon the questionnaire issue ranking exercise, the group prioritisation of social issues were as follows:

Most important	Least important
Amount of available employment	**Access to local representatives**
Ability to do hobbies or non-work activities	**Number of young people leaving Anglesey**
Educational, health and care services	**Amount of traffic on roads in Anglesey**
Welsh language	

As a result of this group dialogue, the following themes and sub themes were identified by participants as important:

- **Welsh language** (risks; learning Welsh; compulsory learning)
- **Employment and training** (opportunities for Japanese; opportunities for Welsh/Anglesey residents; doubt in local opportunities)
- **Activities for young people** (more facilities)
- **Educational, health and care services** (future of the school; school as a resource for future workforce)
- **Communication with large companies** (information on potential development and opportunities – type; information on potential development and opportunities – timing)
- **Population changes** (people moving onto Anglesey; impact on economy)

The theme of Welsh language and employment opportunities generated a positive amount of group discussion to begin the first group discussion with the YSTJ Students group. Predominantly, the impact of a new nuclear development was perceived by group members as negative and representative of risk to the Welsh language. It was perceived by a number of participants that a significant number of English-speaking workers moving to Anglesey would have a detrimental effect on the Welsh language, and that these workers would make little or no effort to learn the language. The 'struggle' of the Welsh language was raised as an ongoing problem, and it was also suggested that intimidation may also result from a large number of non-Welsh speaking people moving or coming to Anglesey for work reasons. Unlike the YUB Students group, the issue of Japanese workers coming to Anglesey was raised as a risk, a negative impact, of a new nuclear development. It was perceived that Hitachi GE, the Japanese owners of the developer Horizon Nuclear Power, would utilise a large Japanese workforce during the development, with a figure of 80% being mentioned by one group member, and that there was little possibility of these people learning Welsh. However, participants were in agreement that it would not be appropriate to make learning Welsh compulsory for development-related employees. Also, the topic of a large Japanese workforce migrating to Anglesey was perceived as a mitigating factor in local people gaining employment, and that those coming from Japan had capabilities which local people did not and so could not compete for skilled roles.

These findings highlight concerns towards highly skilled international migration, a suggested indicator of globalisation (Findlay, 2006), and highlight the perceived potential impacts of it for local employment opportunities. As Findlay *et al.* (2000) note in earlier work, there does exist an established discourse in the literature regarding arguments for and against amending immigration policies to mitigate employment being 'taken' from local or 'native' people by migrant workers (*see* Borjas, 1993). Recently, the risk of immigrants forcing a drop in the wages of local workers and 'forcing indigenous people out of jobs' in Wales has been utilised as a political argument by the 'Vote Leave' campaign in the upcoming EU Referendum in the UK (BBC, 2016a). Concerns and issues surrounding the socio-economic impact of in-migration to rural areas are not new (see Boyle and Halfacree, 1998), and have long been linked to the effects of rural gentrification (Robinson, 1990; Stockdale, 2010), and the effects this can have on rural housing stock (Cloke, Philips and Rankin, 1990) and increasing house prices for example (Capstick, 1987; also see Murdoch and Day, 1998). It is suggested by authors such as Findlay (2002) and Lowell *et al.* (2004) that increases in skilled migration reflect a migration policy shift in the UK seen post-1997 when the Conservative government, broadly opposed to labour immigration, was replaced with a Labour government more supportive of international recruitment, leading to a scenario where the UK is now a significant net recipient of skilled international migrants (Findlay, 2006). A shift is seen to have occurred in the UK, moving from the 'brain exchange' of the 1990s towards the more recent situation of significant 'brain gain' (Findlay, 2002). Findlay (2006) notes that 'brain exchange', whereby human skills are exchanged between locations, can lead to 'brain gain' for

recipient populations whereby the overall skill pool is seen to increase as a result of this influx of skilled individuals, but that this skilled migration should serve not to *replace* local skill development; rather it should supplement "extra investment in training domestic labour" (*ibid*: 83). Findlay (2006) highlights these international social movements, particularly temporary skilled migration, as a policy challenge in the UK, in that there is a risk of such migration being utilised *in place* of the training of local people to meet UK skill requirements such as those for energy infrastructure projects.

This concern was not shared by all participants, with some predicting that more local people would be 'hired' than some expected. The suggestion was also made that it would be unnecessary to employ people to 'build a wall', and that whilst more 'complicated' roles may be filled by non-local workers, there may be opportunities for local people during the construction phase. Conversely, it was suggested that local businesses may benefit, and that secondary employment may represent opportunities as the development progressed. Overall, there appeared to exist a sense of doubt and uncertainty as to the opportunities for local people, particularly regarding higher level roles, as well as the certainty of roles in a broader sense. I agree with the proposals of Findlay (2006), in that skilled migration for the Wylfa Newydd development should *supplement* the training of domestic labour and not replace opportunities for skilled, 'local' individuals. I argue that given the current findings, further stakeholder engagement is required between developers and local communities on the issue of skilled migration expectations in regards to the Wylfa Newydd development, and that this should be done sufficiently 'upstream' so as to make young people aware as to the skills requirements of projects, potential skilled employment pathways, and address existing doubt among local populations on these matters.

The impact of a new development on activities available for young people was also discussed, to which there were several positive responses. It was suggested that an influx of people coming to Anglesey for development-related employment may generate the development of more leisure facilities such as bowling or cinemas based on an increased need, facilities which were seen to be lacking. One participant noted that a greater choice of facilities and leisure services may assist in stemming the number of young people leaving Anglesey – which was identified as one the group's least important issues according to their Priority Profile - reflecting an opportunity for youth and cultural retention on Anglesey. Opportunities were also perceived surrounding the theme of educational, health and care services, in the context of aiding the future of the school and visualising the school as a potential source of employment for the development, provided the close proximity of the school to the current and proposed nuclear site. Discussion on the topic of potential development-related benefits generated enthusiasm and positivity among some group members, with one participant suggesting that industry experts could utilise the school as a training centre for future employees, so that local residents may eventually be employed and involved in the operation of Wylfa Newydd.

Such perceived potential benefits from the development share similarities with those reported in the literature on 'boomtowns' (e.g. England and Albrecht, 1984; Fleming and Measham, 2014; Greider and Krannich, 1985; Stedman et al., 2012), whereby local communities can experience periods of significant socio-economic gain during the lifetime of industrial developments. I argue that in order for new nuclear developments to contribute towards social sustainability at the local scale, short-term strategies of local development that ignore the needs of permanent local communities must be avoided, and that longer-term strategies of sustainable development which carefully consider the long term and diverse needs and priorities of local communities are implemented. I echo the cautious assertion of Brasier *et al.* (2014), that "without careful planning and diversified economic development, communities stand the very real chance of being in worse shape than they were before the boom" (p. 8). I also argue that more strategic engagement with social groups can provide more opportunities to discuss how these perceived benefits and opportunities can be realised, and if they are involved in the process, enhance the sustainability of development-related decisions.

Group members identified a desire to know more about the development, what the plans were, and general information regarding job opportunities, with a preference for more visits in school identified as preferable by several participants. It was suggested that this communication should take place before sixth-form, due to the decisions made by students just prior to sixth form regarding subjects; this notion of pre sixth-form engagement received significant support from the group. This further supports my recommendation for greater upstream engagement, to increase the awareness of young people towards potential opportunities.

Finally, the impacts of more people coming onto the island were discussed, with an initial suggestion being made that more people coming to Anglesey may lead to increased housing, increased employment and increased 'everything', adding to the perspective of the development as being representative of potentially constructive and positive opportunities. However, other participants suggested that nearby towns would become occupied by people from outside Anglesey, with one suggesting that a local town would be "*full of Japanese people*". Such population increases as a result of large-scale energy developments are similarly reported in the literature on boomtowns and the local impacts of energy-related developments (Measham and Fleming, 2014; Stedman et al., 2012). In regards to boomtown-related growth at the local scale, Brasier *et al.* (2014) have stated that "long-term residents may find the social fabric of their communities changed or threatened by the sudden presence of 'newcomers'" (p. 8). Between these two perspectives, a suggestion was made by one YSTJ Teacher participant that whilst the local economy may benefit, it would be an economy increasingly being utilised by people born outside Anglesey, and not *"people that were born here, were brought up here".* This is reflective of the local impacts common of 'boomtown' scenarios, whereby local economic benefits are mainly experienced by temporary residents employed to work on the energy developments

(Stedman et al., 2012). Regarding other issues of least importance, the issue of 'access to local representatives' was not considered to be important in the context of a new development and was not touched upon or discussed by the group.

Reflective Commentary

Similar to the first discussion session with the YUB student group, a positive group dialogue was generated within the session, with interesting and insightful points being made by many group members. However, similar issues were encountered in that a number of participants appeared reluctant to contribute, whereas others were more forthcoming and demonstrated greater confidence in sharing thoughts and opinions. This was something that despite my expecting may occur, remained a challenge to try and ensure the involvement of all group members. This also seemed to demonstrate a general sense of uncertainty among the group on several issues, limiting their ability to engage in dialogue of any detail. This caused me to reflect upon the session to determine whether any more could have been done to assist group members to put their views across. This is typical of Action Research, whereby the researcher considers their practice and seeks areas for improvement. As a result, I considered that providing more time to participants to respond may have assisted those more cautious in the group. This also demonstrated the challenges of qualitative research, and the value of group-based facilitation experience.

In summary, the group perceived the proposed Wylfa Newydd development as posing several opportunities to local people and the local economy, but were also doubtful as to the realisation of these opportunities. The group was wary of significant Japanese immigration to the island, and also perceived this as something impacting upon opportunities for higher level employment associated with Wylfa Newydd and on the composition of local communities. Participants were hopeful that incoming workers and their families may learn Welsh, particularly through young family members, but were doubtful of the uptake of Welsh language courses, whilst opposing any move to make them compulsory for incomers. Reflecting broad uncertainty about the development, the group was vocal about their desire for greater communication for developers and industry representatives, in order to understand what opportunities were available for young people, and that this engagement came at a time when their options in regards to subject choices were still open.

6.2.3 YSTJ Teachers

According to the group's Priority Profile based upon the questionnaire issue ranking exercise, the group prioritisation of social issues was as follows:

Most important	Least important
Physical health	**Access to large companies**
Mental health	**Different types of housing**
Educational, health and care services	**Amount of training/skills courses on Anglesey**
Welsh culture	**Taking part in voluntary activities on Anglesey**
Welsh language	

As a result of this group dialogue, the following themes and sub themes were identified by participants as important:

- **Employment and training** (importance and impact; prioritisation; 'local' employment and retention of young people; type of jobs for local people**;** student knowledge of opportunities)
- **Communication and collaboration with large companies/organisations** (with schools and students)
- **Physical health** (uncertainty)
- **Mental health** (link to employment/unemployment)
- **Sustainability-related suggestions**

- **Population changes (people moving onto Anglesey; impact on economy)**
- **Decision-making and consultation (perceptions of influence)**

The group discussion with the YSTJ Teachers group was, generally speaking, more detailed than those of the two student groups, which was unsurprising given their life experience, knowledge, confidence and profession. Despite employment not being ranked as one of the group's most important social issues, employment was discussed by the group as central to both individual and societal health, and its connection to many other social issues. One participant outlined this notion by stating that other social issues were *"corrolaries that flowed directly from increased employment",* whereas another participant described employment as *"the crux of all things".* This perception of employment from group members reflects the perceived criticality of employment in modern society, as described by Bauman (1998: 5):

"…to work is good, not to work is evil…work is the normal state of all humans; not working is abnormal"

This notion of employment as a 'crux of all things' received support from several other group members, with the impact of employment on not only economic aspects of livelihood but also people's mental health, associated with stress and depression in cases of unemployment, being identified. "*Generational unemployment*" was also identified as an issue in Anglesey, which was suggested by one participant to breed a *"poverty of aspiration"* among people. This echoes the notion of 'inter-generational unemployment' (Watkin, 2010) found to exist in other rural areas, whereby young people do not experience "the 'normality' of working life within their immediate families" (p. 136). It is suggested that rural unemployment is compounded by factors such as "restricted access to transport, services and housing" (*ibid*: 134; Monk et al., 1999), and that the rural youth in particular come up against barriers of geographical isolation and poor opportunities, in addition to commonly low wages, which then impact on access to transport and housing (Cartmel and Furlong, 2000). It is also suggested that in rural areas in particular, greater familiarity and recognition of people, and a greater knowledge of their pasts, can further impact people's future employment opportunities; in extreme cases, this can come in the form of local or social stigmatisation (Woodward, 1996). In this context, the Wylfa Newydd development represents an opportunity to help address a central social issue, as seen by many in this group, and stem this inter-generational unemployment seen in Anglesey.

Some participants were cautious of the apparent focus by decision makers on the island, such as the local council, on employment, particularly in regards to the new nuclear development. This was perceived by some as being pursued by local government 'at any cost'. This wariness by some group members reflected a cautious support of the development, but were fearful that other aspects of their community, such as culture and environment, would suffer as a result of this, also

noting the potential impact on key industries such as tourism. Whilst this aspect of employment was perceived as a risk, the development was perceived by many as a potential opportunity for young people, on the proviso that local students were able to access and take advantage of these opportunities. Such views reflect a position similar to that of 'reluctant acceptance' (Bickerstaff et al., 2008; *also see* Pidgeon et al., 2008) from group members, in that nuclear developments receive tentative, conditional support from people (originally due to the potential for combating climate change). This view of potential opportunities for students was proceeded by a call for much greater engagement with schools and students, by the nuclear industry, in order to make them aware of available opportunities in the first instance. This reflected concerns of procedural justice in the context of community engagement on employment opportunities, to ensure that students were aware of the requirements and pathways to development-related employment.

Uncertainty was also voiced in regards to the type of jobs that would be available to young people, with doubts as to the availability of higher paid, higher skilled jobs to Anglesey residents. In this sense, the promotion of 'jobs for local people' was rapidly followed by uncertainty regarding what form such 'local employment' would take. This reflects potential trust issues for these participants, who doubt the opportunities that are to be available for local residents. As detailed by Pellizzone *et al.* (2015), trust depends strongly on strong and continuous communication, and trust is also a central contributor to the development of perceptions and attitudes (Poortinga and Pidgeon, 2003). Therefore, I argue that an evident lack of communication from industry-related and governmental officials on employment opportunities, as raised by participants, has contributed to participant doubt in regards to the legitimacy of 'local employment' rhetoric. In short, the findings indicate that insufficient communication has affected knowledge and trust, which in turn has impacted negatively upon perceptions of local employment opportunities. It is proposed in the literature that trust in the communication processes themselves are central to effective public engagement processes, particularly when differing levels of knowledge exist between groups (Pellizzone et al., 2015). Renn and Levine (1991) describe this link between trust and communication, indeed of trust in communication, and thus how received messages (e.g. messages of local employment opportunities) are perceived:

> *"Trust in communication refers to the generalized expectancy that a message received is true and reliable and that the communicator demonstrates competence and honesty by conveying accurate, objective and complete information" (p. 179)*

I argue that this lack of stakeholder engagement as highlighted by participants is affecting stakeholder knowledge and trust, of both the individuals communicating messages of development-related employment opportunities and the messages themselves. Such uncertainty in regards to employment opportunities and calls for greater engagement also highlight the potential

barrier to employment that can exist in rural areas in the form of the availability of information about job opportunities, representing a personal 'demand' factor of individuals (Hodge et al., 2002). Hodge *et al.* (*ibid*) also suggest that factors such as the close-knit communities that commonly exist in rural areas, traditional ideologies, limited opportunities for and access to training, relatively low wages and narrow economic structures in these areas contribute towards placing rural citizens at a disadvantage in regards to gaining employment.

On the theme of greater communication in regards to employment opportunities, group members were united in their demand for greater collaboration between schools and the nuclear industry/developers; the present situation was seen by a number of participants as a missed opportunity. The amount of communication to present was deemed insufficient, with engagement from developers was seen as lacking. Cancelled visits and a decreasing number of placements with the nuclear industry were raised as indicators of a weakening working relationship between the companies and schools, fuelling prior concerns of poor awareness and uncertainty surrounding future opportunities. This again reflects the suggestion of Hodge *et al.* (2002) that among other factors, the factor of availability of information about job opportunities can serve as a potential barrier to employment in rural areas. I argue that without significant improvements in the amount of communication and engagement between industry and schools, opportunities for employment associated with the Wylfa Newydd development cannot be fully realised and therefore pursued by the next generation of Anglesey residents.

Uncertainty surrounding the technology more generally also led to some participants voicing concerns in regards to the potential health-related risks of a new development, particularly in regards to the effects of radiation on the health of local residents; perceived high rates of cancer on Anglesey by one group member was mentioned in conjunction with these health concerns. As observed with other groups, there appeared to be no knowledge of published studies on the public health impacts of radiation (e.g. COMARE, 2005, 2006, 2011; Steward, White and Reynolds, 2008) among participating teachers.

Other health concerns of participants, as mentioned previously, related to the impact of long-term unemployment on people's mental health. On this issue, whilst not being viewed as a panacea, the Wylfa Newydd development represented a potential to address long standing issues on the island related to 'generational unemployment' or 'inter-generational unemployment' (Watkin, 2010), as well as *"the brain drain"* as described by one participant, of young people leaving the island due to a lack of quality employment options. As noted previously in this chapter, this reflects the impact of social movements in response to employment opportunities, which may involve the international movement of skilled workers (Findlay, 2006). Whilst participants were supportive of development-related opportunities, several were also wary that without sufficient considerations of the long-term plan supporting decisions, they would not be sustainable and would be beneficial only in the short term. Whilst previous financial support for local

communities from Magnox, developers of the original Wylfa Power Station, was acknowledged as positive, participants mentioned the need for a 'social plan' and a 'working action plan' to support future decisions and demonstrate a coherent long-term vision for the development, noting that a large influx of workers from outside Anglesey would not demonstrate interests of local development or sustainability. This corresponds to the previously mentioned caution put forward by Brasier *et al.* (2014) on the necessity for "careful planning and diversified economic development" (p. 8) to avoid negative impacts to local economies from energy developments in the long term in the instance of short-term decision-making, including the employment of large numbers of 'newcomers' (Findlay, 2006).

This influx of workers corresponded to the theme of population changes, where group members voiced concerns about this potential migration from outside Anglesey, and the impacts they could have on community cohesiveness and the capacity of local services. One participant noted the potential for a 'two layered society', where Anglesey residents would exist in separation to worker communities; a scenario to be avoided at all costs according to the group. Such social scenarios and experiences have been reported in the literature, particularly for studies concerned with the impacts of energy developments and boomtown developments; as I have mentioned previously, long-term residents may experience changes in the 'social fabric' of their communities, in that they perceive their communities as "changed or threatened" by 'newcomers' (Brasier et al., 2014). Studies report that communities have experienced various social impacts resulting from the introduction of new populations, such as increased pressure on housing availability, social and healthcare services, policing and schools (Kohrs, 1974; Williamson and Kolb, 2011), in conjunction with unanticipated stresses for local citizens (Brasier et al., 2011; Freudenburg and Wilson, 2002; Gramling and Freudenburg, 1990), and numerous social impacts resulting boomtown developments including "drug and alcohol abuse, domestic violence, rising divorce rates and mental health issues" (Brasier et al., 2014: 8; *also see* Camasso and Wilkinson, 1990; England and Albrecht, 1984; Freudenburg, Bacigalupi, and Landoll-Young, 1982). Therefore, provided the importance of the issue of mental health as specified by this group, this literature is valuable for understanding the potential impacts of energy developments according to specified social priorities.

Participants also suggested that an increased population may also present some opportunities in relation to increased business for local companies and that opportunities *would* result for some in Anglesey with an increasing population scenario. The final theme identified in the group dialogue was that of decision-making and consultation, which was perceived negatively by a number of participants. The amount of public consultation was seen as insufficient by some, whilst others were disillusioned as to their influence and 'voice' in effecting development-related decisions. A general consensus emerged from the session that the voices of local people would be heard but most probably not considered, that key decisions had been made and that the development would

progress regardless of their input. Doubt was expressed as to the value of contributing opinions or views on the development, as many demonstrated a sense of resignation towards the perceived fruition of Wylfa Newydd. This highlights issues regarding local engagement and processes of stakeholder involvement in the project, as little confidence was expressed as to any local influence; this highlights issues of procedural justice in regards to project planning and decision-making, as perceived by a social group whom many would consider to possess sufficient capacity to engage effectively in such processes.

Reflective Commentary

The dialogue with the teacher group reflected an apparent feeling of *reluctant acceptance* amongst the group towards a new nuclear development on the island. It was evident from the group discussion that although opportunities may exist in relation to local employment and local businesses benefiting from an increased customer base, participants were wary of the costs of these 'benefits', and of the quality and sustainability of these. Dialogue was both deliberative and critical, to a noticeably greater degree than during the student sessions, which was somewhat expected. However, similarly to the student sessions, there remained individuals who appeared to be reluctant to contribute, or were content to contribute only occasional comments, whilst other participants were more enthusiastic to contribute on several of the issues discussed. This highlighted potential challenges and benefits to me in dealing with groups of individuals who are experienced in speaking in group environments on a daily basis; challenges in the possibility of numerous dominant speakers within a single group, and benefits in that well-paced and informed dialogue is likely provided the topic of discussion is not overtly niche. What was also experienced in this session, which was not felt to be the case to the same degree in the student sessions, was the constraint of time, due to the volume of discussion. Reflecting upon the group dialogue, a session of longer duration may have allowed for some points to be explored further as opposed to being required to move onto the next issue.

6.2.4 CTGYM Farmers

According to the group's Priority Profile based upon the questionnaire issue ranking exercise, the group prioritisation of social issues was as follows:

Most important	Least important
Welsh language	**Reliability of public transport**
Physical health	**Amount of traffic on roads**
Amount of young people leaving Anglesey	**Access to large companies who operate on but are not based in Anglesey**
The amount of people moving onto Anglesey from elsewhere	**Condition on roads on Anglesey**
Welsh culture	

As a result of this group dialogue, the following themes and sub themes were identified by participants as important:

- **Welsh language** (link to development/employment; amount of spoken Welsh; impact of immigration)
- **Employment** (employment for local people – future; employment for local people – present; impacts on population change; experience of previous Wylfa development)
- **Communication** (information from developer; from large companies)
- **Physical health** (uncertainty; catastrophe; radiation-related illness; associated developments; importance)

- **Safety** (potential for catastrophe; risk inequity)
- **Local benefits from development** (beyond employment)
- **Training and skills development** (opportunities; training-experience gap)
- **Welsh heritage and culture** (language)
- **Road infrastructure on Anglesey** (impact on traffic)
- **Decision-making and consultation** (energy-related developments)

The most important social issue according to the CTGYM Farmer group entering the group session was Welsh language, and it was this issue that was discussed firstly. There were numerous concerns surrounding its continued use and the impact of non-Welsh speakers moving onto Anglesey. Negative perceptions included a suggested lack of bi-lingual signage for and around the proposed Wylfa Newydd site, reflecting a demonstration of a lack of respect from developers for local culture and its importance in Anglesey. However, opportunities were also discussed in the context of the new development, such as the development acting to retain young people on Anglesey and mitigate the out-migration of youth from the island, taking the language with them. This issue of youth out-migration, leading to an increasingly elderly rural population, has also been reported by Marshall and Simpson (2009) as occurring in National Parks in the UK, leading to concerns over the sustainability of these locales. Indeed, the authors observe that over the last decade rural sustainability, specifically ensuring the sustainability of rural populations, has become an important social policy issue (Best and Shucksmith, 2006; Champion, 2007). One participant also identified existing opportunities for current security guards on the Wylfa Newydd site to learn Welsh, demonstrating that action was being undertaken on this subject.

In general, participants were pessimistic about the future of spoken Welsh in Anglesey, claiming that the number of people speaking Welsh was declining and that to their frustration, too many Welsh speakers chose to speak English of their own accord, which itself had a detrimental effect on the language's future. Immigration was also portrayed and perceived as a risk to the future of the Welsh language, with a number of participants mentioning the impact of Welsh speakers from Anglesey marrying non-Welsh speakers from outside Anglesey, from which point the Welsh language was spoken to a lesser degree. Such comments displayed a desire to see the Welsh language maintained and flourish, but a fear that both Welsh and non-Welsh speakers were contributing to its persistent decline. The centrality of the Welsh language for some, in the context of maintaining Welsh heritage, was evident by one participant's position:

"To me, heritage is our language isn't it?"

This perceived centrality of the Welsh language to Welsh heritage and life in general reflects the work of Day (2002) who details it as a central contributory factor to Welsh identity and its

significance as an almost unique symbol of cultural difference, and Nguyen *et al.* (2013), who assert its importance to the lifestyles of Welsh people. The significance of Welsh language as noted in the literature supports the feelings of loss felt by participants in regards to the next generation of Welsh speakers emigrating from the island, with the language taken with them, and the need to mitigate this.

Development-related employment was another issues deemed important by participants; the group consensus was that there should be significant opportunities for local residents, and that these opportunities should be made aware to residents and that jobs should be offered locally at the earliest opportunity. This highlighted a feeling of what was considered to be 'just' and 'fair' in regards to employment opportunities. An example was provided of a local person who was due to return to Anglesey to gain employment at the proposed site. However, unlike other groups, the employment opportunities for local people were perceived as also potentially having a detrimental impact on the farmers themselves and their livelihoods; participants noted a risk of individuals choosing to follow employment opportunities in the construction industry, to work on the proposed development, who might otherwise be employed by the agricultural industry, working on their farms. Such effects have been noted in the literature on boomtown developments of the past, particularly those in the United States, of incoming industries impacting upon the skill and worker base for other industries in the local area (Brasier et al., 2011; Brown et al., 2005). Indeed, older group members recalled this occurring during the development of the Wylfa Power Station during the 1960s. This lay knowledge of historical periods of similar developments reflects the important local expertise and knowledge which is discussed by many in the literature as vital for ensuring that decision-making is as informed as possible and that in turn the quality of the project more broadly is enhanced (Beierle, 2002; Beuker and Wolsink, 2007; Fiorino, 1990; Perhac, 1996; Wynne, 1996). Group members spoke of concern about potential development-related immigration onto Anglesey, but also viewed the development as a tool to retain young people; it was clear by this that the development presented clear risks and opportunities to the group, in the facilitation of immigration of non-Welsh speakers and retention of young Anglesey residents respectively. More senior group members recalled that during the development of Wylfa in the 1960s, when a significant number of Welsh men were employed, as well as those of other nationalities, responding to the wariness of other participants to the potential influx of 'foreign' workers. On this point, one participant recollected the construction of a bridge in Holyhead, which saw a significant number of Italians employed following the acquisition of the contract by an Italian firm.

In regards to the company responsible for developing the new site – Horizon Nuclear Power – communication with large companies was then discussed. A number of participants were positive in regards to the communication from Horizon to date, noting the distribution of a quarterly newsletter to residences across the island, updating residents on early stage developments.

However, it was also noted that key information was absent from these newsletters, such as key dates for the commencement of construction, and therefore, employment. In the context of communicating with the developer, several farmers questioned the necessity of this at this stage, and could not envision why this would be necessary or desirable. This corresponds to the Priority Profile of this group, in which access to large companies was not considered an important social issue. However, several participants did assert that it was of greater importance to communicate with electricity transmission-related companies, such as National Grid, due to transmission infrastructure often being sited in the fields of farmers. This demonstrates how further engagement, beyond quantitative-based responses, with groups enables greater understanding of their true social priorities, considering that the group's Priority Profile indicated that this issue, of access to and communicating with large companies, was one of the group's least important issues. It was also specified that being able to communicate directly with a person during these rare occasions was of critical importance, articulating their frustrations with having in their experience to 'speak to a machine', which provides valuable insights and has important implications for future engagement efforts with this group.

Another matter of critical importance to group members was the issue of physical health, particularly in regards to the catastrophic potential of a nuclear development, radiation-related illness, and the impact of associated developments - overhead transmission lines - on human health and cancer incidences. The potential for a nuclear development to experience a catastrophic event was spoken about in a humorous manner by participants, whereas the vulnerability of these facilities to a terrorist attack was of a more serious nature. Several group members have lived on Anglesey for decades and have therefore lived through a full operative lifecycle of the existing Wylfa Power Station, without serious incident. I propose that this has contributed to them displaying reduced concern in regards to a catastrophic event, and that this is associated with familiarity with and overall positive or neutral experience with the existing facility. This effect, based specifically on a facility's lifecycle as opposed to general familiarity of those facilities, is not identifiable in the literature. Therefore, I propose that this demonstrates a 'lifecycle effect' experienced by individuals who live through the complete operational lifecycle of such a facility. I propose that this influences their perception of and attitude towards future facilities of a similar nature, depending on the events that have or have not taken place during this lifecycle period. However, terrorism is currently a prominent global issue that is regularly reported on by news and media outlets, nationally and internationally, therefore socially amplifying the perceived risk of such an event (Pidgeon, Kasperson and Slovic, 2003). In regards to overhead transmission lines, one participant recalled the views of a visiting GP on the island, who suggested a causal link between cancer cases on the island and transmission infrastructure. Participants also felt that, reflecting notions of distributive justice and fairness, the requirement for Anglesey residents to live among and 'with' this transmission infrastructure should then require the responsible companies to transmit and distribute locally generated electricity

according to local preferences, i.e. under ground or along the seabed. The statement by one participant, that "*Health is the most important thing…Without health, you'll have nothing, everything's finished"* reinforced the general feeling of the group on this topic, and therefore, the potential for conflict should large-scale developments or infrastructure threaten or risk the health of local people.

Closely associated with public health, safety was a topic also identified as being of central importance to farmers. The notion of vulnerability was again raised by participants, suggesting that it would be a key terrorist target in the event of an attack, highlighting concerns of risk inequity. Perceived risk inequity was also evident in the comment made by one participant that if nuclear power was '100% safe', power stations would be built in England in densely populated cities such as London or Manchester. Participants also commented on the possibility, if only slight, of a catastrophic event taking place, citing recent incidents in Fukushima, Japan, as evidence that absolute safety could not be assured, and that it was also not impossible for a tsunami to strike the Anglesey coast. Responding to this variety of potential risks to Anglesey highlighted by the group, some suggested that Anglesey should see benefits beyond mere employment, that additional investment in Anglesey should be ensured. One participant recollected a similar situation when Shell were active in the oceans around Anglesey, establishing an investment fund for the island. This demonstrates how some people's experiences of industries and developments may influence their expectations of future developments, and therefore their attitude towards it.

Linked to employment, which has already been shown to be an important issue for the group when discussing a new nuclear development on the island, training and skills development was an issue that generated a notable amount of discussion. Several in the group, whilst acknowledging the importance training opportunities for local people, asserted that training without sufficient experience to complement it was ineffective and did not appropriately prepare trainees for the workplace. Therefore, this was perceived to devalue them as potential employees. Farmers were vocal about a need for more experience and placements to follow training and skills development, suggesting that a merely a few weeks of training was insufficient preparation for employment, and that greater attention on this issue was needed on bridging this apparent 'training-experience gap'.

According to the groups' Priority Profile following the first session, the issue of the amount of traffic on Anglesey roads was not considered to be of great importance. However, in the context of a new nuclear development in Wylfa Newydd, this issue clearly grew in importance for the group. Several participants stated this, commenting that increased traffic would likely cause significant, 'terrible' delays, particularly around Menai Bridge, as mentioned by the YUB Students group, and that increased traffic may also result in an increase in the incidence of road accidents. One participant added that the Ministry of Transport would become more active with

the increase in heavy goods vehicles travelling in and out of Anglesey, whereas another participant suggested that despite these initial issues with traffic, the eventual result of the development would be improved road infrastructure on the island.

Finally, the issue of decision-making and consultation highlighted feelings, similar to the YSTJ Teacher group, of helplessness and powerlessness in regards to their influence on energy-related decisions. Similar findings are reported by Wynne, Waterton and Grove-White (2007), who find that working class residents of Cumbria demonstrate a feelings of little or no choice in regards to their dependency on BNFL and the nuclear industry, who appear to demonstrate greater resentment and hostility towards these bodies than more middle class groups who have a greater sense of flexibility and freedom. Several participants made reference to recent events in Anglesey regarding public consultations by National Grid on electricity transmission route corridor selection, for new overhead transmission line development associated with increased capacity resulting from the new nuclear infrastructure. They made clear their frustrations with the consultation process, described by one participant as merely *"some PR stunt"*, due to the apparent decisions made by National Grid that reflected a prior preference of route corridor, and an apparent discounting of public feedback and preference. One participant made their frustrations clear, stating:

"We're not happy at all with the way the National Grid has treated us in Anglesey, at all, we don't listen to a word they say to us"

Other participants claimed that they didn't have 'a say' in development-related decisions, indicating a perception that decision-making was removed from their reach and influence, and that decisions had already been made, leaving their input seemingly valueless.

Reflective Commentary

Reflecting upon the group discussion with CTGYM Farmers, I am drawn to two immediate challenges; conducting the session in Welsh, and trying to maintain a coherent flow to the dialogue, despite a desire to allow the dialogue to flow organically, and retain a degree of structure. Due to the willingness for group members to discuss issues, it was sometimes challenging to know when to allow dialogue to continue between participants, due to the points being made, and when to move on from the current point being explored. Also, despite being fluent in Welsh, there were some terms and phrases spoken by participants which I did not immediately understand, despite the general meaning of the comment of statement being understood. This highlighted the challenge of the limits of my personal linguistic abilities in such dialogic forums. Also, the transcription of this session was more time consuming than the other group sessions, due to both the translation of the dialogue from welsh to English, but also due to the inaudibility of some participant comments. Although it may be requested by the facilitator that participants speak clearly, local dialect and personal delivery of speech mean that it is not possible for everyone to speak sufficiently clearly on every occasion for the purposes of recording, although this is a reflective lesson for future sessions. Similar to the YSTJ Teachers group, the restriction of time was also felt during this session, leading me to consider that despite shorter sessions being more appealing to participants who are not being paid a fee to participate, a longer session may have allowed certain discussions and deliberation to continue longer than they did.

6.2.5 Similarities and differences between groups

During the dialogue-based workshops, it was clear that there were several differences and similarities between participating social groups. In regards to similarities, there was a shared sense between all groups that Welsh language and employment for local people were important issues to be considered in the context of a new nuclear power development. The shared sentiment of 'jobs for local people' appeared to reveal a sense of conditional support from groups, that this was a critical issue in the positive perceptions of local stakeholders towards the development, similar to the notion of reluctant acceptance posed by Bickerstaff *et al.* (2008; *also see* Pidgeon et al., 2008). Ensuring that local people benefitted from employment opportunities linked to the development was a point which was spoken about by all four groups, and that this would also have a positive impact upon retaining and maintaining Welsh language, which was seen by many to be potentially negatively impacted by large numbers of people coming to Anglesey from

elsewhere to occupy employment posts. This was particularly discussed in the context of young people, and that the proposed nuclear development was seen as providing a key source of employment opportunities for 'the next generation' on the island.

There was also a shared skepticism regarding employment opportunities, a broad *inter-group uncertainty* as to whether these employment opportunities would be realised and available to local people and the younger generation in the coming years. Farmers were most vocal on the need to ensure that local people saw the benefits of siting a new nuclear development through the realisation of employment opportunities; this was communicated as almost a caveat for this group. Although there was evidently a shared understanding of the need to have 'the right people' in posts, given the nature of the industry and technology, there remained a desire to see Anglesey residents benefit primarily. In the case of the CTGYM Farmers group in particular, it was deemed that employment opportunities be realised by Anglesey residents *before* others. Whereas the student groups agreed that employment opportunities were important, there was a high level of uncertainty as to how many opportunities would be available to them and what form these opportunities would take. Indeed, it was communicated by both student groups that communication regarding employment opportunities and what training or skills development would be required for different roles was lacking, and that any communication on this subject should ideally be occurring at an earlier age, before decisions were taken regarding the choice of specific subjects to study (i.e. before sixth-form). The concern about a lack of communication regarding employment opportunities for a new nuclear development was echoed by many in the YSTJ Teacher group. They communicated frustrations regarding the lack of a working relationship between educational institutions and industry and the dearth of visitations by industry representatives to engage with students on potential futures in the nuclear industry and the requirements for such a career choice.

This perceived insufficiency in communication challenges prior recommendations that high levels of engagement at the local scale are required among other factors to successfully realise new nuclear build programmes. For example, a report by Birmingham University's Policy Commission (BPC, 2012) states that "the success of any major new build programme relies on the completion of the first reactor…on time and within budget and with high levels of local engagement". Such sentiments are echoed by Kemp *et al.* (2006) who emphasise the importance of fully engaging with groups at the local scale. A general sense of doubt also emerged from the school-based groups that Anglesey residents would most likely not occupy higher skilled and higher paid roles, compounded by this lack of communication as to what these jobs would entail and require of prospective employees. This deficit in both communication and engagement indicated to school-based groups that employment opportunities would be taken by other people, otherwise they would be engaging in discussions with employers as to the required pathways of personal development for potential roles. This is reflective of frustrations felt in other energy-

related and public engagement scenarios towards poor communication. A lack of meaningful engagement with local communities is an issue that has been highlighted by authors elsewhere; this is discussed by Wilson and Van Alstine (2014), as is the issue of *transparency* between industries and local communities in relation to the Extractive Industry Transparency Initiative. On the insufficiency of stakeholder engagement, Cotton and Devine-Wright (2012b) detail the uncertainty felt by local stakeholders following periods of public consultation carried out by UK electricity transmission system operator National Grid (NG), noting that they were unaware of how to respond or who to respond to following the closure of NG's public consultation window due to insufficient communication. Perceived deficits in engagement and consultation have also been discussed as reason for public opposition of projects, such as mining operations for example (*see* Carstens and Hilson, 2009). Such studies highlight the importance of engaging with local stakeholders, and of engaging in a meaningful way; this includes being transparent and ensuring that stakeholders are knowledgeable of how they may 're-engage' should they wish to. Recent work by Van Alstine (2014) discusses transparency in a plural context, arguing that transparency has the power to both inform *and* empower people. I argue that greater engagement and transparency in regards to development-related opportunities would potentially serve to both inform and empower various groups in Anglesey, such as the school-based groups discussed here. This is of particular importance given that these groups play a significant role in shaping and forming the future generation of the island's populace, and how they perceive developments on it.

This engagement deficit may reflect a perception and attitude by developers, similar to that posed by Hoffman and High-Pippert (2005), that sections of the public do not wish to engage, which might serve as a contributing factor to the seeming lack of active engagement outside official periods of public consultation. This deficit may also reflect the findings of Barnett *et al*. (2012) in their study of perceptions of 'publics' from individuals in the renewable energy industry. They find that early engagement can be viewed as wasteful given the changeable nature of information and plans during early phases of development, in that "the accuracy of information would change as plans developed" (p. 47), and that changed information can be viewed by the public as unacceptable. I suggest that in light of the findings and voiced frustrations of participants, the perceived lack of active engagement outside of official public consultation periods is contributing to feelings of unacceptability. This could lead to impacting upon their trust in the industry, the building of which is an instrumental motivation to engage in the first instance (Petts, 2008). Student groups demonstrated a partial resignation that they would probably not be the generation to realise these opportunities, but that opportunities remained to improve communication and inform younger people at this early stage. This need to understand the *requirements for employment* was also asserted by CTGYM Farmers, however the need for increased communications with young people was not discussed by the group. The findings indicate the employment of what McComas (2001: 39) has termed a "minimalist approach to public

participation" by developers and development-related officials in the form of communication and consultation. This has seemingly resulted in the expressions of insufficiency and desire for greater in-person and active engagement made the participants of this study, particularly in regards to employment opportunities and pathways to pursue and potentially fulfil these, among other issues of social priority. Indeed, the YSTJ Teachers in particular spoke of a desire to see a closer and more collaborative relationship develop between Horizon and their school. This may serve to address the uncertainty and doubt which evidently exists among participating groups, and may also facilitate the positive outcomes of stakeholder engagement (Mathur, Price and Austin, 2008), including social learning and the enhancement of local decision-making.

The potential impacts of nuclear power developments on the physical health of local residents was another issue that was raised by several groups, and as a result, the monitoring of radiation levels was a desired form of measurement by many. This revealed a *knowledge deficit* among groups as to whether there were any persistent risks from nuclear power stations in regards to increased radiation levels locally, and of any continued efforts that were being made to monitor such levels or indeed studies conducted on this subject. The only group aware of efforts being made to monitor radiation levels were CTGYM farmers, who were aware of milk testing on farms across Anglesey, but who were concerned with difficulties in accessing the results of these tests. Similar frustrations are reported by Wynne *et al.* (2007) in their study of public perceptions of the nuclear industry in Cumbria, UK; the authors report on public resentment at the perceived withholding of information about leaks and pollution-related incidents at the Sellafield site. The authors note that the perceived withholding of information in Cumbria is contributing to feelings of mistrust towards the nuclear industry, "fed by past controversies and instances of questionable management" (p. 3); this is reflected in some of the responses of the CTGYM Farmers in regards to poor communication to local residents during the Chernobyl incident for example, in addition to the perceived insufficient access to radiation testing on milk.

It also appeared that no participants from any of the four groups were aware of the published research that has been conducted, such as those by COMARE on childhood cancer leukaemia incidences around UK nuclear power stations (COMARE, 2005, 2006, 2011). These represent annual reports which are joint-produced by the Food Standards Agency and national environmental agencies[5] on radioactivity in food and the environment (RIFE) based upon UK-wide monitoring programs (e.g. RIFE, 2014; RIFE, 2015). Further research includes the published, peer-reviewed study conducted by Steward, White and Reynolds (2008) considering leukaemia clusters linked to low-level radiation in Anglesey and North Wales. This study reviewed and critiqued published, non-peer reviewed reports from anti-nuclear campaign group

[5] Environment Agency; Food Standards Agency; Food Standards Scotland; Natural Resources Wales; Northern Ireland Environment Agency; Scottish Environment Protection Agency

Green Audit on the subject, finding that claims made by Green Audit researchers on the incidences of leukaemia in these areas lacked plausible evidence to support causal claims. Indeed, Steward *et al.* (2008) state that whilst cancer clusters around nuclear installations may be reported on occasion, a definitive link between nuclear installations and these incidences has not been supported by evidence thus far, which evidently has not been widely communicated to or between residents of Anglesey:

> *"The cause of most childhood cancer is unknown, but no credible evidence has yet been found to link it to low level radiation from nuclear installations even in large multi-site studies (COMARE, 2005), although clustering may occur from other factors (COMARE, 2006)" (p. 40).*

Both adult groups discussed the potential negative impacts of increased immigration onto Anglesey as a result of a new nuclear development, which had clear links with frustrations and uncertainties surrounding the degree of local employment. Whereas the teacher and farmer groups were vocal about the potential impacts on the spoken Welsh language and community cohesiveness, the student groups were less concerned about such social and cultural impacts of incoming workers. Indeed, the student groups were more optimistic about the opportunities for young people, such as the children of incoming Wylfa Newydd employees, to learn Welsh and slowly influence their families over time, into speaking or understanding the language. Whilst there was a generalised hope that people moving onto Anglesey for development-related employment may want to learn Welsh, groups - particularly student groups - were doubtful overall as to the uptake of Welsh language courses of their own accord, and agreed that to make such courses compulsory was inappropriate and untenable. The only group that did not echo such notions of the inability to make newcomers learn Welsh were farmers. On the topic of Welsh language, a point shared by several participants from different groups was the notion of employing local people, who spoke Welsh, in order to mitigate the dilution of the Welsh language and also mitigate costs involved in educating non-Welsh speakers to learn the language. The two groups from Ysgol Syr Thomas Jones – YSTJ Students and YSTJ Teachers – demonstrated a similar perception on the potential positive impact of immigration on the future of their school, regarding both student numbers, financial investment and the possibility of the school effectively developing into a skill-base and personnel-resource for the nuclear industry through increased collaboration.

Differences were also identified between group dialogues. One difference was revealed on the subject of communication from industry in regards to public consultation opportunities. Whereas farmers expressed a knowledge of opportunities to attend events and gain more information and ask questions on the project, YSTJ Students expressed a distinct lack of awareness of local consultation events, and frustration towards this, with one participant noting their experience of

finding out about an event only by commuting through the village where an event happened to be taking place. This indicates existing procedural justice issues, or at least a potential for procedural justice issues to develop, in regards to stakeholder awareness and their ability to participate in the consultation process, and as Cotton and Devine-Wright (2011) identify, the impacts of such potential injustices, so that there is not equity in opportunities to participate or even to gain information and ask questions, are numerous and can be difficult to remedy. Another difference revealed by group dialogue was the concerns expressed by the YSTJ Teacher group in particular in regards to immigration and its impact upon community cohesion to the degree that it may create a divided community, a 'two tier' society. This notion of community degradation or division was not expressed to the same extent by other groups. Linked to this were concerns from this group on the development of worker's accommodation, as part of a proposed holiday village development in western Anglesey, and the socio-economic impact this would have in separating 'workers' from existing communities, raising issues of potential insider/outsider conflict (see Herr and Anderson, 2014). As Young (1990) notes, people in towns and neighbourhoods often possess a perception of their locale as familiar and close-knit, where people know each other, share values and lifestyles, and "relate with feelings of mutuality and love" (p. 235). The findings indicate that several participating teachers are fearful or concerned that incoming workers will potentially have a disruptive and even divisive social and cultural impact on their local communities. Young also observes that strong feelings of 'community', of a desire for or to retain communities as people know and enjoy them, can evolve into a barrier towards incomers, in what she terms the "exclusionary consequences of valuing community" (2000: 235):

"Such a desire for community often channels energy away from the political goals of the group, and also produces a clique atmosphere which keeps groups small and turns potential members away" (p. 235)

Young also argues in the same text that this common 'ideal of community' can lead to the denial of difference between people and groups which is naturally occurring – termed "the social differentiation of temporal and spatial distancing" (2000: 234) – and that commitment to this ideal, rather than valuing difference and heterogeneity, "tends to value and enforce homogeneity" (*ibid*). This suggests that there may develop a tension within these communities between incoming workers, perceived by some participants to be potentially disruptive to local culture and cohesion, and local community members who value 'the ideal of community' and wish to retain a certain degree of cultural and social homogeneity. It is recommended here that this be explored further, as to understand the potential for and effect of local migration-related impacts and the actions that could be taken to facilitate measures for integration and tolerance so as to mitigate conflicts.

Further differences were evident on the issue of mental health; YSTJ Teachers were the only group to express the significant link between employment and mental health, and the deleterious

impact of long-term and indeed 'inter-generational unemployment' (Watkin, 2010) on the mental health of local people, and indeed those in the next generation of their household, leading to what one group member termed a 'poverty of aspiration'. CTGYM Farmers were the only group who expressed concern as to the direct impact of a new nuclear development on their own working lives. This relates to the potential, as had been experienced by older members of the group decades ago during the development of the now shut-down Wylfa NPS, for people working in the agricultural sector, directly on farms or as contractors, to be 'tempted away' by opportunities associated with nuclear developments offering higher wages.

Other differences can be highlighted in regards to the practicalities of engaging with different groups. Whilst it was at times more challenging to generate dialogue with groups and discussion amongst themselves, the contributions of both student groups were both insightful and valuable. Frustrations and desires were expressed in a way which made it clear where improvements and progress could be made on specific issues, such as communication on employment opportunities and awareness of development-related public events. The YSTJ Teachers group, as expected given their occupation, saw dialogue generated and maintained with little effort, with ideas and opinions being raised and discussed with confidence, which was experienced less so with student groups. However, due to this willingness to discuss issues of importance, it was at times more challenging to manage discussions and keep discussions 'on topic'; however, this is the nature of dialogue in a group environment and of deliberation. This challenge was also met with the CTGYM Farmers group, and it was challenging, indeed to a greater extent, to maintain participant discussions within the context of the session so that did not divert to other subjects. However, this is reality of deliberative dialogue that is fluid and multidirectional, and engaging in dialogue on issues of importance to individuals. This revealed the effect of *intra-group familiarity*, so as to cause participants to be sufficiently relaxed and familiar with those individuals around them so that may be able to partake in discussions on a variety of topics, including shared experiences and knowledge. It also demonstrated the notion of communities being sites of pluralism and diversity, composed by a multitude of different groups and individuals as asserted by authors such as Chambers (1983) and Li (1996). This may not be evident in a scenario where a greater diversity of individuals was congregated, where familiarity was diluted or restricted altogether. However, I also experienced the benefits of such intra-group familiarity, in that there were rarely periods of non-discussion and group dialogue was facilitated and indeed catalysed by the experiences of that particular group in a particular setting, resulting in insights which were both area and group-specific. The key difference between groups, of a practical nature, was the expressed preference of farmers to have the dialogue-based sessions conducted in Welsh, whereas other groups chose for the sessions to be conducted in English. Welsh language was identified as an important issue by all groups, however this indicates a potentially stronger prioritisation of ensuring Welsh is spoken when at all possible. This has implications for future engagement processes, as different approaches may be appropriate for engaging with different groups

provided their differing experience and preferences for such engagement. This supports my recommendations elsewhere (Whitton et al., 2015; Whitton et al., 2016) for the implementation of a pluralist approach to stakeholder engagement to manage this diversity and engage different stakeholder groups in an effective manner. As Young (2000) asserts, difference should be celebrated and valued as opposed to being seen as problematic.

At this point, I now discuss the implications such findings may have for future processes of stakeholder engagement.

6.2.6 Implications for future stakeholder engagement and participation

Stakeholder engagement is similar to participation, in that it describes the various ways in which information, views or opinions flow multi-directionally between the stakeholders and decision-makers (Cass, 2006). Sjoberg (2003) describes stakeholders as people with special interests and concerns for a particular issue, whereas Whitton (2010) notes that common definitions consider stakeholders as a group or individual affected by a proposal or project. The stakeholders in this case are people currently living or working on Anglesey, and the proposal or project is one of a new nuclear power station built on a site adjacent to the recently shut down Wylfa nuclear power station, constructed over 40 years ago.

Taking into account the findings of the dialogue-based group sessions, I argue that future processes of stakeholder engagement on Anglesey should allocate time to identifying social groups in Anglesey and submit necessary time to engaging in dialogue with them to understand their broad social values and priorities in relation to large-scale developments on the island. This will not only highlight inter-community difference, but will also enable locally-specific details and local context to be revealed. It will also provide important guidance as to how best the impacts of large-scale developments can be managed, from those that are likely to be most affected. Thus, the outcomes of engagement prove to be more contextualised, thereby providing a more legitimate and sustainable foundation to the decisions which are informed by engagement processes. Such information can be used in a wider context, by identifying areas of priority for community development more generally, thereby utilising periods of deliberative dialogue to a greater extent than towards only a single development, process or subject.

The qualitative findings of this research have revealed core social issues that should more greatly inform and structure engagement, according to the public interest revealed by the group dialogue. This concurs with the 'face-to-face ideal' underlying traditional deliberation as acknowledged by Page (1996), and the effect of the researcher presence for establishing a rapport with participants as highlighted by Caserta *et al.* (1985), particularly when questions of a sensitive or personal nature are involved. Concurrently, the sensitive nature of the engagement subject, i.e. new

nuclear power, also warrants face-to-face engagement to be considered by engaging bodies, as nuclear power remains a socially and ethically contentious technology (Cotton, 2014).

What they have also revealed are differences in the way groups perceive the opportunities which are presented by the development of a new nuclear power station in their locality, and the impacts that may result from an energy transition from current (now old due to recent shutdown) to new nuclear. This differential and pluralistic 'public perception' of new nuclear in Anglesey warrants an approach which seeks to understand this diversity of perception in such a way that communication and engagement with local stakeholders is sensitive to group difference. The findings of this thesis support the conclusions and recommendations of previous studies such as that conducted by Venables *et al.* (2009) on local community perceptions of nuclear power in the UK, which suggests that there is such complexity in community beliefs about nuclear power that genuine, extensive dialogue regarding new nuclear developments is necessary, stating that:

> *"the "landscape of beliefs" about nuclear power in such communities is both subtle and complex, avoiding simplistic bipolar dichotomies such as "for" or "against," and that there is a need for extensive and meaningful dialogue with such communities over any new build plans" (p.1089).*

There are a number of different strategies that may be employed when engaging with the public. Bowen *et al.* (2010) provide a useful overview of the various strategies employed and indeed the different degrees to which the public may be engaged, along a continuum. In their study of community engagement strategies between firms and communities, they present the different engagement continuums of different sources, such as government, voluntary sector and corporate. By borrowing terms from the leadership and governance literature label different sections of the continuum – relative to increasing degrees of engagement, from one-way information provision, to two-way dialogue, to leadership and empowerment – as *transactional*, *transitional* and *transformative* community engagement (*see* Bass, 1990). Considering the current research and the dialogue with social groups, it appears that the engagement at present of, for example, Horizon, is both transactional and transitional, but has not progressed into transformational as the extent of engagement is currently community consultation. Referring to their dedicated consultation website, Horizon undertook a period of community consultation in Anglesey at the end of 2014, and began their next stage of consultations in January 2016; at present, these consultations aimed to gain 'feedback' to proposed plans and to 'take account of local views' (Horizon, 2016). In addition, Horizon are requesting feedback on a series of strategies developed to 'manage the identified impacts and effects' of the development, covering subjects such as community benefits, construction worker accommodation, education engagement and Welsh culture and language, for which a series of 'fact sheets' were developed (*ibid*). In their report on community participation, and in the context of public service providers and users in

community settings, Morris and Gilchrist (2011) conclude that should relationships between users and providers continue to be more transactional and impersonal, reforms by the UK Government will neither build or sustain social networks. Indeed, the authors argue that these networks hold great importance concerning their contribution to and impact upon the physical and mental health of citizens. Whilst this refers to public services, this holds value for the current study and for future strategies for engagement between local stakeholder groups and nuclear-related decision-makers, as this also impacts upon social sustainability at the local scale.

In reference to the current research, the distribution of Horizon's quarterly Community Update booklets to inform and update residents of development-related progress were acknowledged by farmers, and the opportunity to attend Horizon public meetings or events where plans could be seen, questions could be asked, and company staff could be met, was also noted by groups. However, it was also noted by several groups that information provision, reflecting the first transactional stage of engagement, was lacking and insufficient, and that more should be done to inform residents, particularly young people, of the employment-related opportunities associated with the proposed development and the skills-based requirements which would need to be met for a range of roles. Members of the YSTJ Student group contested that public awareness of public events was poor at present and that advertising should be improved, with the added suggestion that only those in the immediate locality of the meeting were aware of the occurrence of the meeting. This highlights potential shortcomings with the transactional engagement processes of Horizon, which could impact upon the ability for stakeholders to participate in transitional engagement processes, raising issues of procedural justice and fairness (*see* Fuller and Bulkeley, 2013; Paavola and Adger, 2006; Visschers and Siegrist, 2012; Walker and Eames, 2006; Walker, Wiersma and Bailey, 2014). Groups were also uncertain about health-related risks and public health-related issues associated with nuclear power infrastructure, such as local radiation level readings and recorded cancer cases, reflecting an apparent deficit in the extent of transactional engagement in Anglesey on these issues (*see* Section 6.2.5).

Informed by the literature (*see* Section 2.3), I assert that engagement can *lead to* participation, whereas participation *involves* engagement. Therefore, it is important that stakeholder engagement be pursued so that participation may occur where necessary and appropriate in regards to decision-making. Stakeholder participation is often undertaken as it is a core element to democracy, and can also be utilised to achieve a specific goal in decision-making (Abelson & Gauvin, 2006; Beierle & Cayford, 2001; Fiorino, 1990; Rowe & Frewer, 2000). When we consider developments such as new nuclear build, where, as Post-Normal Science (PNS) theory dictates, there are uncertainties in which science is unable to know or predict, we must also consider the views of stakeholders, to which these uncertainties apply in a social, economic and environmental sense. Indeed, authors of PNS theory (De Marchia and Ravetz, 1999; Funtowicz and Ravetz, 1993a, b; Ravetz, 2004, 2006) assert that the traditional 'reductionist' approach of the scientific

system, reliant on the almost exclusive knowledge of technical experts, is insufficient and should be democratically updated, and that stakeholder engagement and involvement in decisions is necessary for legitimacy and democracy to be ensured. I agree with Funtowicz and Ravetz (1993a) who promote the *collective production of knowledge*, including stakeholders and those affected by the issue at hand (Buhr and Wibeck, 2014). However, I propose going beyond this; not only should knowledge of potential social impacts, according to stakeholder priorities, be produced collectively between stakeholders and 'experts', but this should be collective of identified social groups, considering the pluralistic findings of the current research, resulting in a more *representative* and indeed *democratic* production of local knowledge for decision-making purposes. In this sense, I concur with efforts to pursue and implement theories of deliberative democracy (Habermas, 1993, 2002) through public participation and deliberation, whereby inter-subjective argumentation is promoted (Cotton, 2014), where persuasion through debate and argumentation replaces coercion (Dryzek, 2000), and where there is a move from questions of 'what' to enquires which explore questions of 'why' (Flynn, 2011). As Holden (2009) states, this is essential for supported, sustainable decisions to be taken:

"…the most reliable route to defensible and implementable solutions is through the pathways of deliberative democracy, explicitly engaging a multiplicity of communities on terms that make sense to them" (p. 444 – 445).

This is important in consideration of the fact that new nuclear build proposals are a result of national energy policy that provides support for nuclear new build on existing nuclear power sites, and not local or even regional decision-making, and are not wholly supported at the local level, despite potential distributive benefits. The local scale, and engagement of stakeholders at this level, also presents opportunities to identify and consider stakeholder preferences. As Jenks (2004) states, communities represent social systems with the ability to take into account values and preferences of community members, which is often not possible at larger scales to the same degree. The social-group approach that I propose in this thesis also takes into account the potential for increased receptiveness when engaging social groups in environments that are both convenient and familiar to them. The act of *going to* engage with these groups in places at which they may regularly gather or congregate, as opposed to *waiting for* groups to congregate in a place which is unfamiliar and potentially inconvenient, such as can be the case for public consultation or public surgery events, may impact not only the amount of stakeholders which are engaged but may also impact upon the quality of engagement which takes place.

Another key difference is the *type* of engagement that would take place in these different circumstances. There would be much greater opportunity for, and the group environment would be more conducive to, deliberative dialogue than in public meetings, which usually centre around answering local stakeholder questions and providing information via various formats

(e.g. board-mounted maps, leaflets, information booklets).

There are quite obvious and legitimate time and financial considerations here for engagement convenors to consider and manage with a group-focussed approach; I acknowledge the budgetary constraints experienced by organisations and the limitations of resource allocation. However, I argue that the *quality* of stakeholder engagement may in the long-term impact the *quantity* of engagement which is required if time and resources are expended to engage effectively in deliberative dialogue with groups. When this is done in a collaborative manner which centres on locally legitimate issues, then the need for further multiple engagement processes in the future may be reduced due to the gained understanding of community-level pluralistic priorities. If social groups are engaged through a more socially-specific approach, group priorities, values and preferences - whether in regards to engagement preferences, information needs, or development concerns and expectations – are likely to be more comprehensively understood and acknowledged. I argue that this can then inform future decisions and also potentially mitigate conflict resulting from perceived procedural injustices, which arise when individuals feel that public awareness and advertising of events are insufficient, or if events are perceived as being organised at a time or place which is inconvenient. This is particularly relevant for marginalised groups who have restricted opportunity, whether this be due to mobility issues or time restraints, to attend organised public events. By engaging social groups in group environments, I argue that a greater perceived equity of power emerges, which can facilitate more productive dialogue. Bendell (2003) suggests that for stakeholder dialogue to be worthwhile, it cannot be viewed as separate from outputs and outcomes, and as I have proposed, it "must involve a tangible sharing of power" (p. 69).

Central to this thesis is my arguement that *familiarity* plays an important role in the efficacy of stakeholder engagement. I propose that the familiarity experienced by groups, whether this be in regards to the familiarity of the venue (i.e. a common meeting place of the group) and/or of those individuals also in attendance (i.e. friends, acquaintances), can assist in developing an environment of security, safety and privacy, in which to discuss and deliberate issues which may be sensitive or personal in nature. In this sense, dialogue can occur in an environment that may be perceived as less restrictive than public, more managed events, and should occur in a manner that is highly inclusive. I propose that this may be of particular importance for groups of young people, who may have little or no experience of such engagement. Therefore, an environment or setting which is familiar may assist greatly in their engagement with new processes and people, and the presence of friends or peers may well catalyse dialogue and deliberation. Also, despite potentially having valid points to contribute, many young people may not have sufficient confidence to participate in public events, particularly in regards to speaking publicly to ask questions or raise issues in front of unfamiliar, and potentially large, groups of adults, due to their unfamiliarity and inexperience with such settings. More targeted engagement

with young people, the next generation of adults no-less, may mitigate such problems. Groups such as farmers, who work notoriously long hours, particularly at certain times of the year, may greatly appreciate opportunities to be involved in dialogue prior or following pre-planned group meetings, such as was the case in the current research due to the limited availability of free time. This applies for many other groups, special interest groups, who may meet regularly and therefore have time allocated to congregate. For teacher groups, overall, they represent individuals who are relatively confident communicators given their profession, and therefore they may possess sufficient confidence to attend more public meetings in unfamiliar settings. However, schools provide somewhat of a 'ready-made' setting for holding discussions and engaging in dialogue, given the general purpose of schools in the first instance. I suggest that this combination of confident and often articulate speakers with an existing and functional environment of learning, dialogue, and deliberation provides a highly suitable location for effective stakeholder engagement. This familiarity and functionality of group settings can therefore contribute to the foundations of effective dialogue, although there are many other critical factors, such as the identification of stakeholder/social groups in the first instance. As Bendell (2003) notes, this can be identified by stakeholder groups themselves, reflecting a further component of quality engagement as specified by the AA1000 AccountAbility stakeholder management system. This system was developed by the Institute of Social and Ethical Accountability (ISEA), a standard that focusses on issues of inclusiveness and procedures. Indeed, the AA1000 advocates 'stakeholder inclusivity':

> *'Inclusivity concerns…the views and needs of all stakeholder groups. Stakeholder views are obtained through an engagement process that allows them to be expressed without fear or restriction. Inclusivity requires the consideration of 'voiceless' stakeholders including future generations…'*
>
> ISEA (1999)

With a topic such as nuclear energy, which is highly technical, complex, unpredictable and difficult to quantify, particularly in regards to unknown social impacts, this increased aspect of familiarity for social groups may facilitate dialogue on nuclear-related issues even if subject familiarity is limited. With effective communication from experienced facilitators, it is possible to explain this information in a personable and understandable way. For nuclear-related companies and organisations, effective stakeholder dialogue cannot only be an important component for good corporate citizenship, but if conducted with progressive intentions, sustainable changes for all can be generated. However, poorly conducted or ill-intended dialogue can end result in high resource expenditure (time and finances) and counterproductive activity, mitigating trust building, social collaboration and positive corporate publicity (Bendell, 2003).

A further critical consideration relates to communication theory, and the role of public stakeholders during public engagement and the type of communication conducted between public and 'expert' agents. In their study of public engagement approaches for carbon capture and storage technology, Buhr and Wibeck (2014) detail two different approaches to communication; the *transmission* and *participatory* approach. The *transmission* approach describes an objective to *inform*, of one-way information transfer in order to gain public trust in science and acceptance for designated views. The sender is the 'expert', and the public are passive recipients with non-active roles. Conversely, the *participatory* approach promotes *learning* through multi-directional dialogue, where both experts and lay public have active roles and are considered as co-constructors, sharing experiences, social framings, and local and contextual framings, where the objectives are to include a range of views and not only develop mutual trust but also to facilitate ideals of deliberative democracy. Provided the nature of nuclear power, considering its persistent issues of scientific uncertainty, technological complexity, and social sensitivity, and considering the post-normal science position that there also exists associated ethical and value-related considerations, a participatory approach, incorporating deliberative dialogue, is considered to be appropriate. However, there may exist a rationale for employing the transmission approach to communication periodically when pluralistic group priorities and information and communication needs are understood in the future, and specific information can be communicated to group sources.

My experience during the current research demonstrates that there exists sufficient diversity among social groups in their levels of knowledge and social priorities to indicate the value of an approach that promotes mutual learning and invites multiple perspectives. I therefore argue that groups be engaged in early-stage dialogue to enable their engagement and communication needs and preferences to be understood, whilst understanding their social priorities and therefore the range of subjects which they wish to know more about. As Buhr and Wibeck (2014) note, the participatory approach may be considered suitable to local communication due to its ability to incorporate local factors, although the suitability of both approaches is dependent on various factors, such as dialogue objectives or the conviction of individuals. I acknowledge that there exists the possibility for conflict to emerge during participatory dialogue, as multiple perspectives are involved. However, the social-group approach may present an opportunity to mitigate this, due to the congregation, to a degree, of familiar or similarly minded individuals. I also suggest that high reliance on the transmission approach to communication may lead to *greater* conflict, if local stakeholders are not provided with sufficient opportunity to discuss issues of personal or local importance, and gain answers and understanding through deliberative dialogue. To rely on the transmission approach is to risk perceptions of public persuasion and 'information for acceptance' manifesting among public stakeholders.

Based upon my experiences, I argue that there may exist a need for both transitional and participatory approaches to stakeholder engagement, in the form of an *integrated* approach. There

exists a knowledge deficit at present among all groups for different subjects and social issues, however one which is shared by several is the uncertainty of radiation-related health risks from nuclear power stations. As previously noted, peer-reviewed research on cancer-related clusters in Anglesey and North Wales does exist, and whilst it is a specified important issue to three of the four groups (*YUB Students, YSTJ Teachers and CTGYM Farmers*), awareness of its existence appears very low within participating social groups. Thus, I argue that this should be rectified in the interests of enabling informed dialogue. Information of this nature might be made known or communicated to Anglesey residents as part of a transmission approach with the aim of solely informing them of its existence, but due to its sensitive nature and the technical nature of the information itself, it is proposed that this would better communicated to stakeholders as part of a participatory approach. Information could be communicated in less-technical terms, the research and findings could be discussed, and learning could take place between 'experts' and public stakeholders, thereby addressing the knowledge deficit and developing knowledge which would then be communicated to others outside the engaged groups.

Such an approach is informed in part by the substantive argument of Fiorino (1990), relating to the value of lay judgements in decision-making. The co-production of knowledge is an outcome of collaboration which has been highlighted and supported in the literature (e.g. Breukers and Wolsink, 2007), and has been proposed as important and appropriate when facts are uncertain and decisions are urgent (Funtowicz and Ravetz, 2003a), such is the case where the social impacts of energy developments are considered. In a similar sense, it has been argued that co-produced knowledge is more likely to represent sustainable knowledge (Clark and Dickson, 2003). Such an approach does not serve to resort to traditional approaches of 'educating the public' in order to simply communicate the science and therefore garner public acceptance. Rather, it is communicating information to stakeholders that relates to an identified issue of priority but which they may not be aware exists, and communicating it through dialogue-based methods, so that stakeholders gain a genuine understanding of the work which has been undertaken and of the current position on a particular topic. Information should be shared where it is available, but this should not solely be through one-way delivery; rather it should be discussed with those that have identified its subject as a social priority, with the aim of social learning and addressing long-standing uncertainty, questions or misconceptions. This responds to recommendations in the literature which assert that in order to access knowledge which is tacit and shared between individuals at the community level, through both observation and personal experience (Gertler, 2003), "in-depth, experiential, and participatory techniques" (Catney et al., 2013: 516) are required.

For stakeholder engagement processes in Anglesey, the research has demonstrated that unlike for other areas in the UK, acknowledgement of the importance and use of the Welsh language is of critical importance; the significance and importance of the Welsh language to residents of Wales, particularly Welsh speakers, has been acknowledged by various scholars (Cloke et al., 1997; Day,

2002; Nguyen et al., 2013). This relates to engagement materials, correspondence, and conduct of stakeholder engagement itself. Failure to acknowledge this may lead to issues during stakeholder engagement, with dialogue potentially being affected or even limited, with issues of mutual respect becoming relevant in such cases. Other issues of key importance, for different groups, will only be identified and understood through participatory and dialogue-based engagement. Welsh language may represent a core issue of importance and priority for many groups, but provided the number of social groups that exist on Anglesey, there may be several other core issues that are shared by certain groups, which engagement based upon information provision and answering questions, such as is the case with Public Surgery events for example, cannot realise. The importance of Welsh language and in the ability to converse in Welsh where desirable was realised during the current research study. This was also acknowledged during another research process in which I was also involved during this research period (see Appendix 1), that of the Generic Design Assessment (GDA) Public Dialogue Pilot for the ABWR, the proposed reactor for the Wylfa Newydd development in Anglesey (*see* Whitton et al., 2016; Appendix 23).

6.3 Research Question Set 3

Which social issues are prioritised, by each group, for the purpose of early stage sustainability indicator development, and reflecting upon the process, how does this inform future indicator development processes?

Based upon the findings of two dialogue-based group sessions for each social group, four group-specific indicator sets (GSISs) were developed (Table 39, p. 269-270). The value of these indicators lie in reflecting the social priorities of groups from which these indicators could, in collaboration with stakeholders groups, be developed into functional indicators for use in technological assessment; in this case, for the social sustainability assessment of new nuclear power stations.

The four GSISs detail a total of 32 indicators, only five of which are shared by more than one social group (*see* Section 5.3.6), reflecting a degree of inter-group commonality on social issues as shown by the following:

- *Number of Anglesey residents employed directly by the development*
  (YUB Students, YSTJ Students and CTGYM Farmers)

- *Number of development-related employment opportunities for Anglesey residents*
  (YUB Students and YSTJ Teachers)

- *Number of people moving onto the island for development-related employment*
  (YSTJ Teachers and CTGYM Farmers)

- *Number of school visits by nuclear industry – development and employment information*

  (YUB Students and YSTJ Students)

- *Road traffic activity during development periods*
  (YUB Students and CTGYM Farmers)

The findings show that whilst there may exist a degree of priority alignment between some social groups within a given community, in the context of a new nuclear development there exists evident differences between social groups on several social themes. For instance, the following themes are of importance to several groups to varying degrees, but not to every group, reflecting broad social themes of concern and priority:

- local employment and training opportunities;
- impacts on Welsh language;
- improved engagement between the nuclear industry and local residents (particularly young people) on employment; training, and development-related topics;
- impacts of immigration of development-related workers (i.e. non-Welsh speakers) onto Anglesey;
- health impacts related to radiation, and;
- impacts on road traffic on Anglesey.

This indicates a local pluralism in regards to social priorities, and specifically in this case in regards to the development of new nuclear infrastructure on Anglesey. Such pluralism warrants an approach to future indicator development that appreciates that a rural community such as Anglesey is constituted of a multitude of values, needs, preferences and priorities. If this is ignored, it could lead to social assessments of a large-scale, dimensionally complex development such as Wylfa Newydd measuring social aspects and impacts that hold relevance to a small proportion of the populace, catalysing perceptions of illegitimate assessment and potentially unjust decision-making. This echoes the pluralistic assertions of Pidgeon (2011) of 'nuclear communities' and also those of Young (1990) on the importance of recognising group difference. Not only this, but Young posits that recognizing and embracing these differences which exist between social groups is critical in realising social justice. In the context of this study, this social justice also translates into *energy justice*. In order for assessments and decisions associated with large-scale, multi-impact infrastructure developments to be recognised as socially just, whether they are deemed as nationally significant infrastructure projects or 'socially and ethically contested technologies' (Cotton, 2014), they must recognise and reflect the multi-dimensional priority structure of social groups which exist within local communities.

Rawls (1971) states that justice is the first virtue of social institutions; by this assertion, processes of assessment and decision-making which take place within the social institutions of communities, and deal directly with a plethora of social impacts and considerations, must demonstrate such justice in order for those processes to prove virtuous. More recently, Bickerstaff *et al.* (2013) argue that energy justice is not only a critical component of low-carbon transitions, such as Anglesey is currently experiencing, and which nuclear is referred to as being crucial in the delivery of (DECC, 2011), but is a key underpinning component of a sustainable energy future. This refers of course not only to current but to future generations, and therefore,

acknowledgement of the priorities, which this study also indicates are not uniform, of young people representing 'the next generation'. I recognises here the work of Agyeman *et al.* (2003) and Agyeman (2013) on 'just sustainabilities', which recognises the critical link between a just society and one which is sustainable. I echo this in the sense that energy developments are part of and can contribute towards developing sustainable societies. I propose that for new nuclear developments to constitute a sustainable society in Anglesey, indicator development processes and social assessments must acknowledge intra and inter-generational social difference in order for them to be considered 'just', and that decisions must similarly reflect this social pluralism to attain procedural justice.

Butler and Simmons (2013) assert that within a UK context, nuclear power is framed in such a way that limits the attention paid to justice-related concerns, and fails to engage with justice issues related to low-carbon transitions. I suggest that justice-related concerns are treated in a way which limits engagement with the complexity of issues which exist with nuclear transitions, these issues will then not be addressed by energy system development processes "in ways which commensurate with their implications" (p. 157).

In this context, I argue that the pluralistic complexity of local communities must be acknowledged in order for process (e.g. sustainability indicator development, technological assessment) to be deemed socially just. This also applies for decision-making to be legitimate and sustainable, and for broader 'energy justice' goals to be realised. This is based on the notion that normative assumptions towards 'public priorities' and of what 'local people' care about are inadequate and do not acknolwedge intra-community social and cultural differences. Epistemologically, I conduct research from an *interpretivist* position regarding sustainability indicator development. This recognises the subjective realities of local stakeholders and their different conceptualisations of 'sustainability', particularly in regards to a large-scale technological development that impacts people in such different ways. In this sense, I agree with the notion that social phenomena cannot be understood without exploring subjective realities (della Porta and Keating, 2008) and revealing the meanings and interpretations (Walliman, 2006) of different social collectives, as this study has sought to do.

My research is informed by the work of authors such as Butler and Simmons (2013) and Bickerstaff *et al.* (2008) on the *framing* of nuclear power. I argue that in conjunction with greater attention towards justice-related concerns, those engaging with the public on nuclear power should do so as part of a wider energy narrative whereby nuclear power is framed as one energy generation technology of many. This does not contest but rather looks to progress the recommendations of industry bodies such as the Nuclear Industry Council who in recent years have proposed the strategic development of a "consistent nuclear narrative" (NIC, 2014: iii). By doing so, the justice concerns of energy systems and energy infrastructure more broadly can be addressed in a collective manner, particularly in places such as Anglesey where the energy

landscape is constructed of several energy technologies worthy of such consideration and discussion. Similarly, I argue that sustainability indicator development should be a process which is conducted for all energy technologies in a specific locale should they exist or be proposed, and not solely nuclear energy. As a result, local groups and communities could understand the impacts of *all* energy infrastructure (and indeed the role of different technologies in interconnected *energy systems*) in their area that might impact upon their lives, according to their specified issues of social priority, thus determining the social sustainability of the wider energy landscape. This would contribute to a broader understanding of and progression towards 'energy justice', as opposed to solely 'nuclear energy justice'.

I argue that not only can the processes of indicator development generate meaningful tools of assessment for nuclear power developments, but that such processes also hold value in their ability to identify the differential perceptions of social groups towards the same development. This can be utilised as a tool for engaging stakeholders on the potential impacts and implications of nuclear developments, at a level of specificity that is often uncommon in nuclear-related public engagement, whilst retaining stakeholder priorities at the centre. As a result, outputs may be deemed as more locally legitimate and reflective of local circumstances. The process of sustainability indicator development is one that has the potential to be beneficial in terms of social and collective learning, but caution must also be employed so as to ensure effectiveness and fairness of procedure. The current research has developed several indicators and indicator sets that serve to highlight differential group priorities, which has the potential, provided further indicator development, to inform nuclear decision-making and ensure greater social value of decisions. However, the current research process demonstrated that this process requires time and further collaboration with local stakeholders to realise deployment-stage maturity of indicators. The main limitations and challenges experienced during this process are discussed in greater detail in Chapter 7, in conjunction with recommendations for future research and practice. However, I propose that the social pluralism demonstrated by group's social priorities also highlights a need to engage with groups in differential and context-appropriate ways to effectively develop such indicators. The results indicate that stakeholders in Anglesey and Wales more generally, due to cultural specificities, may need or prefer to engage with organisers or facilitators differently to other stakeholder groups in the U.K. This may be particularly important for assessments of 'sustainability', particularly those social in nature, as they may likely to encounter socially and culturally unique or localised criteria, whilst also identifying issues of group commonality.

I reflect on the study of Carrera and Mack (2010) here, and their development of social sustainability indicators for the assessment of various energy technologies. As the authors propose, not only can indicators developed in a discursive process, such as occurred during the current research, be robust, particularly when developed between experts and stakeholder groups

as they did, but they are also more likely to demonstrate utility in the long term and be accepted by others stakeholders. The same case is made here; not only can indicator development assess whether a development is socially just, but the sustainability of the indicators themselves in enhanced when developed as part of a discursive and collaborative process between multiple stakeholder groups of varying ‘expertise’.

6.4 Research Question Set 4

What are the implications of the research findings for public stakeholder engagement and decision-making at the local scale? How do they inform a public stakeholder engagement and dialogue strategy for nuclear decision-making?

This section examines the findings of the research and discusses how they contribute to an understanding of public stakeholder engagement and decision-making at the local scale in Anglesey. This section also brings together research findings with both literary and personal considerations on themes and issues raised by these findings, in order to conceptualise a public stakeholder engagement and dialogue strategy. This is done in the context of nuclear power developments, and thus, nuclear decision-making, at the local scale. I do not discuss notions of national decision-making and national stakeholder engagement, but rather consider local stakeholders who are more likely to be *directly* impacted by the development of new nuclear infrastructure.

The findings of the current research have highlighted that there is considerable uncertainty among participants, whether this be in regards to details of the Wylfa Newydd development itself or in regards to the social implications of the development for local residents. Therefore, I argue that due to such uncertainties, dialogue with these stakeholders in the future should be both deliberative and exploratory, to enable both stakeholders and engagement convenors to understand the expected impacts of the development and the expectations and perceptions of locally impacted groups respectively. I also argue that the face-to-face ideal of traditional deliberation (Page, 1996) should be pursued and utilised, particularly at the early stages of engagement with these stakeholders. I propose that the sensitive nature of the subject of engagement – nuclear power - warrants face-to-face engagement to be considered by engaging bodies (*see* Caserta et al., 1985), considering that it remains a technology contentious in both social and cultural respects (Cotton, 2014).

The research findings also demonstrate the existence of local knowledge which could be utilised to inform and enhance decision-making at the local scale (*see* Beierle, 2002; Breukers and Wolsink, 2007; Fiorino, 1990; Perhac, 1996), an example of this being the experience of CTGYM Farmers of the development of current Wylfa NPS and some of the challenges faced by the local community at that time. YSTJ Teachers also spoke of a desire to be involved and engaged as they had experience in planning and thinking strategically as was required in their profession. The findings also reveal the differences which exist between groups in regards to social priorities and perceptions of how such a development could affect them and their community, which I argue warrants a more participatory approach to engagement with these groups to understand these

differences in order to respond to and manage them. In this context, the participatory approach described by Buhr and Wibeck (2014) becomes relevant, and transitional engagement, or even transformational engagement, lies at the centre of community-level communication, depending on the level of collaboration (Bowen et al., 2010). To gain greater understanding of the complexity of communities and stakeholder group priorities, it is proposed that a participatory, dialogue-based approach which places stakeholder priorities towards the centre of stakeholder deliberations will facilitate mutual learning, whilst understanding pluralistic social concerns and sources of potential conflict. In reference to the GDA Public Dialogue Pilot process (see Appendix 1), there were found to be several similarities between the socially orientated priorities of GDA process participants and participants in the current research. The social issues mentioned/highlighted as important in both processes by participants were:

- Training, upskilling and employment of local people
- Incoming workforce, and housing of incoming workforce
- Impact of nuclear power stations on local public health
- Impact of development on road infrastructure (bridge construction)

Considering these, it is evident that local employment and public health are common priorities for stakeholders participating in both processes, with development-related immigration and impacts upon roads and road infrastructure also being mentioned by a number of stakeholders between the two processes. This indicates that there exists a core of social issues that are likely to arise during stakeholder dialogue processes in or near to Anglesey. This may also indicate that there are several key issues for which it would be important to not only inform stakeholders of decision-making relating to these issues, but that such decision-making may well be made more sustainable if a more participatory approach was undertaken. This would involve local stakeholders in not only defining important issues at the local scale but also in deliberating and developing solutions, so that they were locally legitimate, relevant, and more likely to be supported by stakeholders in the long-term

The GDA Public Dialogue Pilot process is a recent example of where a dialogue-based approach has been employed in practice, and facilitated through a dialogue between workshop attendees ('stakeholders') and facilitators ('experts'). This in part (as a significant portion of the workshops were in the form of expert-delivered presentations) reflected the type of dialogue proposed by Innes and Booher (2004) which is essential for effective engagement practices, that of multi-directional communication exchange between involved parties. In addition, the *context*, *relevance* and *tailoring* of messages within dialogue were all points identified as important from Round 1 workshops (3KQ, 2015; Whitton et al., 2016), supporting the pluralist approach to engagement. Dialogue has been found to be particularly important within the field of energy generation, especially in regards to large-scale infrastructure. For example, Cuppen *et al.* (2010) assert its pluralistic value in their study of biomass technology developments in the Netherlands:

'. . . in order to deal with complex environmental issues, structured stakeholder dialogues are needed that map out and articulate the various perspectives – values, interests, knowledge claims and underlying assumptions – that exist with regard to the issue' (p.579).

This articulation of perspectives that Cuppen *et al.* (2010) speak of is a foundational component of the aims of objectives of this thesis. Not only is dialogue able to articulate stakeholder values and perspectives, but it can also identify stakeholder preferences, in regards to stakeholder dialogue itself. I have posited previously the importance of dialogue, including its potential penetrative impact upon development acceptance:

"…dialogue is a central component of public participation and its success or failure can dramatically alter the publics' perceptions of fairness, trust and inclusion, which in turn can impact upon support or acceptance of a development or industry"

(Whitton et al., 2015: 131).

The findings of the dialogue which research participants were engaged in have implications for both stakeholder engagement and decision-making processes in the future. To reiterate, dialogue is not only a central component of this thesis, but is also critical for any social strategy of engagement and decision-making which is to involve a two-way flow of information and exploration of positions, ideas and experiences. As I state elsewhere, it plays a central role in effective decision-making:

"Improved dialogue between industry and stakeholders can significantly impact upon the quality of decision-making (Webler, Tuler and Kreuger, 2001), demonstrating a more democratic decision-making process"

Whitton *et al.* (2015: 127)

I have previously argued that dialogue, as a central part of public participation, is "essential to any notion of social sustainability" (Whitton et al., 2015: 129), and I echo this in reference the current research; the role of dialogue for democratic engagement and effective, sustainable decision-making to be achieved is clear. As Rossi (1997) asserts, dialogue or 'rational discourse' is central to deliberative processes, and is based in notions of Communicative Reason and Rationality, as proposed by Habermas (1984), reflecting *successful* communication.

6.4.1 Reasons for a dialogic approach

Based on the research dialogue experiences with social groups in Anglesey, I find the dialogic approach effective and appropriate as part of an integrated approach to engagement, particularly for

nuclear-related processes, for several reasons.

Firstly, it enables group priorities to be explored in a way that is not possible solely through qualitative methods. Group-based dialogue with each of the four groups enabled social priorities highlighted in during the quantitative-based stage of the research to be discussed with participants, and for nuclear-related concerns to be expressed more clearly when the framing topic was introduced in the first group session.

Secondly, it is an appropriate form of communication when exploring and discussing subjects of a sensitive or controversial nature, such as nuclear power. The group-based dialogue enabled participants to share experiences and voice concerns, which enabled group members to converse on matters which they may not have otherwise, enabling other participants to realise that their concerns or position may be shared by others, and in some instances, gaining answers or knowledge on particular issues for which they had questions or concerns. Dialogue also possesses a transformative quality, which is valuable in instances where complex (technically, socially, culturally, environmentally) subjects such as nuclear power are being discussed; Rowe and Frewer (2005) propose that "the act of dialogue and negotiation serve to transform the opinions in the members of both parties" (p. 255-256). For nuclear-related discussions, when experts and public stakeholders come together to discuss issues of priority or concern, dialogue can lead to both parties engaging in mutual learning and understanding the positions of the other in greater detail, helping to mitigate conflict. In addition, the dialogue with each group identified not only that different priorities existed between groups, but it also provided an insight as to the values, sometimes shared, supporting these priorities. For future engagement strategies and decision-making processes, such value-based knowledge is important and constructive; it enables positions to be understood and priorities to be de-constructed and viewed from a different perspective. For example, dialogue with both student groups revealed not only differing priorities, but also the different experiences that informed student positions.

Thirdly, dialogue enabled familiarity to develop between myself and the participants, which facilitated the development of rapport and the communicative flow of the dialogue itself. This was particularly felt to be the case in the sessions with the YSTJ Teachers and CTGYM Farmers groups, and particularly in the second group-based sessions. The importance of familiarity has also been found by the recent GDA Public Dialogue Pilot process, particularly for building trust (see Appendix 1; *also see* 3KQ, 2015; Whitton et al., 2016). Whilst this was considered a positive, facilitative result of dialogue during the short-duration sessions of the current research, I am mindful that in longer-term research projects, this familiarity may increase to a point where it could begin to impact upon the interactions between researcher and participant. However, this was not deemed an issue for the current research.

Finally, the dialogue with each group highlighted a number of different challenges when engaging with different groups. These included challenges in generating dialogue between young people

who lack experience in this form of group communication, on an unfamiliar topic, and challenges in managing group discussions between farmers, who possess both strong personalities and a wealth of experience to draw from in comparison, and ensuring that dialogue remains focussed on the outlined central themes. The value of facilitation of dialogue-based experience cannot be under-estimated in these instances, if the dialogue is to be manageable, fair, effective and ultimately 'successful' for all parties involved.

A dialogic approach to engagement, particularly one that is to engage sensitively given the subject matter of nuclear power or SECTs more generally, was also supported by the findings of the recent GDA Public Dialogue Pilot process (*see* Whitton et al., 2016). The official report from the process (3KQ, 2015) suggests that personal interaction with stakeholders will not only enable effective communication, through deliberative dialogue using a variety of formats, but that it will also facilitate the building of trust. This is proposed to be crucial if the information being communicated is to be taken as trustworthy and based in truth, and whether further engagement is likely; it is unlikely that if trust is not built between both parties that further communication will be effective. Numerous authors have written of the significance of communication in influencing trust (Pellizzone et al., 2015; Poortinga and Pidgeon, 2008; Renn and Levine, 1991), whereas Gambetta (2000) proposes that cooperation requires mutual trust between parties.

More collaborative stakeholder engagement presents opportunities to both convenors and engaged communities, and opportunities for both corporate and democratic gain. Indeed, I suggest that even the term 'stakeholder engagement' becomes less appropriate when discussing multi-directional communication between different actors of this nature. This synthesis of expert-based technical knowledge and locally based knowledge reflects the generation of knowledge through processes of deliberative dialogue and critical communication. This may be encapsulated by the term *deliberative knowledge generation*, which in reference to the work of Bowen *et al.* (2014) would be positioned between both transitional and transformational engagement, and representative of the participatory approach outlined by Buhr and Wibeck (2014). The move towards more deliberative and collaborative knowledge generation to understand and respond to energy transitions collectively certainly holds social and sustainable value. Underlying this are the goals of procedural and social justice and to enable decisions to reflect more accurately the priorities of those individuals who will experience associated changes in more tangible ways, now and into the future, ways in which more distant populations will not. In addition, a more inclusive and collaborative approach, as supported by authors such as Breukers and Wolsink (2007) in regards to energy policy decision-making, where local resources and assets are valued and utilised, could contribute towards enhancing social capital (see Kilpatrick, Field and Falk, 2003; Putnam, 2000; Whitham, 2012) and social inclusion (see Oxoby, 2009; Smith, Bellaby and Lindsay, 2010) at the local scale.

This is also supported by the findings of the GDA PDP (*see* Appendix 1; Whitton et al., 2015), whereby participants from Anglesey and nearby areas voiced interest in utilising 'local resources' for future engagement. They also discussed the potential for local people to assist with engagement processes throughout the local area following their involvement in the process, given what they had learnt. I posit that the process also revealed a diversity among stakeholders in regards to engagement preferences; whilst some participants desire more information on nuclear-related subjects and wish to engage, others do not wish to participate and are happy to receive information passively or seek out information themselves, reflecting the bracket of 'transactional' engagement proposed by Bowen *et al.* (2010). This reflects the diversity found in the current research between participating groups. Therefore, I further argue that this social pluralism found at the local scale warrants a pluralist approach to stakeholder engagement. On this point, I have previously stated that "one size will not fit all, and a mix of communicative approaches is required in order to reach and communicate with various stakeholder groups" (Whitton et al., 2016: S34). Stakeholder engagement must be socially effective and it must be democratic. Therefore, it must also be appropriate and diverse where necessary; as I also state elsewhere, any communication with local stakeholders should appreciate the individuality of communities and site-specific circumstances (*ibid*). I argue that there exists a sufficient diversity of social groups at the local scale who share different (potentially complementary but potentially conflicting) preferences, both inter and intra-generationally, to warrant this more diverse approach, in the interests of democratic legitimacy, procedural justice and social sustainability.

I have argued that community-level social groups hold a diverse range of social priorities, which together are representative of the local community in which they reside. I conceptualise communities as sites of pluralism as do others (e.g. Chambers, 1983; Li, 1996) and I therefore reject any conceptualisation of 'the public' as a single or socially homogenous entity which can be engaged with in a uniform manner. I argue that such thinking is unhelpful in efforts to make engagement more effective, for both the 'engaging' and 'engaged' parties, and potentially damaging in regards to building sustainable relationships. I propose that it be applied to nuclear decision-making in an effort to improve social awareness, help create a greater understanding of social impacts of nuclear-related developments, and, in turn, the social sustainability of associated decisions. In the context of nuclear developments and surrounding communities, such an approach is necessary if decisions are to reflect local diversity, and therefore, the potential multiplicity of impacts from nuclear developments. Pidgeon (2011) states that within these 'nuclear communities', there exists "a diverse set of publics" (p. 2); it is these different publics within the large public body of "local society" that such a strategic approach to engagement and decision-making seeks to access and reach. By understanding these different groups within nuclear communities, there diverse values, priorities, and preferences may be understood, so that more informed and more legitimate decisions can be made, which are inherently therefore,

more sustainable. It should also be noted that for Anglesey, an island which through the EIP is undergoing several energy-related transformations – reflecting a *pluralistic energy transition* – the label of 'nuclear community' is becoming less relevant and accurate to describe Anglesey, as nuclear power constitutes only one dimension of Anglesey's energy profile; it is more accurate to imagine Anglesey, in part, as an *low carbon energy community,* which shares characteristics common of nuclear communities, such as marginalisation, both geographically and politically.

The research findings demonstrate that there exists significant differences between social groups on several key social themes, but also that they deem other key issues to be of similar importance or unimportance. According to the quantitative data, some issues are deemed relatively unimportant, whereas other issues are deemed very important by all or a majority of groups, albeit to different degrees. Responses on other social issues indicate a common mid-table conceptualisation of issues of 'mid-importance'. I find that such differential group priorities reveal the pluralism of communities and support arguments for a more diverse approach to stakeholder engagement to reflect this (*also see* Whitton et al., 2015; Whitton et al., 2016). This looks to place greater importance on the priorities of stakeholders (*see* Turcu, 2013) as opposed to relying on the presumptions of 'experts' and decision-makers in the technocratic sense.

The development of a socially strategic approach to engagement and decision-making is also a response to the evidenced desires of communities and stakeholders to become more engaged and involved in decision-making processes associated with large- scale developments. These are known to potentially impact upon the complex socially, environmentally and economically-constituted fabric of society (Bronfman et al., 2012; Doukas et al., 2011; Shamsuzzoha, Grant and Clarke, 2012). This comes at a time when the public becomes more attentive and responsive to energy choices, after decades of energy policy institutions operating out of the public eye, with limited public involvement (Miller, Richter and O'Leary, 2015). Transitions in socio-energy systems produce wide ranging social impacts across communities, leading to both social protest and conflict surrounding energy policy decisions (*ibid*), further supporting a shift to approaches that incorporate local decision-making. The need for such a strategic approach has been identified in the literature; Pidgeon and Demski (2012) assert that understanding the different characteristics of places, and how places are constructed by those who live there, is of critical importance in understanding response patterns to large-scale infrastructures. An approach that seeks to understand places through a social approach, indeed in this case a social-group approach, seeks to understand its social structure and its internal social mechanisms, and utilize this to develop more strategic engagement processes with local communities. Greater understanding of the social characteristics and function of places, it is proposed here, will lead to decisions that are both considerate of local characteristics and are more likely to be supported by the social groups who see their preference and priorities considered, acknowledged, and reflected. Similarly, Batel and Devine-Wright (2015) suggest that both public support and policies

for infrastructural deployment may be impacted by an approach which enables greater understanding of public responses in different places. In order to gain such differential understanding requires a strategy appreciative of difference in the first instance and one which enables deliberation of these differences in an equitable manner and environment, i.e. an environment in which one group is not at an clear advantage in regards to their familiarity with the location, which may impact upon power dynamics.

However, the critique of the dialogic approach is that the interplay of power and emotion dynamics could impede deliberation, and that the resulting dialogue could be seen as idealism. It is posited by van Stokkom (2005) that deliberative processes, particularly those to inform policy, do not meet the ideals of equality and rationality ideals on every occasion, finding that "an interplay of power and emotion dynamics that can aid or impede deliberation" (Whitton et al., 2015: 129) may sometimes exist behind such ideals of ongoing rational dialogue between equal participants. A distinct problem with the deliberation model is the assumption that decision-making can be studied and considered as a rational, cooperative process. In dealing with complex agents such as human beings, such assumptions are founded upon idealism, and are therefore highly questionable. Indeed, empirical evidence in research literature contradicts such assumption by indicating that people's unique nature and interdependence contributes significantly to increasing uncertainty, creating incomplete information and different interpretations of actions and decisions (*ibid*). However, Whitton *et al.* (*ibid*) argue that "active competition among ideas is a requisite for improved decision-making" (*ibid:* 131). Considering this, a strategic approach to stakeholder engagement and dialogue must integrate deliberative capacity, whilst appreciating the interdependence of local stakeholders, the diversity found between social groups and the potential for power dynamics to mitigate the development of collaborative solutions, on either an individual or group level. This also takes influence from the work of Habermas (1970, 1987), who asserts that good participation must be fair and competent. It is proposed here that such afore-mentioned interplays of power and emotion dynamics during deliberative processes can impact upon both the fairness and competence of participation, and therefore, whether such a process may be ultimately determined as 'just'.

On justice, Rawls asserts that laws and institutions, if found to be unjust, should be reformed or abolished, 'no matter how efficient and well-arranged' (1971: 3). I argue that this should similarly apply to decisions, and indeed engagement and decision processes also, mindful that their impact - particularly at the local scale - is potentially significant for present and future generations. I question the demonstrable justice and effectiveness of traditional nuclear 'consultation' processes whereby participating local residents feel powerless or resigned to pre-determined futures, as we have seen from a number of the current study's research participants. This is compounded by perceptions that *their* perceptions of justice in regards to the impacts of large-scale developments such as nuclear power infrastructure in their locality, considering that

they represent the body of individuals likely to experience the acute impacts of these developments, are not adequately explored or taken into account. Thus, a strategic stakeholder engagement approach should involve deliberative dialogue demonstrative of procedural justice, fairness and competence. It should also seek to understand stakeholder conceptions of justice in the context of development-related decision-making, contributing to decisions that are as a result viewed as just by impacted communities or groups. Decisions of this nature have the opportunity to contribute to local sustainability efforts, mindful that public participation and dialogue is critical in social sustainability pursuits (Whitton et al., 2015).

This research has identified the value of dialogue, indicating that multiple perspectives can be understood and that there is also a potential for mutual learning as subjects and issues are discussed in a deliberative manner and experiences are shared, in this instance within a public and group setting. Public deliberation, which Gastil (2000) describes as "discussion that involves judicious argument, critical listening, and earnest decision making" (p. 22), facilitates discursive participation, which holds value for democratic efforts and the pursuit of sustainable aims. As Delli Carpini, Cook and James (2004) posit, "public deliberation, then, is the process through which deliberative democracy occurs", and deliberative democracy plays a central role in realising social sustainability, particularly at the local scale. According to the work of John Dewey, *full* deliberation involved "a careful examination of a problem or issue, the identification of possible solutions, the establishment or reaffirmation of evaluative criteria, and the use of these criteria in identifying an optimal solution" (Gastil, 2000: 22). I argue that this must become an integral part of stakeholder engagement and decision-making strategies for nuclear and broader energy developments. This must involve a collaborative examination of developments between various stakeholder groups, utilisng deliberative dialogue and co-developed evaluative criteria (i.e. indicators) to identify locally legitimate solutions and sustainability pathways.

For the deliberative dialogue I propose in my strategy to be legitimate, it must involve, at all stages, those stakeholders who are to be directly impacted by the focal issue, and for the outcomes of this deliberation to be sustainable, they must be locally recognised and legitimate. Hence, it is appropriate and necessary that social groups in Anglesey be involved in deliberative dialogue regarding NNB in their locality. Stakeholders should also be able to decide what course of action is acceptable or appropriate, and indeed what communication is appropriate, such as bargaining (*see* Bohman, 1996), particularly in cases where there is the potential for stakeholders to experience numerous negative impacts as a result of an unelected scenario. It is for stakeholder groups to decide whether bargaining is appropriate or not by deliberating the case, in the same way that Habermas (1996) suggests that it is for citizens to deliberate when and where bargaining is an appropriate dispute resolution method. Agreeing with Chambers (2003), I promote deliberation within a stakeholder engagement strategy. Debate and discussion must be facilitated to allow for reasonable and well-informed opinions to form. Central to this strategy, there should be a willingness for stakeholders to listen to others and revise their preferences, as a result of

deliberative dialogue and the presentation of new information, claims and experiences shared by fellow stakeholders. I argue that the aim of such a strategy should be the *legitimacy of outcomes* as opposed to necessarily achieving consensus.

The potential benefits of a more strategic approach to stakeholder engagement which targets social groups are numerous. In addition to decisions being perceived as just, as a result of more comprehensively understanding local conceptions of social justice, early-stage (in regards to development timescales) and targeted engagement can facilitate an understanding of both group and, collectively, common community priorities. This could potentially reduce the number of consultations and engagement processes that are required within an area, and thus, mitigate the on-set of 'consultation fatigue'. This is particularly relevant where multiple energy developments are planned to be developed within a relatively similar period. My findings resulted from group-based sessions of less than an hour in duration each, aiming to 'fit in' to the schedules or lifestyles of public stakeholders and to be time-effective within this short time spent with groups, by focusing on their priorities for the duration. In contrast, the workshops of the GDA Pilot Public Dialogue process were much longer in duration. They demonstrated the potential to discuss and deal with questions on a wide range of topics, including approaches to future engagement, by spending several hours participating in dialogue with local stakeholders. The two processes, whether short or long in session duration, reflect the ability of local stakeholders to contribute important knowledge to discussions, some of which dealt which complex or technical concepts. I propose that these two research experiences demonstrate the value and potential in dialogue-based engagement with local stakeholders, and, in the case of the current research, the relatively low cost of such engagement, particularly relative to the potential informative outcomes and opportunities for co-learning, facilitating familiarisation with topics and personnel, and linked to this, trust building. This link between familiarisation and trust is reflected in the findings of the GDA Pilot Public Dialogue process in particular, because of baseline questioning.

The development of social sustainability indicators during this research, whilst being of value to the sustainability assessment of a new nuclear development over the long term according to the issues of priority of local public stakeholders, can also serve as an informative and directional tool of stakeholder engagement. Similarly, in their EU-based, social sustainability assessment of various energy technologies, Carrera and Mack (2010) highlight how the discursive process undertaken to develop these indicators, involving energy experts and stakeholder groups, assisted in reinforcing the utility and acceptance of the indicators. Valentin and Spangenberg (2000) note that community sustainability indicators can be utilized to develop visions of sustainable societies, to be used as compasses to direct people towards an intended scenario. I argue that sustainability indicators can direct those involved in stakeholder engagement as to the areas of greatest importance for different social groups within a locality and improve the *relevance* of engagement to local stakeholders. As I have shown, indicator development enables stakeholder priorities to

be explored and a proposed nuclear development to be discussed in the context of these differential priorities. The result is the identification of group-specific themes and issues which reflect their values and concerns, and which future stakeholder engagement can be steered by. In this sense, the process of sustainability indicator development with public stakeholders informs the process of stakeholder engagement.

In addition to informing stakeholder engagement efforts, the group-based dialogue from which sustainability indicators were developed highlights areas of potential social conflict and social opportunities with different groups, which are linked to perceived risks and benefits respectively (*see* Section 5.2). By deliberating with social groups as to the long term impacts of a proposed development, and therefore discussing notions of sustainability and societal well-being among others, it can be determined which groups should be engaged on specific issues, whilst highlighting key areas influencing conditional support for future developments.

I have previously argued that new and plural forms of dialogue are required if not only public support, but public consent for developments "are truly sought by government and other decision-makers" (Whitton et al., 2015: 132). If this public consent is denied or not attained, then this potential for societal opposition and conflict will increase and risk delaying these nationally important projects. However, I also suggest elsewhere that infrastructural politics in the U.K. is currently undergoing a 'deliberative U-turn' (Whitton et al., 2015), which predicts the reversal of the 'deliberative turn' observed by Dryzek (2000) at the turn of the millennium when more dialogue-based engagement and deliberative processes emerged surrounding planning decisions. This is a reversal that seeks to return more decision-making powers to the Secretary of State, and potentially removing opportunities for local communities and stakeholders to participate in dialogue on NSIPs, which may influence planning decisions. This may pose a threat not only to opportunities for more effective, dialogue-based engagement and decision-making processes, particularly in the context of social sustainability at the local scale, but to opportunities for greater local democracy also. This risks a dismantling of the increased perceptions of fairness, inclusion and trust, and therefore the support of stakeholders, which dialogue-based approaches can assist in fostering. I argue that rather than revert towards traditional approaches such as DAD (Decide-Announce-Defend) which place decision-making primarily back into the hands of elites and experts who are often detached from local circumstances and realities, more inclusive approaches such as EDD (Engage-Deliberate-Decide) should be pursued (*see* Theaker and Yaxley, 2013). The Environment Agency are an example of one UK organisation adopting the latter approach (*ibid*). I suggest that the nuclear industry in the UK learns from the experiences of such organisations to enhance their approach to local decision-making and ensure greater sustainability at the local scale and the achievement of more robust and supported solutions based on a more comprehensive understanding of local circumstances.

In summary, it is argued that dialogue must play a significant and central role in future nuclear-related stakeholder engagement and decision-making processes. I propose that this dialogue should extend from 'public' scale to 'social group' scale, so that the diverse, plural perspectives found at the community scale can be articulate, and priorities can be understood in greater detail. The research findings have wider implications for both public-facing engagement and communication materials, particularly for communicating technical or complex subject matter. Rather than employing a broad-brush or uniform approach to engagement, it must be conducted appropriately according to local context and also the stakeholder audience (Whitton et al., 2016). Engaging stakeholder groups at the local scale provides more opportunity for decision-making processes to explore and understand the complexity of 'the public' and respond accordingly. I argue that this is particularly important when developments are in their early stages of planning, so that early decision-making processes are locally informed and understanding of local context. However, this should be done on a participative or collaborative basis, whereby affected stakeholders are not kept at arms length from decisions that affect their lives, often in significant ways. I propose that stakeholder dialogue, which must be deliberative to allow concerns and ideas to be suitably discussed, be part of a mixed-methods approach. This enables quantitative findings to be explored, and for stakeholder responses to be deconstructed. For stakeholder engagement and decision-making to be democratic, there must be opportunity for democratic communication to take place with interested parties, a requirement which is facilitated by periods of deliberative dialogue with stakeholder groupings. Therefore, in the following section I detail my strategic proposition to action these arguments for progress in nuclear stakeholder engagement and decision-making, although its relevance and application extends beyond this specific technology.

6.4.2 Stakeholder-group Dialogue Strategy

In this section I propose a conceptual strategy for nuclear-related stakeholder engagement and decision-making, which is based on multi-stage deliberative dialogue and a group-based approach. The *Stakeholder-group Dialogue Strategy* (SgDS) (*see* Figure 25) details a process of engaging with stakeholders in a manner that identifies and explores stakeholder priorities through dialogue-based methods, such as face-to-face engagement in environments familiar to that group. This reflects recommendations I have made previously (Whitton et al., 2016), and integrates recommendations proposed by Habermas (1984), that communication must be competent but also fair for it to be considered successful and effective, reflecting the intentions of engaging in dialogue in environments which are accessible and familiar to groups. The strategy is informed by Habermas's concept of the *ideal speech situation* (1989), whereby stakeholder dialogue should take place in familiar communicative environments in which people feel comfortable and enable people to participate, deliberate, discuss and debate constructively, respecting the contributions of each participant and allowing each participant to contribute should they wish to. In this sense, I

also assert that participation and engagement should be conducted on a voluntary basis. It was experienced during this research that some people wish to contribute less than others, and do not have the same desire for engagement as others may do. Therefore, engagement opportunities should be present and available to all who wish to take them up, including young people who represent the next generation of the adult population. However, I do contest the notion of *the* ideal speech situation. Rather, I refer to the pluralist nature of communities highlighted by this thesis in arguing that principles for effective, fair and constructive communication between groups and individuals should be developed which is flexible and able to be adapted and tailored depending on the audience and their needs and priorities.

Engagement with social groups to understand their preferred methods of communication and engagement and their issues of greatest importance and priority is also recommended to ensure that engagement and 'stakeholder dialogue' is as effective as possible. Therefore, decisions made as a result of information gained from such engagement processes are more procedurally just. I propose that time which is spent engaging in processes of familiarisation, trust-building and gaining an understanding of stakeholder group priorities earlier in the process can also save both time, costs and consultative repetition at later stages. I propose that the strategic dialogue be initially informed and facilitated by research and expert studies in conjunction with exploratory community dialogue, so that the process is supported by a collaboration between academia, industry and communities. Collaboration is promoted by scholars such as Breukers and Wolsink (2007) in regards to energy-related decision-making for various reasons, including enhancing the quality of projects and the legitimacy of processes and outcomes. This collaboration should also include stakeholder engagement professionals at its core, particularly for reasons of ensuring procedural fairness and process quality.

The SgDS is informed by the research methodology detailed in this thesis, which was based on a process of *identification* (of social groups), *establishment* (of group priorities), *clarification* (of social priorities in context), and *understanding* (of group priorities and how these inform sustainability efforts). It is based upon the notion that quality decisions are taken through open, constructive argumentation and communicative action between project officials and local stakeholders (Papaioannou, 2012), and looks to move beyond consultation towards greater deliberation, dialogue and participation (*ibid*; *also see* Rowe and Frewer, 2005). The SgDS proposes a series of dialogue stages, each of which involve reflection (*blue curved arrows*) on the previous stage to assess and potentially modify or improve practice for future engagement stages, which involves ongoing communication with participants as to their experience and preferences for engagement and participation. In this sense, several participants engage in a mutli-directional exchange of information and knowledge (Innes and Booher, 2004; Robertson and Choi, 2012), as part of a multi-stage dialogue with opportunities for reflection between stages, as

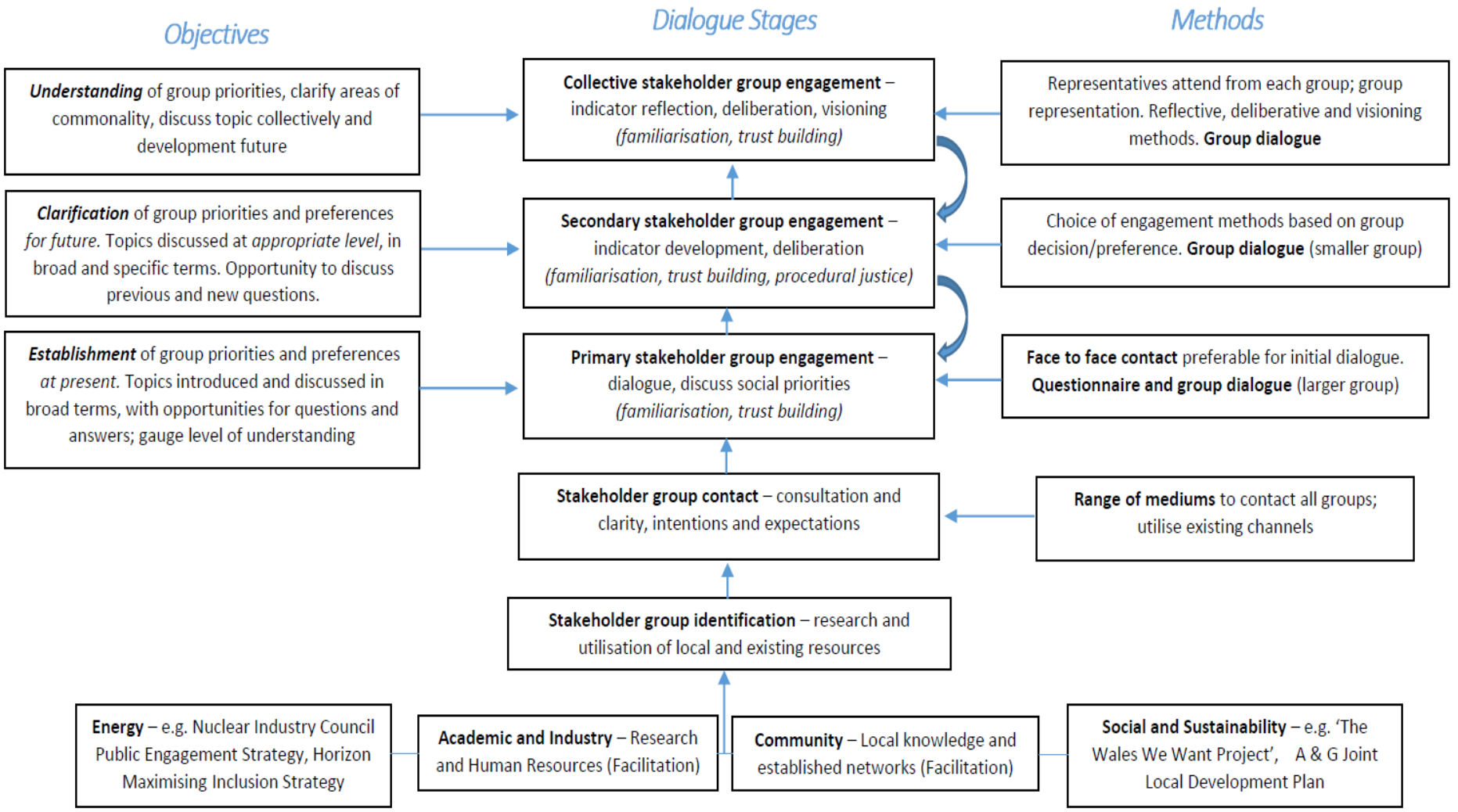

Figure 25. Stakeholder-group Dialogue Strategy (SgDS) for social sustainability indicator development and nuclear decision-making

is common in Action Research (McNiff, 2013). As a result, the consideration of all information provided by equal contributors facilitates the achievement of collective solutions (Beierle and Konisky, 2001), in order to enahnce decision satisfaction and acceptability among local stakeholders (Robertson and Choi, 2012).

In the first instance, information from a multitude of sources is brought together by facilitators in a collaborative and exploratory process to identify current positions on a variety of subjects and information on relevant topics. I propose that in the interests of procedural justice and neutrality, the processes is facilitated by a collaboration between academic and local community facilitators, with continued input from industry agents where detail and clarity is required. Local community facilitators are important actors in the initial identification of social groups and communication with these groups, due to reasons of local knowledge, trust and familiarity. A multi-stage process of dialogue is conducted by this facilitation team, utilising a mixed method, multi-format approach to engagement which seeks to appropriately engage with a range of social groups, identify social priorities, and explore these through the three engagement stages of the process. The SgDS is concerned with engaging social groups to enable them to *inform and co-develop* stakeholder engagement processes in order for citizens to gain from them, and not only those bodies who traditionally 'do' public engagement. The identification of the most appropriate methods and formats of communication, as has been experienced during the GDA Public Dialogue Pilot process, enables stakeholder engagement to be more targeted, and then for knowledge development with groups to be effectively facilitated. This multi-dimensional strategy is based upon an ontological platform of social constructivism, acknowledging social and group difference; different social groups will conceptualise issues and concepts and construct knowledge in different ways, based upon their own experiences, as will the individuals forming these groups.

Therefore, I argue that a singular and uniform approach to community-level stakeholder engagement is inappropriate. The existence of a pluralistic 'public' supports the case for a pluralistic approach to communication and engagement if procedural justice and efficacy are to be realised. Stakeholder co-development *of* the process, with facilitators and experts, and co-learning *from* the process, with facilitating individuals and experts, are important elements of the strategy in order to ensure procedural justice and fairness are maintained throughout. This also facilitates both the building of *familiarisation* and *trust* between local stakeholders (local experts), industry (technical experts) and academia (research experts). Not only is it proposed here that familiarisation facilitates trust-building and cooperative potential, as a result of the findings of this research and those of the GDA process, but it has also been stated in the literature that trust is a central factor in successful human decision-making (Greenberg, 2014; Sidorstov, 2014; Sovacool, 2014b; Stern, 2014). For trust, being founded on the concepts of values and competence (Greenberg, 2014), familiarisation serves to enable outside experts and facilitators

to better understand local values on which priorities and concerns are based, but also for local stakeholders to experience the competence of outside experts. Therefore, this participatory approach allows trust to build for and towards all participating parties, thus enhancing the sustainability of the strategy overall.

The process is concerned with engaging specific groups in the earlier stages of decision-making to explore group priorities, but then seeks to bring groups together in the final stages to enable perspectives and positions on issues to be shared, and for mutual learning to occur between groups. Multi-group discussion of social priorities and perceived impacts of nuclear developments is undertaken in this final stage, with visioning techniques utilised to facilitate dialogue and the development of visions of a sustainable future at the local scale that takes into account group priorities. Areas of commonality and difference between groups are revealed and discussed, but are respected in accordance with notions of group difference (Young, 1990).

This strategy is developed based on notions of justice as fairness and communicative action as proposed by Rawls (1971) and Habermas (1984) respectively. All stakeholders should be considered equal and have equal opportunity to contribute, with participants seeking to coordinate their actions by reasoned argument and cooperation through deliberative dialogue. The strategy aims to go beyond traditional 'stakeholder engagement' which is often limited to 'consultation', in that it incorporates co-development and co-learning between participating actors. In developing the strategy from an Action Research position, it is critical that those who are resident within the locality and are identified as interested stakeholders participate fully in the process, both in facilitation and during all engagement stages. This provides them the opportunity to visualise their own futures, determine their own visions of and criteria for social sustainability within their own communities, and seek action according to these self-determined preferences. The current research has demonstrated that the development of sustainability indicators can not only articulate criteria for the local determination of a development's sustainability, but that it can also serve as a method of engaging stakeholders in a deliberative and cooperative manner. The approach places local citizens towards the centre of decision-making and engagement processes associated with developments such as nuclear new build, which can significantly and pluralistically impact current and future generations.

Implementing a social strategy to stakeholder engagement presents an opportunity to more effectively inform decision-making for nuclear power developments, because of a deeper and pluralistic understanding of local communities; of the social groups that constitute them, and the social priorities that are held by these groups. In conjunction with more participatory processes involving public stakeholders, who through the current and GDA research processes have demonstrated capacity to engage in deliberative dialogue on numerous and complex issues, it is proposed that decision-making processes may be more democratic and deliberative, and that as a result, decisions are more locally informed, legitimate and sustainable as these

developments, which are multi-scalar and multi-dimensional in their impacts, progress.

7.0 Limitations, Challenges, Contribution and Future Research

This chapter details the limitations of, and challenges experienced during, the current research process. Within these sections I will reflect on both practical and theoretical issues encountered, and how the research is limited in its enquiry. I then propose the contribution of this work to the wider literature. The chapter concludes by suggesting avenues of future research by which to continue this line of research and other directions in which I or other researchers could conduct further study.

7.1 Limitations of research

This section will detail several key limitations of the current research. However, these do not reflect the only limitations of the current study. The limitations below will be addressed in this order within this section:

- Amount and diversity of participating social groups
- Number of groups engaged within a specific social group bracket
- Extent of indicator development process

7.1.1 Participating social groups – amount and diversity

The research process sought to engage several social groups in Anglesey in order to identify and understand differences in social priorities should they exist. I initially identified several social groups on Anglesey that might be suitable for contact and participation in the research process. Due to the research approach adopted– an Action-oriented approach – the notion of researcher positionality was a factor that informed my decision to contact and seek the participation of social groups that I have previously communicated and conducted research with. Three of the four eventual participating groups – student groups from two high schools (Ysgol Uwchradd Bodedern - Bodedern High School, and Ysgol Syr Thomas Jones – Sir Thomas Jones School) and an agriculturally-focussed group (Cymdeithas Tir Glas Ynys Môn – Anglesey Grassland Society) – were contacted in regards to the research, as were a group of teachers from Ysgol Syr Thomas Jones who had not been engaged previously for research purposes. However, for this group the same individual was contacted at the school as had been contacted during previous research (Head of Sixth Form) to discuss the research and potential involvement of teaching staff. Due to the multi-stage mixed-methods approach devised, it was deemed that four social groups would provide sufficient and adequate empirical data for the purposes of the study, and that four groups would result in 12 data sets to analyse, reflective of one quantitative and two qualitative stages of the approach conducted with four groups. The selection of these groups also enabled the comparison of two pre-adult and two adult groups, and considering that young people

are rarely involved in public engagement or local decision-making processes (*see* Hart, 2009; Larkins, 2014), as discussed in Section 2.5.1, this was considered to be important, particularly provided their given status as 'the next generation' of Anglesey-resident citizens.

Whilst comparing responses from four groups, this study only takes into consideration the views and priorities of a very small sample of the social groups that exist on Anglesey. There are numerous other social and special interest groups which are active or present on Anglesey, and the inclusion of other social or special interest groups may have provided the research with greater and more diverse comparative data from which to derive observations and conclusions on the differential social priorities of the 'Anglesey general public'. However, as has been noted in earlier chapters, several other groups were contacted in regards to their interest in participating in the research process, to which I received either no responses (Wales/Anglesey Young Farmers), polite declination (protest group 'People Against Wylfa B' - PAWB), responses of initial interest but eventual apology due to busy schedules (Women's Institute), and responses stating initial interest but insufficient interest from other group members (Anglesey Food Group – Gorau Mon). These groups, similar to the teachers group, had not been involved in my previous research, and so researcher positionality was much less of a factor when communicating with these groups. This may well have played a factor in a lack of progress with these groups, as did group schedules and acquiring group interest adequate enough for participation at the same level as other groups, demonstrating that despite its importance, having the ability to converse in Welsh with Anglesey residents is but one factor in being successfully engaging social and special interest groups and gaining interest during recruitment. This limitation also highlights the potential advantages of a single stage research process, such as conducting only quantitative research utilising a single survey or questionnaire method, which may prove more accommodating to the restraints of group members in regards to availability or time, which becomes a factor in multi-dimensional processes. These groups may have responded differently to the proposal of a shorter and simpler methodology and process, but due to the my intentions of seeking greater detail and therefore understanding of social priorities and criteria for determining the social sustainability of a potential nuclear development, through group-based dialogue, such a simplified methodology was not appropriate. To this point, Patel, Doku and Tennakoon (2003) note that participants are unlikely to take part in research unless they are able to identify with the research and understand its validity and relevance to them, which could also explain the reluctance of some groups to participate, particularly the Anglesey Young Farmers and the Gorau Mon groups. The authors also suggest that potential participants 'presumably' conduct a "personal cost-benefit analysis" (*ibid*: 234) when they are deciding whether to participate, for which some of the costs may include time, financial and inconvenience costs (*also see* Lindenberg et al., 2001), which reflects the feedback from the Women's Institute on their reasons for not participating in the research.

Reproducibility of the research (i.e. the extent to which consistent results are obtained when produced repeatedly (Casadevall and Fang, 2010)) is one challenge which may be encountered if the research was conducted in locations outside Wales, provided the partial focus on Welsh language and culture within the research questionnaire. Reproducibility is a particular challenge in social research and that conducted at the local scale, due its specificity on local conditions and experiences, and the fact that social systems are dynamic and complex systems whose responses to questions may differ depending on external factors and life experiences. Social studies at the local level have received criticism for many years; Stacey (1969: 137) details several arguments against 'locality studies':

1. they are mere description;
2. they are works of art, idiosyncratic and non-replicable; therefore,
3. they are of no use to a science which must be based on the comparative method;
4. they are committed to a holistic approach to sociological theory; and
5. they abstract from empirical social reality at a point where such abstraction is neither feasible nor useful.

Difficulties in the reproducibility of social science research has been noted in the literature (*see* McNutt, 2014). Unlike the degree of reproducibility (i.e. occurrence of phenomena under different conditions) or replicability (i.e. ability to run identical experiments to obtain identical results) which is possible in the biological sciences (e.g. Casadevall and Fang, 2010), it is extremely problematic to attempt to conduct multiple tightly-managed social experiments in recreated and regulated conditions, with the aim of achieving the same outcomes. Indeed, in experimental science, it is stated that reproducibility may be the most important issue for authors and reviewers alike, being described as "a bedrock principle in the conduct and validation of experimental science" (*ibid*: 4972). This being said, the value of locality studies remains in the social sciences, particularly those that do not depend on a single data type from which to determine conclusions. For example, Feilzer (2010) discusses the limitations of utilising survey or poll data in isolation (*also see* Osborne and Rose, 1999), noting their inaccuracies in relation to participant interpretations of scale-response (e.g. Likert) questions, and stating that the research's value is lessened by such data-based restrictions.

This could be addressed at least in part by the replacement of these questions with 'local culture and conditions' lines of enquiry, which could look to explore local circumstances and conditions but without a focus on 'language'. However, in areas with significant cultural and/or ethnic diversity, language may remain as an important issue for local residents. In the case of the current research, the research questionnaire was developed in-part utilising social categories from the work

of Turcu (2013) which had been tested in various locations across the UK, and in-part incorporating categories from a Local Development Plan to ensure local legitimacy. This being said, it is argued by scholars that local or community-level research is both important and necessary, as the nuances of localities are of great relevance to complex infrastructure projects that are to exist in an area for several decades. For example, Weingaertner and Moberg (2011) note the necessity of "context-specific information" in "practical applications" (p.1). Others such as Eames and Egmose (2011) have conducted highly localised sustainability studies in the UK (Islington, London), which has served as one of the strengths of the research, particularly for the identification of sustainability goals. I argue that in the context of social science research, unique circumstances and conditions exist in most places, and in order to serve as legitimate and informative research, these particularities must be highlighted and explored by researchers. I argue here that for research to contribute in any way to understanding local change, it must first work from the context in which that change will occur. This is where the social and natural sciences differ; differences exist and should be valued, as Young (2000) has argued. I propose that similar approaches and methods (e.g. scaled statements of importance, ranking exercises) can be utilised by researchers in different locations, but that ultimately these should be adapted to accommodate the unique context of a researcher's field of study. Otherwise, a locality's characteristics may be misrepresented or diluted in the name of reproducibility. I propose that mixed-methods are rather conducive to reproducibility in social science research, often more so than methodologies based on gathering a single data type, due to the opportunities to explore answers in greater detail, whereby the unique context and specificities of the study location may emerge.

7.1.2 Sufficiency of groups within social group bracket

Three social group brackets were involved in the current research process; young people (under 18), educators, and farmers, with two different groups being included from the former bracket. This was done to address a potential perception that young people may all prioritise very similar issues due to a lack of social experiences and maturity, which is historically suggested as a reason for their lack of general social inclusion in wider societal processes (*see* Section 2.5.1). I do not suggest in this research that the results from these participating groups reflect the priorities, values or social needs of other similar groups, of other agriculturally-related groups, of other groups of educators on the island, and indeed other groups of students or young people on Anglesey. This research only provides a brief 'snapshot' of the social profile of the social bracket in which the group may be considered; indeed, the Priority Profiles developed in this research provide only an indication at this point of what the priorities of other groups in the same social bracket may be. In order to provide greater detail and clarity to the results presented here, more farming or agricultural groups, more teacher groups, and more groups of young people must be engaged with. This would enable a greater insight to the pluralistic social profile of Anglesey, and indicate the degree of diversity that exists among 'Anglesey residents' and local communities. For example,

there are three other main secondary/high schools on Anglesey, and so there are other opportunities to understand not only the social priorities of 'Anglesey sixth-form students', but of young people on Anglesey in general. As I state in Section 2.5.1, young people are a valuable group to involve in decision-making for various reasons, and are also a group which is important on Anglesey due to issues of the out-migration of young people (*also see* Marshall and Simpson, 2009) and resultant 'brain drain', an issue highlighted by the YSTJ Teachers group during this research. For the social group approach which I propose in this thesis to be effective in the long-term, numerous groups within specific social brackets need to be engaged in order for an accurate 'social group profile' to develop. Also, the issue of groups which span more than one social bracket must be highlighted, as within diverse communities this may be common. For example, members of teachers groups may also be members of protest groups, whilst members of student group may also be members of a local young farmers group. This issue is further complicated by the process of anonymization which was employed in the current research; this mitigates being able to identify which individuals span multiple groups, whose multiple-group responses may influence single-group results.

7.1.3 Extent of indicator development process

A process of social sustainability indicator development with participating groups was employed, reflecting upon group-based dialogue to establish criteria to inform further development of indicators to assess the social sustainability of a new nuclear power development on Anglesey. In this sense, criteria were developed to be citizen-focussed, locally relevant and context-specific, and thus intended to be "easy to collect and interpret for communities" (Reed, Fraser and Dougill, 2006: 406). The criteria were established from group-based discussion of a series of criteria presented to participants during the third and final sessions of the research process. They were not developed explicitly with participants in a workshop environment, but were developed *by* myself, and *based upon* and *developed from* specified group priorities. This takes from the approach of Reed, Fraser and Dougill (2006) who propose an *integrated approach* to indicator development which acknowledge the roles of "participatory approaches setting the context for sustainability assessment at local scales" and of "expert-led methods in indicator evaluation and dissemination" (p. 406).

Their development was also conducted according to arguments in the literature which state that reasoned resolution requires the acknowledgement and inclusion of different perspectives (Dryzek, 1990), and that the participation of the target audience in developing indicators is more likely to result in the target audience appreciating and therefore using them (Bell and Morse, 2003; Rydin, Holman and Wolff, 2003). I argue that such integrated approaches, whereby expert and lay groups working together equally, are more effective than predominantly top-down or bottom-up approaches in ensuring the development and application of legitimate indicators. Such

legitimacy is in accordance with local priorities, legitimate in accordance with sustainability literature, and legitimate in regards to their applicability in 'the field'.

However, for such sets of criteria to become applicable in the field, they must undergo further development, over long timescales and through further consultation with other stakeholder groups. I propose that this is necessary for the indicators to become more "scientifically rigorous" (Reed, Fraser and Dougill, 2006: 406). This was not appropriate for the current research, nor would it have been possible given the nature of the study and this being only one aspect of the research. The complexity of indicator development warrants the involvement of several parties, including individuals who are experienced in their development and application, experience that I am yet to gain.

As Parris and Kates (2003) note, indicators are selected to assess progress towards or away from a stated goal, a stated goal which I propose has not been sufficiently articulated by the present study and requires broader input from a greater number of participants. However, this may evolve and emerge in time with further social group engagement and stakeholder collaboration on indicator development. This limitation of the current study provides a point of commencement for future study, from which these initial criteria can be utilised as source material for wider dialogue on sustainability indicator development, either with the same group, with other social groups, or with local decision-makers.

Also, the lack of experience and unfamiliarity of 'sustainability indicators', and the notion of 'sustainability' itself, meant that attempting to develop indicator sets beyond this identification stage would not have been possible or appropriate, particularly given the duration of group-based sessions. In addition, the small number of participants engaged with from each social group to identify these preliminary social criteria has meant that whilst being indicatively representative, these indicators are not comprehensively representative of the social groups they are associated to. Therefore, more young people/students, teachers and farmers from across Anglesey must be engaged in order to test whether these indicators are representative of wider group priorities or whether they require revision, in the interests of quantitative legitimacy.

7.2 Contribution to Knowledge

The research contributes in several ways to academic knowledge and stakeholder-orientated practice, which are discussed below in the context of practical, theoretical and methodological contributions.

Practically, I have made contributions to the areas of engagement strategy and sustainability indicator development. I propose a strategic approach to engaging with local public stakeholders in the form of the Social-group Dialogue Strategy. This has been informed by my experiences

during this Anglesey-based study, and from my involvement in the recent GDA Public Dialogue Pilot process. Not only does this respond to calls from the academic literature for more qualitative and constructivist-focussed research to better understand societal responses to energy infrastructure (Batel et al., 2013; Ellis et al., 2007), but also to calls from the nuclear industry in the UK to improve public engagement and dialogue practices in order to better understand public perceptions and responses to nuclear power as a low-carbon technology, which remains socially and ethically contentious (Cotton, 2014). The research has also sought to answer more historic calls to researchers which I would argue are still yet to be sufficiently addressed, at a time when they remain highly relevant. For example, Chen and Mathes (1989) stated the need for understanding the complexity of technical problems by understanding the values, interpretations and understandings of various interest groups:

"What is needed is a means of defining the problem and the related issues in such a way that reflects its complexity as well as the various values of the multiple interest groups involved. Such a means would recognize that various persons and groups have different understanding of the problem, different interpretations of the possible solutions, and different values for evaluating those solutions" (p. 112)

Through a mixed methods approach, I have gathered both quantitative and qualitative empirical data. This research data, particularly that gained from deliberative dialogues, is able be utilised in future discussions with decision-makers, stakeholders and policy-makers. Boyko *et al.* (2012) states that deliberative dialogues have the potential to address challenges faced by policymakers and stakeholders when using research evidence. The authors highlight two issues in particular in this sense, noting that "research evidence is not always relevant in terms of the issues decision makers face and that research evidence is not always easy to access, use or translate into action" (p. 1939; *also see* Dobbins, DeCorby, & Twiddy, 2004; Lavis et al., 2005). In response, Boyko *et al.* (2012) present three solutions to such challenges that deliberative dialogue provides:

1) utilising research findings to inform discussions;

2) enabling discussion participants to "discuss, contextualize and determine" (p. 1939) what the research evidence suggest according to their relevant knowledge and experiences; and,

3) providing discussion participants with timely and useable information.

I argue that the information gathered during this study satisfies all three conditions as proposed by Boyko and colleagues, in that the data gathered and interpreted by this study is highly relevant to local conditions and current projects, provides further context and detail questionnaire data, and is representative of different groups and generations. Therefore, I argue it is suitable to be used by either decision or policy-makers, or stakeholders, to inform future discussions and

decision-making processes on the subject of new nuclear developments in Anglesey. I have provided translation of sessions conducted in Welsh, which might have been difficult for non-Welsh speaking individuals to utilise without translation. I argue that this information is not only valuable to nuclear-related processes, but also for other large-scale projects in Anglesey where local and social impacts are likely.

In addition to this proposed engagement strategy, I have developed multiple social sustainability indicator sets that reflect the social priorities of different social groups in Anglesey. There is a dearth of energy and social science research on Anglesey, despite the vision of Anglesey County Council to develop into an 'Energy Island' and a global demonstrator of multi-technology low-carbon energy generation. This research represents one of very few studies of Anglesey in this context, and therefore provides a significant contribution to better understanding local stakeholder perceptions of large-scale energy infrastructure and proposed developments on the island, and their perceived social impacts. This knowledge can then be utilised to learn from and inform future public stakeholder engagement processes on Anglesey with a social or energy-related orientation, particularly nuclear energy. In addition, identified social priorities of these different groups provide direction to future researchers exploring the potential areas of greatest social impact from nuclear energy and other socially and ethically contentious technologies (Cotton, 2014).

Whilst I do not claim that the participating social groups were fully represented by the study, such as 'Teachers' for example, provided only a sample of individuals from each group, the indicators not only serve as a tool with which the sustainability of new large-scale energy developments could be measured over time, in accordance with stated issues of local importance, but also as an indication of the pluralism which exists at the local scale in regards to inter-community social priorities and of the priorities of a number of groups. These indicators, and indeed the researcher-developed Priority Profiles for each group, possess the function of informing future processes of local stakeholder engagement, highlighting the issues that each group may wish to engage in dialogue on or, as highlighted by several groups in this study, greater information provision than what is currently made available in the first instance, to address persistent uncertainties. The approach undertaken, in engaging with each group independently to determine group-specific criteria for sustainability, contributes strategically and procedurally to future indicator development processes. Each group is engaged with in familiar environments, spaces that they commonly or routinely occupy for social purposes, in a manner that is accommodating and convenient. This is based upon considerations of procedural justice and fairness, of ensuring that procedures are transparent, inclusive, fair and ultimately just, which contributes more widely to energy justice, a growing field of study in energy and social science research (Bickerstaff, Walker and Bulkeley, 2013; Sovacool and Dworkin, 2014; Sovacool, Sidorstov and Jones, 2013). As Jenkins *et al.* (2016) propose, procedural justice is closely associated with

stakeholder engagement, and concurrently, the current research contributes by highlighting, with reference to the GDA Public Dialogue Pilot process to support this, "the ways in which decision-makers have sought to engage with communities" (p. 175), and community responses to and perceptions of these engagement practices, whilst also highlighting the possible existence of injustices and feelings of being ignored by decision-makers and developers, the latter being felt particularly by the school-based groups. Recent publications on these subjects (Whitton et al., 2015), such as procedural justice, stakeholder engagement, and indicator development in the context of large-scale energy infrastructure, and on the GDA Public Dialogue Pilot process (Whitton et al., 2016) also reflect my literary contributions made during this PhD period to the literature and to academic knowledge.

Finally, the research contributes to knowledge on the broader societal perceptions of new nuclear build in the U.K., on the perceived impacts of these developments on communities and local culture, the potential opportunities to local residents and the likelihood of realising these, and the implications of potential impacts on future generations. The research indicates issues that are prioritised by several groups, albeit to different extents, which serves to inform future processes of stakeholder engagement and public dialogue by the nuclear industry, but also to the energy industry more broadly, given that similar impacts can result from other large-scale energy infrastructure. The research indicates factors and issues that could influence support or opposition of future developments, which if managed and addressed effectively, may transform issues of difficulty into areas of opportunity.

Theoretically, the research has demonstrated further that communities are not homogenous, but are complex and pluralist social entities that must be treated as such in order to begin to gain any level of accurate understanding of the variance in values, needs, expectations and priorities held by their members or residents. This concurs with previous scholars on the subject of inter-community pluralism and contributes further to this work by providing empirical data that highlights this within a rural community setting in the U.K., and more specifically North Wales. This provides a useful reference point and empirical resource for the further exploration of inter-community difference, which is valuable to any organisation of group who intend to engage with this or a similar social collective to discuss their perceptions, opinions or attitudes towards proposed energy developments, particularly within a social context. On engagement theory, the research contributes to knowledge on not only stakeholder priorities and community difference, but also to knowledge on how future engagement strategies should be operationalised within a community setting, and the heterogeneity of engagement to address social pluralism. I argue this can potentially affect the overall effectiveness, both perceived and actual, of stakeholder engagement processes.

Concerning concepts such as energy justice and just sustainabilities, the research contributes to current knowledge by highlighting those areas of social life at the local scale which may most

significantly influence the realisation of energy technologies or systems which are just. This is detailed through empirical data on the pluralist social priorities at the community level, in the context of community-level energy impacts, and the pursuit of social sustainability, that ensures justice and equity for current and future generations at the local scale. The engagement and contributions of both adults and young people during this research has provided data to inform such efforts, whilst also highlighting potential societal challenges to achieving such long-term aims.

Methodologically, the research has highlighted the value of Action-oriented research for such socially exploratory means, for gaining an accurate understanding of local circumstance, local issues, and local priorities for current and future generations of community residents. The multi-stage process employed in this research process has enabled several social groups of significant demographic variance in Anglesey to contribute knowledge to the research process, having the opportunity to discuss personal experiences and views and also listen to and learn from other group members. The broader benefits of Action Research include the detailed diagnosis of a problem, reflection, and eventual remediation of this problem to improve practice (Manley and Shaw, 2002; McNiff, 2013), and the mutual understanding of issues so that more informed action can be taken to address them (Reason, 2001). The current research contributes to knowledge in this sense by demonstrating the co-developed knowledge which can result from Action-oriented research with affected groups, which rather than impact institutional practices, can contribute to addressing matters in complex social settings such as rural communities. The broad approach of 'exploration-identification-clarification' demonstrates my Action-oriented approach, and reflects the cyclical approach and reflection commonly employed by Action researchers (*see* Johnson, Johansson and Andersson, 2014; Manley and Shaw, 2002), representing a simple and yet effective approach to engaging a variety of participants. The mixed-methods approach of this study has enabled local stakeholder priorities to be explored in order to understand the experiences, and the unique local knowledge behind their views and perceptions. The mixed-methods approach of the GDA Public Dialogue Pilot process supports my proposal in a nuclear context. It responds to calls that future engagement processes with members of the public, particularly in areas nearby energy developments, should be both quantitative and qualitative, with deliberative and exploratory dialogue as a central component. I argue that this enables an appropriate understanding of local circumstance and experiences to be gained, and for the most effective ways in which to manage development-related impacts and changes at the community level to be discussed and decided upon.

7.3 Future Research

Reflecting upon the current research, there are several areas of potential future research, whether this be the progression of the current study or alternative directions that could be taken from the current study.

Progressing the current research in the first instance, I propose that considering the involvement of a greater number and diversity of social groups can further reveal the diversity found at the community level in Anglesey in regards to social values and priorities, for the purposes of developing effective engagement and decision-making processes for future nuclear developments. This deeper understanding of what different groups prioritise and why, by utilising the mixed method approach. This serves to assist in moving away from outdated approaches of merely engaging with local stakeholders to 'educate' and gain acceptance of developments, an approach which is inherently shallow and unsustainable, and unappreciative of stakeholder capacities and potential contributions, to approaches which are more participatory, extending peer communities, and accepting of knowledge and value uncertainties in decision-making for complex science-related issues, reflective of a 'post normal' age (*see* Funtowicz and Ravetz, 1993a,b; Ravetz, 2004, 2006). I also propose the testing of the proposed stakeholder dialogue strategy proposed within this thesis – the *Social group Dialogue Strategy* (SgDS) – which seeks to move beyond engagement and facilitate co-development of knowledge with local stakeholders, through the collaboration of different 'expert' actors as process facilitators. In a progression from current approaches, this research would involve the development of visions of 'sustainable futures', as perceived by different social groups. This involves the use of deliberative and visioning techniques, in conjunction with the development of sustainability indicator development with these groups. This assists in establishing a better understanding of the critical criteria and areas of social life for which different social groups deem as central to development and progress of a socially sustainable nature, and concurrently, how large-scale developments such as nuclear power stations impact upon and function within these idealised futures. A similar process has been presented elsewhere (Whitton et al., 2015), as a conceptual framework of social sustainability determination with stakeholders at the local level.

Another suggested area of future research regards the utilisation of alternative methodologies; namely that of Q methodology. Q methodology is becoming a more commonly utilised tool to explore and understand stakeholder perspectives on a multitude of subjects; one of these subjects is nuclear energy as shown below. A mixed-method approach, leading to a methodology which exhibits the strengths of both quantitative and qualitative techniques (Dennis and Goldberg, 1996), it promotes the consideration of diverse stakeholder perspectives and enables a broad range of perspectives and discourses to be revealed from written or spoken qualitative sources. Indeed, Doody *et al.* (2009) clarify that Q methodology presumes that there exists a finite number of discourses around a topic. Cotton (2015) describes Q methodology as a means to "to quantitatively map subjective attitudes and opinions, rendering them open to statistical analysis to enable social researchers to identify a number of idealised accounts or discourses around a topic" (p. 1947), whilst Venables *et al.* (2009) describe its ability to enable the identification of and differentiation between perspectives and viewpoints, shared among groups of individuals (Brown, 1980; McKeown & Thomas, 1988). Q methodology requires the involvement of research

participants to sort and rank in regards to their level of agreement a predefined set of statements which relate to a focal issue, producing the 'Q-sort' (Venables et al., 2009), which is then analysed and interpreted by the researcher, whereby the researcher may "uncover perspectives or positions in a debate" (Cuppen et al., 2010: 581). I suggest that such a debate could be that of the perceived social impacts of NSIPs and whether these perceptions influence perceptions of infrastructural or project sustainability.

Venables *et al.* (2009) argue that Q methodology is highly appropriate for "the study of the complexities and distinct configurations in understandings common to subsets of participants within well-defined populations or expert communities" (p. 1092), supporting my proposal for its utilisation in further research at the community level. It is also proposed that the value of Q methodology lies in the influence of the participant on researcher-gathered data:

> *"…by allowing the categories of the analysis to be manipulated by respondents, the researcher loses the exclusive power to signify the reality of the researched"*
>
> (Robbins and Krueger, 2000: 645).

Q methodology has been applied within a variety of social science fields to "uncover patterns of perspectives that are situated within people's subjectivity" (Cuppen et al., 2010: 581), such as public participation (Webler et al., 2001), sustainable development (Clarke, 2002), and public acceptance of contentious energy infrastructure (Ellis et al., 2007). In relation to the subject of contentious energy infrastructure, Venables *et al.* (2009) use Q-methodology to investigate the perspectives of community members near different U.K. nuclear power stations on living with nuclear risk. Devine-Wright and Cotton (2011) also use the Q-method to assess stakeholder and community actor discourse in regards to the siting of electricity transmission lines, associated with new nuclear build in Somerset in southwest England. Therefore, I suggest that the suitability of Q methodology to enable further study of the perceptions and perspectives of stakeholder groups in Anglesey, and more broadly across Wales and the UK, towards to new nuclear developments and their social impacts is sufficient to propose its utilisation.

A second proposal for future research is associated with the progression of developing sustainability indicators for the assessment of new nuclear build, not only on Anglesey, but in other localities where nuclear power stations are proposed in the U.K. Work by Glasson (2005) has previously identified ways in which nuclear power may impact surrounding localities (the local areas surrounding Sizewell B Nuclear Power Station) in a socio-econmic context, and this further research has the opportunity to explore and assess similar nuclear-related impacts in other areas, thus contributing to a comparative analysis of nuclear-related impacts across the UK. I argue that more research is needed in this area if impacts are to be better understood and managed for the greater benefit of local communities and future generations. This research may entail

collaborative work with local stakeholder groups and local decision makers in these areas, in order to develop the functionality and relevance of group-based indicators based on different local context. A comparative study between Anglesey and other 'nuclear communities' presents an opportunity to understand whether similarities exist in regards to social values and priorities between areas and between comparable social groups (e.g. students, teachers, farmers) and how socially-orientated assessments of nuclear power developments may demonstrate similarities and differences. This would assist in developing our understanding of whether a more localised approach to assessment is indeed appropriate. This area of further research could be highly constructive in not only identifying sustainability criteria for nuclear developments, but for furthering our understanding of conditional support for such developments and the factors that are contributory or detrimental to 'public support'.

Thirdly, the socio-demographic data which was collected during the current research process was not extensively utilised. This data, such as the amount of time someone has lived in Anglesey, whether Welsh is their first language, and their place of residence or community, could be analysed in future research to examine whether the demographic characteristics of local stakeholders influence their expressed social priorities, or whether this information is irrelevant, and factors such as their association with a particular social or special interest group. Socio-demographic data has been utilised elsewhere to predict public perceptions of energy-related developments, such as hydraulic fracturing (Boudet et al., 2014). This research direction may be of considerable value in regards to predicting societal responses or perceptions of developments according to this 'measurable' data. Knowledge of such associations between demographics and issues of priority may facilitate future processes of engagement with local stakeholders, and may also provide predictive value to the conflict-potential of certain sections of society depending on development-related incidences and events, therefore informing both engagement and event-response strategies to most effectively communicate with local stakeholders.

A final area of future research lies in the consideration of energy-related developments other than new nuclear build. The reason for this is the suggestion that the social issues highlighted as important and as priorities for each social group do not only apply to a single energy technology or large-scale development, but apply to many. Whilst developments and technologies may change, the values and priorities of people remain relatively static. The perceived social impacts of a new nuclear power station, when considering the priorities of social groups detailed by this study, can apply to many other large-scale developments built within the locality. This is a strength of the current approach to engaging with local stakeholders, in that more in-depth and effective engagement with stakeholders, such as that proposed by the SgDS, holds insight-value not only for one technology or one development, but for any development which shares a number of similarities, whether this be size, health-related impacts, proposed employment opportunities

etc. At present, a low carbon biomass project (combined food and power) and eco-park are proposed for Anglesey, to be developed by 2018 (BBC, 2016b), which would present a timely comparative case study along side a development such as the proposed Wylfa Newydd development.

8.0 Conclusions

The final chapter is organised into four sub-sections. Firstly, the group-based engagement of the research participants and the prioritisation of social issues is addressed. Secondly, the research-developed social sustainability indicators and the indicator development process are discussed. This is followed by a discussion on the implications of research for future stakeholder engagement and decision-making processes on nuclear and energy-related subjects. Finally, I discuss the contributions of the research to wider academic knowledge and propose future research directions.

The thesis is based upon a central aim; to understand the social priorities of stakeholder groups on Anglesey in order to inform social sustainability indicator development and a stakeholder engagement strategy, in the context of a proposed nuclear power development on the island. The stated aim is shown below:

To examine and understand the social priorities of social groups in Anglesey, both in general and in the context of a new nuclear power development, in order to inform sustainability indicator development and public stakeholder engagement strategies

In order to achieve this aim, several objectives were formulated. This chapter is structured according to these thesis objectives.

8.1 Group-based Engagement and Social Group Prioritisation

The research finds that when *specifying* their social priorities, the four participating Anglesey-based stakeholder groups place great importance on the Welsh language. These findings are supported by studies that have previously highlighted Welsh language as significantly important to Welsh lifestyles (Nguyen et al., 2013) and Welsh identity (Day, 2002). Whilst Welsh language is not deemed important to the same degree by the four stakeholder groups involved in this research, I argue that it represents a ‘conditional issue’, in reference to its potential to influence public stakeholder support for new nuclear build in Anglesey. I conclude that development-related support from these groups is likely to be conditional or influenced on the prevalence of Welsh language not being negatively impacted by development-related decisions and activities. This also applies to the issues of physical health and the amount of development-related employment opportunities in Anglesey (i.e. for local residents), albeit to a lesser extent. Such conclusions are in line with the findings of previous research, which has found a general feeling of ‘reluctant acceptance’ towards nuclear power among sections of the general public, reflecting tentative and conditional support (Bickerstaff et al., 2008; Pidgeon et al., 2008) depending on its framing. I argue that changes to these conditional issues that are found, or even perceived, to be a result of a new nuclear development, have the potential to impact upon levels of support or

opposition from multiple local stakeholder groups. I propose that changes to other issues which have been identified as important but by fewer groups, such as educational, health and care services and the amount of young people leaving Anglesey, may impact upon support for or opposition towards a new nuclear development but to a lesser extent, and may be restricted to particular groups. Further to this, I argue that these conditional issues represent important criteria for social sustainability at the local level, and the pursuit of sustainability within the context of community development.

Significant differences between participating social groups are identified for 21 out of 39 social issues covered by the research questionnaire, representing differences in 9 of the 13 social themes covered by the research. The research highlights the variability in the social priorities of 'the public', thereby demonstrating the pluralist social structure which exists in Anglesey at the local or community level, as previous research has reported (Chambers, 1983; Crane et al., 2004; Li, 1996; Natcher and Hickey, 2002). Therefore, I argue that stakeholder engagement should be conducted in a manner that acknowledges and reflects this plural reality. This applies to Anglesey but also to other areas where new nuclear build or other large-scale energy developments are taking place. In mind of this, approaches and methods for engaging with local stakeholders should be flexible and multiple, and I argue that they should diversify and be more directed in their approach, engaging with groups on issues they have identified as priorities. This is proposed so that inter and intra-community differences can be better understood and project impacts better managed, in line with the recommendations of Glasson (2005) for understanding the socio-economic impact of nuclear energy in the UK. I propose too that this could in turn save time and financial resources allocated to these processes in the long-term, whilst enabling a more detailed exploration of social priority issues.

Beyond engagement, I also conclude that development-related decision-making processes should respond to this intra-community difference in social priorities, and that they be directly informed by a more strategic approach to stakeholder engagement, as I have proposed in this thesis. This should seek to reconcile business, governmental and community needs in 'energy communities' through a sustainability-orientated approach, such as that detailed by Esteves and Vanclay (2009). Utilising deliberative dialogue with stakeholder groups, it should explore stakeholder views on which issues really 'matter' at the local scale, as Turcu (2013) has demonstrated.

However, further research is required to investigate whether these conditional issues are applicable or relevant to other social groups. I propose further investigation into whether there exists a core set of social issues, which are particularly sensitive to the impacts of a new nuclear power development for wider stakeholder support, conflict mitigation and social well-being. Concurrently, research should explore whether there exists more group-specific issues that may influence the support or opposition for a development from a particular group, due to impacts upon

their social well-being and quality of life. I argue that as this line of research progresses, the impacts of new nuclear developments can be better assessed and managed at the local level (*see* Glasson, 2005), whilst mitigating conflict and building trust between stakeholders.

I also conclude that differences are shown to exist between social groups in regards to their social priorities when specified by group members. However, these social priorities appear to alter between the two methods of determination detailed in this thesis, namely scaled responses to statements and a ranking exercise. This highlights the caution that must be adhered to when determining the priorities of individuals using quantitative methods, as different methods can produce different results. I argue that requesting participants to make a conscious decision on which issues are of greatest priority through a ranking exercise is an effective method of determining priorities, and therefore recommend such priority ranking exercises as I have used in this research for future priority-related enquiries. The identification of priorities through ranking served as a basis for proceeding dialogue with social groups and enabled participants to discuss the proposed Wylfa Newydd development in the context of their values, needs, concerns and preferences (*see* Turcu, 2013). At present, there is a dearth of research of this nature in the literature. I argue that in the interests of understanding energy impacts at the local scale, more 'priority-based' research with local stakeholder groups be conducted, and compared with the research presented in this thesis in order to build up our understanding of local perceptions of and responses to energy infrastructure. Research of this nature has both local decision-making and national policymaking implications, provided the growing interest in sustainability by international governments and bodies. It is also recommended that this be conducted as part of an action-oriented approach, which involves working directly with social groups in a multi-stage process which incorporates opportunities for dialogue, reflection and co-learning between participants and researcher, facilitating the development of familiarisation and trust between both parties, and enabling a broad and comprehensive understanding of priorities among local communities and between social groups to emerge.

8.2 Social Issues for Sustainability Indicator Development

By engaging in dialogue with several social groups, I have identified a number of stakeholder-determined social criteria for which new nuclear power stations may be assessed in a social and a local context. Developed criteria reflect issues of local relevance and group-specificity in the context of nuclear energy infrastructure and social sustainability in Anglesey; I present these in the form of group-specific indicator sets (GSISs). I conclude that there exist both group-specific and shared issues of priority between the four social groups involved in this research. Key areas of shared priority for at least two groups include: 1) the number of Anglesey residents employed directly by the development (as a percentage of total); 2) the number of development-related employment opportunities for Anglesey residents; 3) the number of people moving onto the island

for development-related employment; the number of school visits by nuclear industry – development and employment information (focus on 'pre sixth-form'); 4) road traffic activity during development periods.

Common priorities between social groups reflect sustainability-related issues of significance. These criteria demonstrate that there are a number of perceived impacts resulting from a new nuclear development that may have broader social importance than others, and therefore, may influence local support or opposition of the development more greatly than issues where widespread differences in their prioritisation exist. I conclude that these indicators can act to inform and help focus stakeholder engagement; they identify issues that demonstrate shared interests/concern and which should be broadly engaged upon across Anglesey, whilst other issues reflect group-specific interest and should be discussed with those groups in a more directed approach. As I have argued previously, such indicators enable the individuality of communities and site-specific circumstances to be realised (Whitton et al., 2016). GSISs can also be utilised in a variety of decision-making processes at the local scale given their foundation of broad social themes which have been utilised in research elsewhere in the UK (*see* Turcu, 2013), which in-part serves to address issues of replicability often associated with community-level research.

The co-development of sustainability indicators between experts and 'affected' community groups can assist in efforts better manage the numerous and varied impacts of large-scale energy developments on 'local' communities. Developing these indicators with different social groups provides an opportunity to understand these impacts in greater detail, enabling responses and developed solutions to such impacts to be more effective, in terms of both remediation and time, whilst also providing opportunities to build trust. Similar to the calls of energy researchers to track changes in public perceptions over time during the development of energy technologies at the community level (e.g. Brasier et al., 2011), this research calls for the impacts of energy technologies to be measured and tracked during their development. I argue that this should and can be acheived by developing and utilising co-developed sustainability indicators which local stakeholders deem locally legitimate and representative of their social and cultural priorities (*also see* Whitton et al., 2015). Procedurally, indicator co-development also provides an opportunity to not only assess the sustainability of specific developments over time according to specified local priorities, but also to involve and empower local stakeholders. This has further implications for enhancing social and community sustainability, which contribute to broader considerations of energy justice at the local scale.

I propose that greater attention towards understanding public support and opposition of energy infrastructure and understanding why this exists is required, particularly at the local scale and in collaboration with community members. I recommend this is done by engaging in dialogue with different groups to appropriately explore the complexity of support and opposition, and move away from less socially constructive and invested pursuits concerned with gaining 'public

acceptance'. I argue that attempts to gain 'acceptance' of pre-existing plans and ideas indicates coercion and leading, and a deficit of understanding of local values, experiences and priorities, many of which may not 'match' with those of technical experts. Engagement must be meaningful and patient in order to effectively understand the numerous factors which lead someone to support or oppose a development or project, or for them to be uncertain of their position. I argue this is done by implementing a strategic approach as I have proposed. In its absence, whereby the factors underlying someone's support or opposition towards a project are not known or understood, our understanding of public responses to large-scale energy infrastructure - an ongoing challenge and research focus (Batel et al., 2013; Ellis et al., 2007) - will continue at the same level of uncertainty. Meanwhile, I suggest that sustainable approaches to addressing stakeholder issues and concerns will not develop in a timely or cohesive manner.

The GSISs reflect the sustainability-related priorities of only a small number of social groups relative to the plethora of groups that exist on Anglesey. However, they provide an indication to nuclear decision-makers as to the concerns (i.e. 'number of people moving onto the island for development-related employment') and needs (i.e. 'number of school visits by nuclear industry – development and employment information') of local stakeholders. I conclude that these 'conditional issues' highlight key areas which are likely to present opportunities for conflict or support to develop depending on perceived changes resulting from a new nuclear development.

The research contributes towards addressing the dearth of studies that consider the social sustainability of new nuclear developments, and more specifically, such developments' sustainability as determined by those who are most likely to experience impacts from such developments, i.e. affected communities. It is my assertion that the multi-dimensionality of nuclear energy developments and pluralistic communities close to them be reflected in the future sustainability assessments of this technology. In addition, I conclude that local stakeholder groups should play a central role in their development during decision-making processes to ensure their social sustainability and continued utilisation at the local level. I suggest that the experience and findings detailed in this thesis demonstrate the valid nature of this call, and can serve as an example to be adapted elsewhere according to unique local context and cultures.

8.3 Social Group Engagement and Public Stakeholder Engagement Strategy

In response to the social group engagement within the current research, I conclude that a participatory, dialogue and group-based approach to stakeholder engagement, which seeks to go beyond traditional 'engagement' into 'knowledge creation', should be pursued by industry and governmental actors by working in collaboration with academics and local communities. The value and effectiveness of such an approach lies in not only determining areas of potential social impact

and opportunity for local stakeholders, but that areas of potential social conflict, social need, and social opportunity can be highlighted to nuclear-related 'officials', 'decision makers' and even local government. This can enable more socially-sustainable decisions to be made, particularly when early participation seeks to address concerns and questions at an early stage in the process (Beierle and Cayford, 2001), which is particularly important for highly controversial or contentious projects (Sander, 2011).

The Action-oriented approach utilised in this research places value on dialogue, of multi-directional communication with multiple stakeholders, and on deliberation, where information and knowledge are openly shared among equal participants. I experienced a pluralism both in the context of social group priorities but also in the manner in which these groups engaged in dialogue, both with each other and with myself. This demonstrated a 'diversity of participant familiarity' with such processes and with the subject matter of these dialogues, i.e. matters of social priority in the context of a proposed new nuclear development on Anglesey. Therefore, I conclude that more must be done to engage with stakeholder groups of all generations to gain a more comprehensive understanding of how new nuclear developments are likely to impact upon local communities and how to most effectively manage these impacts. I argue that engaging with groups in the manner I have described can greatly assist in addressing this situation and ensure that communities do not simply attempt to 'deal' or 'cope with' energy impacts as they occur without an appropriate degree of informed planning or impact management.

The Generic Design Assessment Public Dialogue Process (GDA-PDP) in which I also participated during the period of this PhD revealed the engagement preferences and local priorities of stakeholders participating in organised, fixed-scope workshops. Stakeholder priorities were found to be more site-based and locally-focussed than the broad 'GDA' scope allowed, reflecting a need for future stakeholder engagement processes to appreciate and understand the predominantly 'local' nature of stakeholder concerns. Trust, familiarity and context were all found to be important factors in ensuring that engagement was both effective and sustainable, with face-to-face contact emerging as an important and preferred method of dialogue-based engagement whereas online- based information provision was also noted as practical and preferable for many participants in this process (3KQ, 2015).

Upon reflection on the GDA-PDP and my own research, I conclude that communicating technical information in a manner which is clear and understandable, and using language and examples which people can understand and relate to are critical points of learning for nuclear-related engagement facilitators. Also, the engagement preferences of different social groups should be sought due to the differences identified as existing between them, particularly between different age groups (e,g, the young and the elderly). They have also demonstrated the capacity and desire of 'lay' stakeholders to engage in dialogue and discuss technical matters, provided there is opportunity, quite simply, to ask questions and receive answers. This capacity to understand often

complex issues, provided the delivery of this information is appropriate for the audience, should not be underestimated or ignored; rather it should be acknowledged and adopted by those designing and facilitating nuclear stakeholder engagement. I propose that the GDA-PDP represents a positive step forward in nuclear-related public engagement and dialogue strategy, supported by the recently-developed Concordat for Public Engagement (NIC, 2015). I argue that plural forms of dialogue are required should public support and societal consent for developments, as I pose elsewhere, be "truly sought by government and other decision-makers" (Whitton et al., 2015: 132). Should this public consent not be attained, I argue there would be greater potential for societal opposition and conflict to emerge against developers or development-related officials. This of course has implications for the realisation of NSIPs, or at least to their realisation according to pre-conceived timescales.

I argue that a uniform strategy to stakeholder engagement will not lead to sustainable solutions at the local level, but instead lead to missed concerns and missed opportunities to build knowledge and trust simultaneously between stakeholder groups, whether these groups be public, industrial, or political. This responds to the proposals of Pearce (2012) for a sustainable nuclear energy system, one of which is regaining of public trust. I propose a strategy for stakeholder engagement that seeks to move beyond engagement to knowledge generation; this is the Social-group Dialogue Strategy (SgDS). The SgDS focusses on deliberation rather than consultation, whereby multiple participants exchange information and knowledge in a multi-directional manner, where all contributions are considered equal, as part of a multi-stage dialogue. This dialogue must be deliberative, whilst also being open and voluntary in the interests of procedural justice. Importantly, those citizens who are likely to be directly affected by contentious developments such as nuclear power stations must be key contributors to decision-making for the resultant decisions to be ethical and just (see Cotton, 2014). As a result, this contributes towards the achievement of collective solutions and a greater likelihood of increased decision satisfaction among stakeholders, whereby quality decisions are taken through open, constructive argumentation and communicative action between project officials and local stakeholders (Papaioannou, 2012). The strategy is developed from an ontology of critical constructivism, which proposes that participants should be involved in the research process in order for truths to be revealed during the construction of knowledge, rather than researchers dictating validated truths to these individuals (Steinberg, 2014). It responds to calls in the literature for "more critical constructivist and qualitative" research to enable better understanding of societal responses to large-scale energy infrastructure (Batel et al., 2013; Ellis et al., 2007). Finally, it is underpinned by the pursuit of 'just sustainabilities' (Agyeman, 2013), which demand and seek to create a better quality of life for both current and future generations via principles of justice, equity, and sustainability. This strategy can facilitate the building of familiarity, trust, knowledge and cooperative relationships within community settings, thus contributing further to the realisation of social sustainability locally and the sustainable

development of NSIPs, such as Wylfa Newydd.

I conclude that the development of large-scale energy infrastructure such as new nuclear power stations, without the meaningful and democratic engagement of local public stakeholders to understand the legitimate priorities of these 'directly impacted' individuals, cannot be deemed as just in procedural terms or in the context of developing a socially just and sustainable energy system. I conclude that future efforts relating to stakeholder engagement, technology assessment and development-related decision-making should be more plural, participatory, priority-focussed and procedurally fair if society is to move towards a scenario of energy justice and just sustainabilities.

I end this chapter and thesis with two broad considerations given the findings of this research and considering the wider field of research: where are we now, and where do we go next? We now understand as researchers the value of public participation and stakeholder engagement in relation to nuclear decision-making, whilst also understanding the restrictions and potential pitfalls if this is not conducted appropriately or considerately. The findings of this research and others in the literature demonstrate the value of dialogue and deliberation, and of the pluralism of communities, whilst also highlighting and cautioning against the exclusion of affected stakeholders in decision-making processes that will likely affect them. This research reveals the specific priorities of social groups, the potential areas of societal impact and current perceptions of stakeholder engagement relating to new nuclear power developments in Anglesey. The knowledge and experiences we are able to reference and utilise is growing in the context of energy impacts and energy governance, to which this thesis contributes. The sustainability indicators developed here add to the growing diversity of tools being generated as part of energy and social science research, and it is only by continuing to develop these tools of assessment that we can understand whether energy technologies and projects are conducive to a just and sustainable energy system.

From here onwards, I argue that this research should be utilised by the nuclear industry, and other energy industries, to better understand and manage development-related impacts and ensure that stakeholder engagement benefits those who design and participate in it equally. We need not repeat the documented errors of the past; instead, it is important that we learn and implement lessons and gained knowledge. I argue that new nuclear developments in the UK must progress with local communities playing a more active and central role in the decision-making process so that their needs and priorities can be addressed. In the immediate future, I recommend further research in Anglesey to understand group priorities and impact perceptions, building upon the positive experiences of this research. I urge other researchers to engage with communities to further explore energy impacts from the perspective of those directly affected. I propose that more strategic and group-focussed engagement be employed, involving the nuclear industry, local decision-makers, academics and local residents to understand heterogeneous local priorities.

Deliberative engagement should also become a more frequent and embedded component of nuclear-societal interaction. As independent researchers, academics will play a vital role in engaging with all stakeholders and facilitate the development of engagement and assessment strategies. Sustainability indicators should be co-developed between technical, political and local experts in an integrated approach, as it is these indicators that will best serve the aim of effectively monitoring and managing energy impacts in a local context. If new nuclear infrastructure projects and surrounding communities are to co-exist in a sustainable and socially and ethically uncontentious manner, then these communities must exist as a central participant and contributor to engagement and decision processes throughout their development. Only then can developments serve the needs and priorities of stakeholders on either side, and manage impacts and benefits through an integrated, ethical and just strategy.

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Appendix 1. Case Study: GDA Public Dialogue Pilot process

During the PhD research process, I was also involved, in an observational and advisory capacity, in a public dialogue process for the assessment of new nuclear power station reactor design; the UK Generic Design Assessment (GDA) Public Dialogue Pilot process, which is detailed by this case study.

As part of a project partially funded by Sciencewise (a BIS (Department of Business Innovation and Skills) funded programme to improve Government policy making involving science and technology**)**, the Environment Agency (EA), Office for Nuclear Regulation (ONR) and Natural Resources Wales (NRW) conducted a public dialogue process with members of the public to identify their needs in relation to public engagement, including the Environment Agency's and NRW's own consultations during the joint EA/ONR/NRW Generic Design Assessment (GDA) of new nuclear reactor designs. This served as a pilot to the public involvement process, occurring at a later stage in the GDA process, the findings of which will inform future public engagement and consultation processes and approaches. Further details of this process are provided on the joint regulators website hosted by the Office for Nuclear Regulation (ONR, 2015). My role in this project was as a member of the Project Management Team (PMT), in an observational capacity during workshops and as an independent academic contributor during PMT meetings. This was facilitated by my NNL-based supervisor Dr Colette Grundy who was a member of the Independent Oversight Group (IOG) for the study and who agreed my involvement with the members of the IOG and PMT at the start of the project.

The formal findings of the GDA Public Dialogue project were published in a report, produced in September 2015 by the company 3 Key Questions (3KQ), who were employed by the GDA process convenors (3KQ, 2015). I have also co-authored a review of this GDA process with discussion of the project's findings, in an academic paper with his industrial sponsor NNL (Whitton et al., 2016).

Several objectives for the GDA dialogue project were established at the beginning of the project. These were to:

1. Inform EA, ONR and NRW current and future public engagement, and the EA and NRW's consultation approach on GDA
2. Identify approaches that will address issues and barriers to sharing complex technical information on the GDA with members of the public
3. Develop and pilot materials on the GDA that are accessible to the public
4. Identify potential public engagement process options for the GDA

5. Help the nuclear regulators to pilot an effective public engagement and EA and NRW consultation approach

In order to meet the project objectives, the process was designed in order to answer a number of key questions:

1. How do members of the public want to be involved in the GDA process?
2. What do people need to know (what are their concerns/interests?) and how can we (nuclear regulators) address their concerns/interests as part of the GDA process?
3. What can we do to help improve people's trust in us and confidence in our decisions (as nuclear regulators?)

Based upon these objectives and key questions, a multi-stage process was developed in order to engage with different public groups who represented the local areas for which the ABWR and new nuclear developments had been proposed by GE-Hitachi and Horizon Nuclear Power respectively. These proposed sites are Anglesey in North Wales and Oldbury in South Gloucestershire. The process also involved a sampling of public attitude towards nuclear power and new reactor design assessment in England and Wales, via an online survey, which served as the first stage of the process. The process involved several stages, which are shown in Figure A1 overleaf and summarised here:

1. **Online survey of public attitudes** – 401 survey responses from people in England and Wales. These responses informed the design of local dialogue workshops by building a picture of national attitudes to the regulation of nuclear power and the assessment of a new reactor design

2. **Round 1 dialogue-based workshops** – two workshops took place in two different locations; Cheltenham on 17th January and Bangor on 31st January 2015. 22 people attended the workshop in Cheltenham (relatively close to the proposed Oldbury site) and 19 people attended the workshop in Bangor (relatively close to the proposed Wylfa site); these participants were invited as a result of their participation in the online survey, and participants who attended each workshop were residents of the respective local area. These workshops were designed to provide people with an introduction to the topic and context of GDA, which included the role of the regulators and regulatory system.

3. **Round 2 dialogue-based workshop** – 9 participants from the Bangor workshop and 9 participants from the Cheltenham workshop attended and took part in the second round workshop held in Crewe on the 21st March 2015. This workshop was designed to provide opportunities for greater exploration of key issues raised in the first round of workshops,

responses to a range of communication and consultation materials, and development of recommendations about future public engagement.

4. **Meetings with the Independent Oversight Group (IOG) and Project Management Team (PMT)** – these took place between each stage of the process, involving reflection and discussion of recently completed workshops and their findings, and planning and preparation for future workshops (3KQ, 2015).

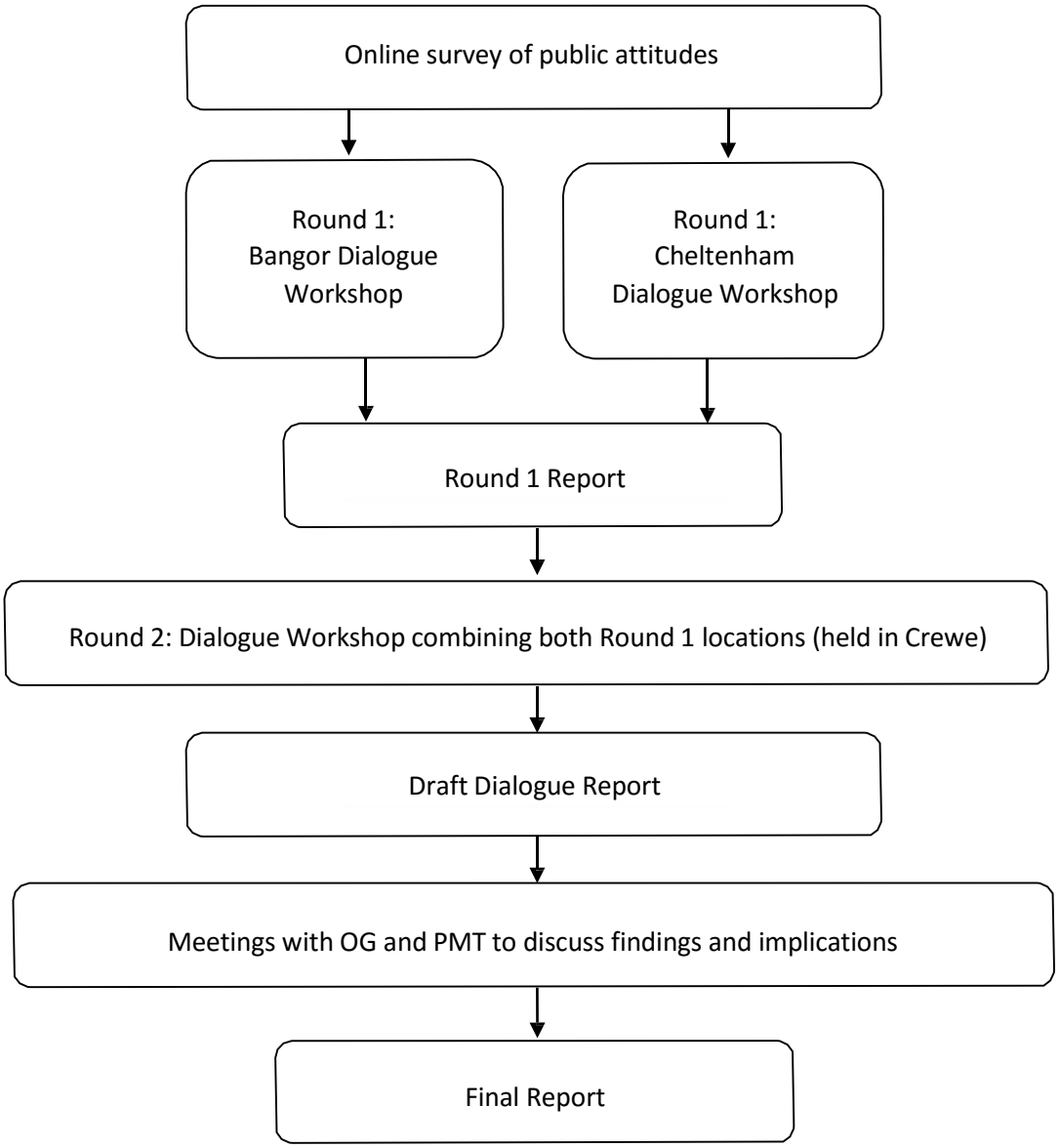

Figure A1. Structure of GDA Public Dialogue Project Process

These stages are now discussed in order to detail the methodology of the process, and also my role and contribution throughout.

First Stage - Online Scoping Survey

The online scoping survey represented the first part of the public dialogue process, and differed to proceeding stages in the fact that it was predominantly quantitative in nature and did not require the direct involvement of the project team once situated online and activated. The aim of this stage was to inform the design of proceeding local dialogue workshops and create a foundation from which the process could build; it aimed to achieve this by developing a broad understanding of national attitudes to nuclear power regulation and new reactor design assessment through the utilisation of an online survey. The survey sought to gain understanding on the following themes:

- Level of awareness of the EA, ONR and NRW and their roles and responsibilities
- Attitudes to new nuclear power stations (for baseline purposes)
- Level of awareness about new build, and of regulation
- Level of trust in the regulators
- People's interests e.g. safety, environment, etc.
- Level of interest in being involved in the GDA consultation process

The online survey provided national context, on citizen views and their expectations of regulators, to the dialogue workshops which sought to facilitate a dialogue with members of the public who lived close to two current and proposed reactor sites. The public sample was recruited via various sources including online advertising, social media and targeted recruitment to 'top up specific demographics' (3KQ, 2015). The survey saw 596 survey respondents, which, following a screening process which removed partial or incomplete responses or those respondents who responded in less than three seconds in order to mitigate 'satisficing' (rushing, not providing considered responses), was reduced to 401 respondents. Each participant received a minimal financial incentive to facilitate participation. The surveying sample was generated to match closely with 2011 Census data in regards to geography, age and gender, and was provided bi-lingually. The matter of the exclusion of individuals without computer or internet access was determined as a 'proportional limitation' given the format's advantages (*ibid*). Finally, in regards to representation, in an effort to broadly reflect UK population figures, approximately 350 respondents were English and approximately 50 were Welsh. Welsh residents were over-sampled to a level approximately double that implied by national census data, with the impact of making the sample 'more meaningful as a dataset' without causing data skewing (*ibid*).

Second Stage - Round 1 workshops (Bangor and Cheltenham)

The next stage in the process saw the commencement of public dialogue workshops in two different locations on two different dates (Cheltenham (17th January, with 22 attendees) and Bangor (31st January, with 19 attendees)), where members of the public convened at pre-designated locations for day-long workshops organised and facilitated by nuclear regulators, the facilitation organisation, and Project Management Team and Oversight Group members. Members of the Oversight Group and Project Management Team attended in observational capacities, contributing to conversations if required, whilst representatives from the regulators were involved in delivering presentations. Recruitment for these workshops was carried out utilising a specialist company employing pre-set specifications regarding age, gender and social grade. Individuals who worked or had family members who worked in the nuclear industry or anti-nuclear campaign groups, as specified on scoping surveys, were excluded from attending. Those members of the public that attended were provided with a token amount of financial compensation for their time. The workshops utilised a variety of mediums in order to meet the following objectives in enabling members of the public to:

1. Understand the process by which nuclear power stations in the UK can be developed (and where the GDA process fits in)
2. Understand the role and responsibilities of the regulators and how they work together
3. Ensure basic understanding of the UK ABWR design and factors that differentiate it from other designs
4. Consider the national public views emerging from the survey conducted
5. Review hopes/ fears/ concerns/ perceptions of nuclear power and the regulatory system and indicate what issues could be usefully explored in the second workshop
6. Be clear about how they can get more information and ask questions about the GDA if they wish (*ibid*).

In a methodological context, the focus of the workshops was to introduce the topic of GDA to those attending and discuss their views and judgements on communicating this topic with the general public. This was done by employing a mixed format which included Power Point presentations, plenary discussion and smaller group discussions around tables. Responses from members of the public were recorded on flipcharts and laptops by members of the facilitation team. As the first activity of the workshop, participants were provided with the opportunity to ask any questions they had regarding the GDA process or the regulators prior to the commencement of the workshop, with facilitators recording these questions on flipcharts. These questions would be re-visited throughout the workshop in order to demonstrate which questions could be and had been addressed and answered, and which questions were unable to be answered due to them being deemed beyond of the scope of the process, such as site-specific queries.

In addition to the engagement techniques mentioned, methods employed within the workshops included requesting participants to mark their responses to four wall-displayed questions at the beginning of the workshop, which would then be revisited at the end of the workshop when participants would requested to answer the same questions again. This enabled attitudinal shifts as a result of the workshop activities to be highlighted and the general degree of effectiveness of the workshop to be indicated. The four questions asked of participants were:

1. *How much do you know about new nuclear power stations and how they are regulated in England and Wales?* (with six possible responses ranging from 'nothing at all' to 'a lot', including a 'don't know' option)
2. *How much do you know about these organisations?* (with five possible responses ranging from 'never heard of' to 'a lot')
3. *How would you rate your level of trust in the regulators?* (with five possible responses ranging from 'not at all' to 'completely', including a 'don't know' option)
4. *How important is it for people to be able to get information and ask questions about assessment of reactor designs?* (with five possible responses ranging from 'not at all important' to 'very important', including a 'don't know' option)

At the end of the workshop, participants were also requested, if interested, to sign up to participate in the second workshop, which involved samples from both Round 1 workshops coming together in a separate location (Crewe), to discuss the workshop topics further. A range of attendees would be selected to represent a demographic mix of individuals at the workshop.

Although a member of the PMT, I did not attend both workshops, only that held in Bangor. My *positionality*, being their ability to speak Welsh, and so potentially assist in conversations for translation purposes if required, and their familiarity with the area and current circumstances relating to the topics under discussion, primarily dictated this decision and was agreed by both the PMT and the OG.

Finally, a report was produced following the two Round 1 workshops, which was distributed to PMT and IOG members for comment and feedback. This report would contribute in to Final Report published following the completion of the workshops and dialogue process.

Third Stage - Round 2 Workshop (Crewe)

Following the final Round 1 workshops in Bangor and Cheltenham in January, 18 selected participants from the Bangor and Cheltenham workshop participant groups gathered approximately two months later for a second workshop in Crewe (21st March). The workshop was designed to enable participants to discuss in greater detail and engage in further dialogue on the areas and topics covered in Round 1 workshops. The objectives of the Round 2 workshop were:

1. Deeper exploration of the issues which had been only briefly discussed in Round 1, such as security and nuclear waste management
2. Discussion of participants' perspectives and responses to a variety of consultation and communication materials to assess their 'public accessibility' and effectiveness
3. The development of a series of recommendations about public engagement for the attention and further consideration of the PMT; these included reflecting on the perceived relevance of being consulted at the generic (cf. site-specific) stage of the GDA process.

The workshop was methodologically similar to the preceding workshops in that the format employed methods including presentations, plenary discussions and group discussion/work around tables to engage, with flipcharts being used again as tools to record participant comments. The workshop aimed to enable participants to consider various communication issues in respect to GDA, such as *how* and *who* to communicate with, and indeed *if* to communicate in the first instance. The workshop was attended by a mix of regulators, facilitators, and PMT and OG members, many of which, including myself, had attended the previous workshops, the roles and contributions of whom remained similar.

The workshop began with a reflection and summarisation of the first workshops, and time was given for two groups to discuss what could be recalled/ 'what had stuck', or whether they had conducted any further research following the workshop. This was followed by a discussion about where the GDA process 'fit' within the wider process of nuclear decision-making, and then an opportunity to respond to a number of questions which had been put to the regulators in the previous workshops. Workshop dialogue was facilitated as to the effectiveness of various mediums of communication and engagement materials, such as infographics and organisational informative displays. A significant discussion was held towards the end of the day regarding the barriers to engagement as perceived by members of the public, and how such barriers could be addressed and mitigated for future engagement processes; these are detailed and discussed in the Results and Findings chapter.

Following the workshop, a draft dialogue report detailing the process methodology, process and findings was generated by the project delivery organisation (3KQ) and again distributed to PMT and IOG members for comment and feedback. This was proceeded by a meeting of the regulators, project delivery team, PMT and IOG to discuss the draft dialogue report, the key findings of the project and what could be done to address the issues raised by members of the public regarding the issues covered. Finally, a final dialogue report was produced by the project delivery organisation, detailing the GDA Public Dialogue Project in full.

The GDA Public Dialogue Pilot sought to engage and generate a dialogue with members of the public to further inform public engagement, such as for the actual GDA Public Dialogue process due to take place in 2016. One of the key objectives of the process is to inform the Environment

Agency's formal consultation with the public on the GDA draft decision document for the ABWR. The Environment Agency plan to consult with the public on the draft decision document and it is intended that the GDA Public Dialogue Pilot project will inform the process. Nuclear regulators have already set out an approach to engagement, detailed within their Stakeholder Engagement Plan (ONR, 2014), which this dialogue project aims to contribute towards. As detailed within the project's Final Report (3KQ, 2015), the process employed a public dialogue methodology as opposed to a market research approach because it enabled interactive conversations between decision makers and members if the public, facilitating greater exploration of issues and enhancing 'two way understanding'. It is these aspects of the process where the current research finds value in their examination. Methodological aspects of the process such as dialogue, two-way exploration of issues of public interest, and the multi-way interaction between decision makers and members of the public, are examined and discussed as to their effectiveness and contribution to our understanding of how engagement can be most effective and beneficial for those involved. These are valuable in informing how future engagement and communication processes with members of the public, particularly for technological decision-making with communities local to nuclear sites, or indeed other socially and ethically contested technologies (SECTs) (Cotton, 2014), can be made more strategic, targeted and effective, for both expert and lay stakeholders.

At each stage of the process, there were several findings relating to public perceptions, preferences and opinions towards the topics covered, including a number of practical findings relating to engagement practices. Some of the project's findings are reported in this study due to their relevance to the current study and research themes. The key findings of relevance to this study are presented in the tables below, for each of the three stages of the public engagement process. These key findings are published in the official report for the Public Dialogue Pilot (3KQ, 2015).

Stage 1 – Online Scoping Survey

The results presented in Table A1 overleaf originate from an online scoping survey of 401 residents from England and Wales, to reflect the proposed sites for the development of the Advanced Boiling Water Reactor, designed by Japanese technology firm Hitachi-GE. The organisations on which a number of questions were based were the Environment Agency (EA), Natural Resources Wales (NRW) and Office for Nuclear Regulation (ONR). As I participated in but did not gather empirical data for this process, the findings reported are those presented in the official GDA Public Dialogue process report (3KQ, 2015).

Theme	Key Findings
Knowledge of EA, NRW and ONR	• EA was the most familiar organisation; 66.6% of respondents said they knew at least a little about the organisation. • NRW and the ONR were substantially less familiar; in each case, 18% of respondents said they knew at least a little about these organisations (this shifted to 39% for NRW when considering Welsh respondents only)
Knowledge about new nuclear power.	• 48% of respondents said they were aware some new nuclear power stations were planned before starting the survey • 52% of respondents said they were unaware some new nuclear power stations were planned before starting the survey
Knowledge of nuclear power regulation	• 65% of respondents said they knew virtually nothing or nothing at all about nuclear power regulation • 2% of respondents said they didn't know/were not sure • 23% of respondents said they knew a little about nuclear power regulation • 8% of respondents said they knew a fair amount about nuclear power regulation • 2% of respondents said they knew a lot about nuclear power regulation
Trust of nuclear power regulation	• 39% of respondents said they largely or completely trusted the EA. • 29% of respondents said they largely or completely trusted the ONR • 22% of respondents said they largely or completely trusted the NRW (23% of Welsh respondents). • 43.7% of respondents said they partially trusted the EA, or didn't know • 54.2% of respondents said they partially trusted the ONR, or didn't know • 62.1% of respondents said they partially trusted NRW, or didn't know

Public engagement	• 79% of respondents said it was very important (11% said it was quite important) that people who live *within 25 miles* of a proposed site had the opportunity to find out information and ask questions. • 44% of respondents said it was very important for people who live in England and Wales, *further than 25 miles* from a proposed site (43% of respondents said it was quite important) had the opportunity to find out information and ask questions. • 47% of respondents said it was quite or very important that people who live outside England and Wales had the opportunity to find out information and ask questions.
What would you want to know more about?	• Safety (82%) • Radioactive waste management (78%) • The impact of radioactive discharges on people and the environment (76%). • Security (64%) • Spent fuel management (59%) • Other environmental impacts (50%) • Management arrangements (32%)
Future involvement	• The presence of a website that explains the assessment process (47%) • Receiving a quarterly newsletter (28%) • Responding to a consultation online (26%) • Not interested in any further involvement (25%) • Attending meetings to hear more and ask questions (17%) • Responding to a consultation in writing (hard copy) (9%)

Table A1. This table shows selected key findings of an online scoping survey of 401 people in England and Wales for the Generic Design Assessment Public Dialogue Pilot Project

Stage 2 – Round 1 Dialogue-based Workshops

Round 1 workshops were dialogue-based and focused largely on introducing the GDA topic to participants, followed by discussing initial responses of attendees to communicating the subject of GDA with the general public. The format of the workshop included plenary discussion, presentations and round-table, dialogue-based group work. Although the findings presented in the table overleaf reflect those from both Bangor and Cheltenham workshops, the Bangor workshop is of greatest interest to this study as this focussed on the GDA for the proposed new build at Wylfa. 19 members of the public attended the workshop in Bangor as participants, with independent Oversight Group members also attending as observers, as well as representatives from the nuclear regulator organisations, who contributed to group conversations, and some of which gave various presentations throughout the workshop; 9 of these 'experts' attended. Table A2 overleaf shows the broad findings from the Round 1 workshops (Bangor and Cheltenham), but additional findings from the Bangor workshop are provided thereafter due to their relevance to this Anglesey-focussed study.

Key findings	Detail of key findings
Context matters	Many participants wanted broader and deeper information than was possible within the formal scope of the GDA process and associated dialogue. Broader and deeper information was important to participants in order to understand the GDA process in a wider context, and to answer pre-existing questions such as 'how does this affect me?'
Make it relevant	Participants tended to find it easier to talk about scenarios in which a specific location or proposed site was involved, rather than a generic approach as is the case in GDA.
Tailor messages for different groups	Current GDA materials were perceived by many participants to be dense, technical, and unengaging. They suggested a range of solutions for making future materials more appealing to the general public, with a particular focus on *design, style,* and *visual imagery.* Making these accessible to younger people and to those without internet access were two common discussion topics. Face-to-face presentation of the information received the most positive response. However, participants were fairly pragmatic about the resource constraints with respect to face to face engagement, such as time and money restraints. Participants suggested online forums or videos might be a good compromise in lieu of widespread seminars or exhibitions.
Trust and independence.	

	Levels of trust and attitudes towards regulators was measured by baseline questions. By the end of both workshops, baselining questions indicated that positive personal interaction (and potentially feelings of having been treated with respect) was a strong driver towards increased trust, balanced with past experience and overall level of familiarity. The overall level of trust varied slightly between the two workshops, but generally participants seemed to understand and accept the independent nature of the regulators. There was a varied response to the suggestion of joint communications (e.g. of regulators with developers or designers). Overall, positive aspects were seen as: lack of duplication; a message of partnership working; increased likelihood of reaching target audience; and saving resources. Cautionary comments included that some people may find joint communications uncomfortable, and the need for care to ensure the different roles and views of the various organisations retained and demonstrated independence.

Table A2. This table shows key findings, based upon key themes, of the Round 1 dialogue-based workshops (Bangor and Cheltenham) for the GDA Public Dialogue Pilot Project

Whilst these are broad findings from both Round 1 workshops, it is also important for the current research to highlight the questions which were asked of the regulators and workshop convenors, at the beginning of the workshop held in Bangor by members of the public, many of which were from Anglesey. These questions were returned to towards the end of the workshop to identify which questions had been answered throughout the duration of the workshop, and which questions had not been answered. Some of the questions asked at the beginning of the workshop were not discussed again. Table A3 overleaf reports a series of questions posed by Bangor workshop participants, presented under various thematic categories, highlighting the concerns and queries of residents in regards to the GDA process and the impacts of nuclear power more broadly (3KQ, 2015). These questions are important given that they indicate the priorities of members of the public in Anglesey in regards to nuclear power and nuclear assessment and decision-making

processes, albeit these priorities are not distinguishable by social group. It is also shown whether participant questions were able to be answered by dialogue throughout the workshop due to the restrictions of the scope of the workshop and focus on the GDA process and nuclear regulation.

Question Theme	Participant Question	Question Answered/ Unanswered/ Not Discussed
Design considerations	*How big will the power station be in terms of physical size and design/look?*	**Unanswered**
Energy policy	*Why nuclear?*	**Unanswered**
	Anglesey is a tourism island, and things like Wylfa, pylons and wind farms all affect tourism on the island. There doesn't seem to be anybody looking at different ways of generating energy that don't have such an impact on the look of the place. What Government agencies are looking at this? Always seems to be that they're looking at the cheapest options and the cheapest option seems to be running pylons across the island rather than burying them.	**Not Discussed**
GDA process	*What's the significance of the word generic that keeps cropping up?*	**Answered**
Local community	*Are there any contingency plans for businesses within 2 miles of the power station?*	**Not Discussed**
	Because it's a long lead-in process, will local people be up-skilled to get quality jobs in the locality? Will contractors working there now and in the future be under obligation to use the local workforce as much as possible? Will there be employment during the transition from the existing station winding down and the new one starting up?	**Not Discussed**
	Will there be a discount on the electricity for the local community? And other local community benefits?	**Not Discussed**
	Will there be an impact on house prices?	**Not Discussed**
	Where is the workforce coming from, and where are they staying?	**Not Discussed**
	When will road construction start, where is the soil going, what are the routes and will there be consultation on this?	**Not Discussed**
	There's a lot of areas of outstanding natural beauty on the island, but there's a couple of power stations on the island and it seems that whatever they want to do to the island that seems to be all right without	**Unanswered**

	worrying about the local people (Specific mention of NE corner of island)	
Nuclear power – other impacts and concerns	*What impact is it going to have on the environment and the local area/local people if there is another reactor?*	**Unanswered**
	Does nuclear have any effect on people's health?	**Unanswered**
	Does the power station in Trawsfyndd have an effect on people's health there?	**Unanswered**
	Did any (radioactive) waste get into the waterways or lakes at Trawsfyndd? In Skelmersdale a few years ago they were finding that a lot of the fish in the Irish Sea/Morecambe Bay area were deformed – what assurance do we have that that won't happen here (off Wylfa)?	**Unanswered**
	Is there going to be a comparison between incinerators and nuclear power with respect to safety. E.g. there was a lot of concern about there being carcinogenic fumes coming off the incinerators – how does that compare with nuclear power?	**Answered**
	What happens if something goes wrong and how much of the area could it affect?	**Unanswered**
Nuclear power – waste and decommissioning	*Where's the waste going to go? How is it stored? How much waste generated by this station will be left for future generations to deal with i.e. how much and how long will it last?*	**Unanswered**
	How long will it take to decommission (the old/existing) Wylfa?	**Answered**
Nuclear power – other	*What are the actual regulations governing the running of a nuclear power station?*	**Unanswered**
Other infrastructure	*Are the pylons they're going to put on Anglesey going to be much bigger than the ones that are there now? Are they going to replace the pylons or will there be 2 sets? And why pylons?*	**Not Discussed**
	Will there be a new bridge?	**Not Discussed**
Regulators	*Who exactly are the regulators?*	**Answered**

Table A3. Bangor workshop participant questions posed to GDA regulators and workshop convenors at the beginning of the workshop, ordered by theme and identifying whether questions were answered, unanswered or not discussed again during the workshop.

A significant number of participant questions posed to regulators and workshop convenors were unable to be answered during the workshop, in addition to a significant number of them not being discussed again. Due to the agreed scope of the GDA workshop, and indeed the GDA Public Dialogue Pilot project itself, out of the 23 recorded questions asked, 4 questions were answered, 10 questions were not answered, and 9 questions were not discussed any further.

At the very beginning and end of the workshop, participants were invited to participate in the completion of a series of 'baseline' questions, to observe shifts in attitude from the beginning of the workshop. Table A4 overleaf presents a list of comments made by participants in the Bangor workshop in regards to the results of the baseline questioning exercise. These are referenced from the official project report (3KQ, 2015), but these also represent a number of participant comments which were recorded personally. Also, where it was possible to record, the position of the individual on the scale is identified, and some of the comments are presented with such scalar distinctions. The responses are in reference to Question 3 out of four: *How would you rate your level of trust in the regulators?*

Participant position on scale	Comment
Low/Bottom	*Because you don't have any contact with these people.*
	They're all bureaucrats! Information is the thing, the bureaucrat thing is a bit tongue in cheek but it is a bit us and them, they're on our side but…
	The only time you have to find out about these organisations is if you have an issue, and it's only at that point that you find out anything about them. The average person off the street wouldn't have a reason to go to the ONR.
Middle	*It's something about information.*
	I think it definitely is a bit them and us. I do think they know a lot more than they let on, you're all very nice and everything but you only tell us what you want us to hear. It's all very nice here but they'll go back and…
Undefined	*Why can't they just answer questions? And if they don't know the answers, just tell us, say that they don't know! I know they have today, but just tell us. We just don't believe them.*
	We will only trust them when we see that they've taken our issues on board and done something about them.
	It's not the people who are here today who are going to put the plant up, it's probably the people who are building it that need to be here to answer the questions. If they're not giving the regulators the information…
	If they would just say that they'll go and find out the answers to our questions – if they just said they'll do their best, and act like they're trying.
	It takes time – the more you can see what they're about, continuity, building relationships etc.
	We tend to judge on past performances.
	It's about seeing results.
	Part of the reason we can't trust you is that you're reporting to somebody else.

Table A4. This table shows participant responses to Baseline Question 3 - *'How would you rate your level of trust in the regulators?* - in the Bangor workshop, with participant positions on the scale utilised in this exercise where known

In addition to these comments on baseline questioning results, participants in Bangor also discussed the issue of trust during group discussions. Some participants stated that due to issues such as financial motivations and 'vested interests', their trust of regulators would be greater than of nuclear developers. Overall, participants suggested that in order to increase and maintain public trust in the regulators, greater familiarity with regulators was critical; this involved more face to face contact; knowledge of regulators, their roles, the regulatory process itself, examples of the safety measures implemented; and demonstration of track record and precedence (3KQ, 2015). In the Bangor workshop, a public newsletter distributed by the developer Horizon Nuclear Power, which provides updates to local people on the progress of the Wylfa Newydd development and also developments within the company such as recent employment posts, was also discussed by participants. Feedback of this public communication document was mixed; some participants voiced scepticism towards the language used to gain people's views on the development – such as 'Your views count!' – whilst others stated that the word 'consultation' was off-putting and unfamiliar, with alternative language being suggested. Other issues identified by participants, with both the language and the visual aspects of the document, were that they appeared to some participants to indicate or suggest that the development was either already there, or that more was required to emphasise that there was still opportunity to influence decisions (*ibid*). Other findings relevant to this study are participant feedback that in regards to communication, local and personal relevance are of great importance to engage effectively with communities, the effectiveness of communication through the delivery of presentations due to the ability to ask questions, and the requirement to consider engaging effectively with different audiences, who will likely have different requirements and preferences (*ibid*). For instance, people who knew very little about nuclear technology would appreciate simplified and 'relateable' diagrams which draw comparisons to the familiar, such as a kettle, whilst more technically minded people, potentially with scientific or engineering experience, would appreciate more technical materials and an alternative approach.

Stage 3 – Round 2 Dialogue-based Workshop (Crewe)

The second round of dialogue-based workshops was held in Crewe, and saw samples of people from both the Cheltenham and Bangor workshops coming together to take part in a joint workshop, based on those participants who signed up, during Round 1 workshops, to take part; 13 people from Bangor and 18 people from Cheltenham showed their interest in attending the Round 2 workshop, with 18 participants being selected by convenors to attend. The 18 participants were selected to represent a mix of attendees (age, gender, etc.) with 9 attending from each of the Bangor and Cheltenham workshops (3KQ, 2015). This workshop was focussed on gaining greater detail on issues which were touched upon in Round 1, discussing a range of

communication tools, techniques and approaches, and identifying key public engagement recommendations for future GDA-related public dialogue processes.

Table A5 overleaf presents the twelve key communication and engagement-related suggestions from the final workshop, many of which are highly relevant to the current study due to their emphasis on local engagement and promotion on familiarity, honesty, equitable and relevant to local circumstances and needs. In addition to these general suggestions, more focussed findings from the workshop included participant feedback and suggestions on *the 'language' of GDA*, *preferred communication and engagement methods*, and *local engagement* (*ibid*), which will be presented at this point.

The language of GDA

Several participants partook in a discussion about the language used in GDA communications, and commented that the name 'generic design assessment', and as a general concept, is difficult to understand. Participants commented that if the topic could not be understood by members of the public quickly, public disinterest was likely to result, and therefore, some participants suggested that greater 'plain English' language should be utilised. Suggestions for solutions to these highlighted issues included simplifying the explanation of GDA, and introduce it using familiar references where possible; renaming the process, and include language that specifies the link to nuclear power; public consultation on the GDA subject, however, the issue of some people being sceptical towards consultation was raised. Also, the term 'generic' was highlighted as potentially being difficult for people to fully understand without detailed explanation. It was also suggested by some participants that there existed a 'them and us' barrier in the context of language, and that this should be addressed by using 'normal' language; one suggestion was to involve members of the public to participate in writing GDA communication materials, whereas utilisation of the Plain English Campaign (PEC) was also suggested, only for the group to discover that PEC had reviewed the GDA consultation document. Despite this, workshop participants remained with questions in regards to the language being utilised. Acronyms, such as GDA, were identified as problematic and confusing, and it was suggested that the use of these was reduced. Due to the confusion brought about by the term 'generic design assessment', several alternatives were suggested, including 'pre-license assessments', 'pre-nuclear design planning', and 'assessment of new nuclear reactors', which were considered to be more descriptive, describing the process more accurately and easily to a lay audience.

Theme of Suggestion	Detail of what is required
Keep it simple	Use 'every day', 'real life' analogies that people can relate to. Using 'pressure cooker' example to explain a nuclear power station was easy to understand. Devise some simple ideas to attract both young and old people.
Innovate	Make it live, humorous and interactive. Do it completely differently to how it has been done for the last few years by using a fresh approach (e.g. use of TV programmes).
Use a range of methods	Consider how to capture different audiences or demographics using different platforms.
Tap into local resources	Tap into local enthusiasm by utilising those people who are engaged to encourage others to get involved. Target local interest groups that you think would have members who are interested. Use local publications and social media. Get young people involved, e.g. through a school project. Bear in mind a lot of what you find out is through who you know and what they bother to let you know.
Drip feed information	Develop familiarity with the topic by drip feeding information and reusing common images or infographics, to keep people aware and able to respond.
Ensure accessibility and visibility of online information	Ensure online information is easy to find and simple to navigate
Be aware of context, history, and preconceptions	Some people have a fear of nuclear power stations and radiation, and associate "nuclear" with weaponry. People should be told what went wrong in the past (e.g. at Chernobyl), and then informed about what is now being done to stop that happening again.
Make it personal	Find ways of letting people know why this matters to them or gaining their interest in an objective, factual way (e.g. impacts on the wider economy; the thoroughness of the regulatory process with respect to safety; how many lights that power station can turn on in comparison to the old one; future forecasting – projections about how much power is going to be needed)
Make it personable	Representatives from the regulators should be open, honest and engaging – get the right people involved. A friendly face makes a difference.
Reconsider the use of language	Abbreviations, such as GDA, and language are currently not helpful; write in a language people can understand.
Clarify what's up for grabs and listen to people's views	Let people know about the process as early as possible, clarify what is up for grabs, what has already been decided, and how GDA fits in to the wider context – perhaps using an infographic. It is critical to listen to people's views.
Raise the profile of the regulators and their role	Try to raise profiles and clarify their roles (particularly their independence) alongside that of other organisations such as NGO's and Government.

Table A5. This table shows the key communication and engagement-related suggestions from the Round 2 dialogue-based workshop in Crewe

Preferred communication and engagement methods

Workshop participants took part in a discussion on preferences for communication methods around GDA consultation. For example, in regards to flyers, some participants considered these to be a communication method possessing a potentially high visual impact factor, which can contain directional details for people to find out more should they wish to. Oher participants questioned whether people would choose to read a flyer in the first instance, or how far people would get when reading a flyer before becoming disinterested or disposing of it. Some participants suggested that other formats, such as adverts on radio or visual advertisements, were required, in the form of a 'multi-format approach'. The cost of such an approach was recognised, however it was also suggested that cost should not be a barrier to this. Making reference to modern methods, the suggestion of text messaging as a form of communication was suggested but then questioned by many participants, considering it potentially intrusive and inappropriate. Another option which received limited support was large stand-up display panels, some of which had been erected in the room in which the workshop was being conducted, However, many participants had not realised that these boards were present despite their size, reflecting an apparent lack of visibility and inability to 'grab' or draw participants' attention. Generally, infographics were considered to be the most appropriate design when using such large display formats. I also observed that a number of participants were supportive of a number of these alternative methods of communication and engagement, but in conjunction with face to face contact; dialogue between individuals remained a vital method for *effective* communication and engagement.

Local engagement

The subject of local public consultations, conducted by nuclear regulators in local communities (close to nuclear sites), was met with a positive response from many participants. The importance of face to face, personal contact was re-stated, whilst enabling people to 'give regulators a face' and provide an opportunity to emphasise to local people the independent nature of their role. It was suggested by some participants that, whether through face to face contact or through video formats, eye to eye contact was important for effective engagement. In addition to face-to-face engagement, other suggestions included engaging people in a 'door to door' format, or producing a video and distributing it to existing community groups. I observed other participants suggest that existing community groups would not only be appropriate and convenient targets for communicating with multiple members of the public at one time, but that these groups may communicate the information, in an understandable way, to others in their networks. Such discussions raised the opportunities of utilising local tourism, police or community meetings to speak with large numbers of people at one time, and local newspapers and magazines were suggested as potential sources of distributing information to extensive networks of people directly. Beyond utilising local meetings, some participants suggested utilising local people

themselves, so that they might talk to others in the community to raise local awareness, a suggestion which received some noticeable support from participants who felt that they had acquired sufficient knowledge after two workshops to consider this option as possible. Personalising post, for example using house numbers as opposed to sending information to 'the occupier', was suggested as an alternative suggestion on a traditional method of distribution, and received some positive feedback, with some participants sharing their own experience of the effectiveness of this method, based on their own experience.

Mixed-methods

The GDA Public Dialogue Pilot process adopted a mixed-methods approach to both data collection and stakeholder engagement. The GDA process adopted a multi-stage process that began with a stage of quantitative data collection, utilising survey methods, to understand broad participant perceptions and views on a range of issues. There is clear value in the approach of the GDA process in order to assess the effectiveness of workshop-based stakeholder engagement, as this information, in conjunction with baseline questioning, can be assessed as to whether stakeholders have gained knowledge or experience greater trust in regulators as a result. The mixed-methods approach of the GDA Public Dialogue Pilot process was more, but not wholly, focussed towards the agenda of convenors whilst also employing the agenda of educating and informing stakeholders. However, the limitations of the GDA process in regards to the scope of workshop discussions and the ability of stakeholders to voice their concerns regarding the development for which the reactor under assessment was planned, was problematic. This was addressed to a certain extent in the Round 2 workshop, where stakeholder questions were returned to at the beginning of the workshop, but the scope of the process remained fixed which prevented a number of critical stakeholder concerns, which were site-specific in nature, from being explored. I do not claim that the current research process is without potential for reflective enhancement. On the contrary, the process of priority-based dialogue inevitably highlights key questions and concerns of stakeholders, in an environment where very few of them could be addressed, as the process was participant-focussed. However, the process highlighted difficulties in providing an environment where some stakeholder questions may be answered and concerns addressed, whilst others will not, and indeed cannot. From the perspective of participants, who may view the rare opportunity of congregating in a workshop environment with a number of nuclear industry 'experts', this may be difficult to understand and frustrating if these concerns and issues are long-standing or of personal importance to the individual, such as those relating to human health for example. Whilst finding value in a range of engagement formats, such as online information pages or info-graphic leaflets, there is a strong preference among stakeholders for face-to-face contact and engagement as preferable for topics of this nature. In particular, this may be more applicable where there may be significant uncertainty, questions participants may wish

to pose where there is an opportunity for such questions to be answered, or where the discussion of experiences may be appropriate and helpful. The sensitive nature of the subject of engagement – nuclear power - also warrants face-to-face engagement to be considered by engaging bodies (see Caserta et al., 1985), considering that it remains a technology contentious in both social and cultural respects (Cotton, 2014).

Stakeholder Priorities

The GDA Public Dialogue Pilot process sought to identify stakeholder priorities primarily in regards to engagement methods and techniques. Stakeholder priorities identified by the process were diverse, and also changed as the process was conducted; for example, preferences for engagement format were more closely aligned with an online source, whereas face-to-face contact and engagement was increasingly preferred by participants as workshops were conducted. In regards to the issues which stakeholders participating in the process prioritised, these were made known at the beginning of the first workshop as a result of convenors listing participant's initial questions. These questions were revisited at a later stage during the workshop, where the questions were looked at to see whether any had been answered by the preceding presentations and exercises. As I have noted, only 4 out of the 23 questions included in this were answered. This reflects the limitations of a process such as GDA, due to its broad, and critically non-site specific, scope, resulting in site related questions, which many stakeholder questions were, not being able to addressed and answered directly by the experts in attendance. For stakeholders, such workshops provide one of few opportunities to engage with nuclear experts or experts who are involved in nuclear processes; therefore, this limitation of scope, leading to an inability for local stakeholders to ask important and possibly long standing questions, may lead to frustration and even perceptions among those in attendance that experts are avoiding or deflecting difficult questions. However, stakeholders were also informed that site-specific processes of engagement and consultation were due to taking place outside of the GDA process, by the nuclear developer for example, and that their questions may be answered by those responsible for these more site-specific processes. Therefore, whilst stakeholder questions may not have been addressed directly, individuals were informed of where their concerns and questions may be addressed.

Stakeholder engagement and engagement preferences

GDA workshop participants stated that the most important individuals to engage are those living less than 25 miles from a proposed nuclear site, such that 90% of survey respondents felt that this group was very important (79%) or quite important (11%) to engage. The percentage of respondents who believed it was similarly very or quite important for individuals living more than

25 miles away from a proposed site were similar in total but to different degrees on inspection, at 44% and 43% respectively. Of these stakeholders engaged within a 25 mile radius from the proposed site, it was suggested by a number of participants that local interest groups be engaged, for many of the reasons which have been mentioned thus far, such as convenience and similar values and priorities. It was also suggested by workshop participants that following such engagement, these groups may then also engage with other local stakeholders and groups. This served a dual purpose of firstly communicating with others so as to transfer knowledge gained from stakeholder engagement processes, but secondly to encourage others to participate in similar processes should they have had a positive experience. Given the aspects of familiarity and trust already embedded at the local scale between stakeholders, such messages are likely to be received more openly and readily than if communicated from unfamiliar sources. As the official report from the process suggests (3KQ, 2015), personal interaction with stakeholders will not only enable effective communication, through deliberative dialogue using a variety of formats, but it will also facilitate the building of trust, which is critical if the information being communicated is to be taken as trustworthy and based in truth, and whether further engagement is likely; it is unlikely that if trust is not built between both parties that further communication will be effective. Participants in the second workshop (Crewe) became vocal in regards to the value of local people in assisting with engagement processes throughout the local area. The notion of 'local resources' was also used to propose the utilisation of local stakeholders and different social groups who had taken part in previous engagement processes, meaning that of the GDA Public Dialogue Pilot process, such was the positive experience of some.

In regards to engagement preferences of workshop participants, these were also numerous and differed between stakeholders. Overall, a website explaining the assessment process was considered preferable to local stakeholders who responded to the NSS. However, as the process progressed, and participants took part in multiple workshops, the value of face-to-face was recognised by participants. The comment made by one participant, in regards to the value of meeting regulators in order to gain trust in them, supports this preference for face-to-face communication for various reasons, trust building being one of these, and having the ability to query points and ask questions, particularly of knowledgeable 'experts', is another:

"You can't trust anyone without a face" (3KQ, 2015)

This contrasts to the responses from the NSS, in which the attendance of meetings to hear more and ask questions received only 17%. However, this is not the same as face-to-face communication, for two reasons. Firstly, this suggests that stakeholders must actively travel to these meetings (it is not specified whether their attendance would be alone or with others) at a particular time, and that they go there to 'hear more' and 'ask questions'. This reflects community engagement of a transactional/transitional nature, in which the stakeholders are mere receivers on the whole, and are permitted to ask questions should they wish. There is no mention of discussion,

or deliberation of any kind. This does not represent the face-to-face dialogue which workshop participants experienced during the process, where deliberative dialogue was facilitated, and communication was such that it heard the views of stakeholders, and then responded to these views, and to a degree, stakeholder concerns, and to a further degree, was able to respond to a number of these concerns vocalised by questions. These two forms of 'face-to-face' engagement are notably different, and considering this, the response of 17% from stakeholders to this engagement option may be quite understandable in comparison to the evident appreciation of more participatory engagement during GDA workshops, reflecting engagement closer towards the transitional/transformational engagement which is promoted in the literature. It should also be noted that 25% of respondents from the NSS also selected the 'no further involvement' option, which reminds us of the important fact that not all stakeholders wish to participate in stakeholder engagement processes and are happy to either receive information passively, or seek out information of their own accord and in their own time. On the notion of the appropriateness of engagement, the responses of workshop participants also highlighted that engagement must be appropriate according to generational factors, and of stakeholder capacities to access certain information on certain platforms. For example, it was communicated that young people and elderly people would require and respond better to different information formats, with young people being more familiar with and preferring online-based material, whereas this format was less familiar to elderly individuals, who would prefer information presented in leaflet or booklet form. However, as I have noted previously, it was fed back to GDA convenors that dialogue-based engagement, such as that in which they were participating and from which a multitude of suggestions and ideas were being generated, was a preferable method of communication by most, if not all, stakeholders.

Dialogue

The GDA Public Dialogue process was facilitated through a dialogue between workshop attendees ('stakeholders') and facilitators ('experts'), which in part (a significant portion of the workshops were in the form of expert-delivered presentations) reflected the type of dialogue proposed by Innes and Booher (2004) which is essential for effective engagement practices, that of multi-directional communication exchange between involved parties. The *context*, *relevance* and *tailoring* of messages within dialogue were all points identified as important from Round 1 workshops. As I have noted in other work, this highlights that any communication with local stakeholders should appreciate the individuality of communities and site-specific circumstances (Whitton et al., 2016). The authors also note that participants stated a desire for broader and deeper information than permitted by the relatively narrow scope of GDA dialogue, and that workshop participants preferred to speak about site-specific scenarios which reflected their personal circumstances and local context, rather than the 'generic' approach and context of

GDA dialogues, highlighting the importance of context and relevance in such communications with local stakeholders. Workshop participants also proposed that messages, whether dialogue-related or those in engagement materials, be tailored for different groups, acknowledging the multitude of needs, capacities and preferences of various stakeholders. Despite face-to-face communication receiving many positive responses in regards to the effectiveness of dialogue, pragmatic realisations were also vocalised in regards to resource constraints, with other formats of communication with stakeholders being discussed and of the appropriateness and suitability of certain formats for certain stakeholder groups. This echoes my current argument, that there exists at the local scale a diversity of social groups who share different needs and preferences, both inter and intra-generationally, which should be acknowledged, understood and accommodated if stakeholder engagement processes are to be effective and sustainable. Such findings have wider implications for both public-facing engagement and communication materials, particularly for communicating technical or complex subject matter, that rather than employing a broad-brush approach to engagement, it must be conducted appropriately according to the audience (*ibid*).

GDA dialogue sought to identify and understand stakeholder preferences to dialogue. Participant suggestions from the Round 2 workshop for future dialogue practices to be effective and positive included:

- Using ‘every day’, ‘real life’ analogies that people are able to relate to, and language people can understand
- Make it live, humorous and interactive
- Be aware of context, history and preconceptions, and be honest about what has gone wrong in the past and how things have changed to address this
- Make it personal, and let people know why it matters to them
- Make it personable, and be honest, open and engaging with people

These suggestions from workshop participants are both constructive and insightful in regards to future engagement processes with public stakeholders. They suggest that the complex and highly technical subject of nuclear power must be, and indeed can be, communicated in a simple and understandable way in order for any degree of effective engagement to occur. If the terminology of ‘technocratic’ approaches of old are continued to be used, then progress with public audiences will be slow; this requires the ‘lay translation’ of technical information into information which uses ‘every day’ language and references to ‘real life’ situations, so that language is no longer a barrier to understanding what is already a technically complex subject. Ensuring that communication is personal, personable and understandable were raised as key factors contributing towards dialogue effectiveness, communicating in an objective, open, and engaging way,

ensuring the appropriate level of complexity for the audience. Such suggestions from stakeholders highlight the need for a pluralistic approach to stakeholder engagement

Participants even commented on the use of acronyms, such as that of GDA, as forming barriers to engagement due to their confusing nature, with their reduced use in public engagement literature being suggested by a number of individuals. This reflects the importance of appropriate language in dialogue settings, and its dependence on the audience. The GDA process found that given elements of humour and interactivity with public stakeholders, complex concepts were understood by people to the point that they could ask questions of presenting experts. The use of simple ideas communicated in a humorous and interactive way was suggested by participants as critical in communicating technical or complex subjects (i.e. nuclear power-related) in an engaging way, which is able to maintain the interest of the audience (Whitton et al., 2016). Regular use of familiar examples to explain complex systems (such as the use of a kettle to base discussions on the functioning of a nuclear power station) and regularly revisiting the reasons why the material being presented was of relevance to stakeholders enabled an understanding and knowledge to develop among workshop participants, and mutual learning to occur between experts and participants as to which issues or concepts were in need of further explanation, or of the position of participants on certain subjects. Awareness of historical and local context, and potential preconceptions established prior to communication, were identified as key during dialogue on issues or subjects with controversial and/or negative historical connotations (*ibid*). However, rather than these subjects or issues being avoided, such as previous incidents or failings, it was suggested that they be discussed, concurrent to the modern efforts in place to address these historical incidences.

Appendix 2. Pilot Research Questionnaire

The importance of different social issues to Anglesey residents

Participant Information

This PhD research project sets out to examine to what degree different social issues matter to people living in Anglesey. A PhD researcher from the University of Central Lancashire is visiting your school to ask you about your views during a series of three workshops:

1. The first workshop will involve completion of a written questionnaire, which will be anonymous.
2. The second workshop will involve smaller group discussions about the results of the first workshop – these will be recorded and transcribed anonymously and you will not be identifiable.
3. The third workshop will involve the researcher returning to discuss with you the outcomes of the group discussions. This will involve your review and verification that these outcomes and findings are accurate and fair.

The questionnaire should take between 15-20 minutes to complete. If you are happy to take part in this study, please fill out the following consent form, which will be returned to the researcher. Please remember that you may refuse or omit to answer any question. Anonymity will be strictly maintained in any subsequent dissemination of the results of this study. You may withdraw from this study at any time but, if you choose to participate, your decision will be considered as final upon completion of the questionnaire.

If you have any questions, please feel free to ask the researcher. The researcher, Mr Ioan Mihangel Parry, can be contacted at the email address imparry@uclan.ac.uk with questions or queries regarding the research study.

Volunteer Consent

The purpose of this part of the form is to ensure that you are willing to take part in this study and to let you understand what it entails. Signing this form does not commit you to anything you do not wish to do.

Please indicate your response to the following questions by deleting as applicable.

Have you read the Volunteer Information?	YES/NO
Have you been given the opportunity to ask questions?	YES/NO
Do you understand that your anonymity is ensured?	YES/NO
Do you understand that you are not obliged to take part in this study?	YES/NO
Do you agree to take part in the study?	YES/NO

Signature*:_____

School:_____

*For consent only – your name will not be disclosed to any third party.

Questionnaire

What is your gender? (Please circle)

Male ***Female*** ***Prefer not to say /other***

Are you a student or a teacher? (Please circle)

Student ***Teacher***

Which town or village do you live in or closest to?
(Please write the name as clearly as possible:……)

If appropriate, for how many years have you lived in Anglesey?
(Please answer to the nearest whole year:……)

Is Welsh your first language?

Yes ***No***

In the following sections, please indicate how much each social issue matters to you by circling the most appropriate number on the scale. 1 indicates that it matters very little to you and 4 indicates that it matters a lot to you. Please be as honest as possible with your answers. Thank you.

1. **Community**

   a. ***Sense of community (e.g. feeling 'part of' a community)***
   Matters very little to me 1----------2----------3----------4 Matters a lot to me

   b. ***Social links and networks (e.g. friends, family, clubs, interest groups)***
   Matters very little to me 1----------2----------3----------4 Matters a lot to me

   c. ***Trust in other local residents (e.g. neighbours, those who live in your town or village)***
   Matters very little to me 1----------2----------3----------4 Matters a lot to me

2. **Local culture**

   a. ***Welsh culture***
   Matters very little to me 1----------2----------3----------4 Matters a lot to me

   b. ***Welsh heritage (things inherited from the past, e.g. land, buildings)***
   Matters very little to me 1----------2----------3----------4 Matters a lot to me

   c. ***Welsh language (at least maintaining its current level of use in Anglesey)***
   Matters very little to me 1----------2----------3----------4 Matters a lot to me

3. Population changes

a. ***The amount of younger people leaving Anglesey***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

b. ***The amount of people moving onto Anglesey from elsewhere***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

c. ***The number of Welsh speakers in Anglesey***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

4. Crime and safety

a. ***Crime whilst at home (e.g. vehicle theft, theft of or damage to possessions or property)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

b. ***Crime whilst away from home (e.g. verbal or physical assault, robbery while mobile)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

c. ***Crime affecting your local area generally (e.g. damage or theft of communal property, graffiti)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

5. Health

a. ***Physical health (e.g. illness, disease)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

b. ***Financial health (e.g. poverty, homelessness, affording basic items or services)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

c. ***Mental health (e.g. depression, loneliness)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

6. Employment

a. ***Variety of employment in Anglesey (e.g. different types of jobs, a lot of choice)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

b. ***Quality of employment in Anglesey (e.g. highly paid, highly skilled)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

c. ***Amount of employment in Anglesey (e.g. number of available job positions)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

7. Quality of life

a. ***Enjoyment of time spent working (e.g. paid or unpaid work , education)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

b. ***Financial security (e.g. being able to do, pay for, or buy what you need to, in order to feel comfortable)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

c. ***Enjoyment of leisure time (time spent not working or at work)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

8. Training/skills courses

a. ***Variety of training/skills courses on Anglesey (e.g. different types of courses)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

b. ***Access to training/skills courses on Anglesey (e.g. being aware of courses and training, courses being open to anyone)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

c. ***Amount of training/skills courses on Anglesey (e.g. the number of courses being run)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

9. Local participation

a. ***Taking part in voluntary activities in Anglesey (e.g. conservation work, helping elderly residents)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

b. ***Taking part in local decision-making in Anglesey (e.g. part of a local board, attend council meetings)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

c. ***Taking part in community events in Anglesey (e.g. St. David's Day celebrations, local festivals)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

10. Housing

a. ***Amount of affordable housing on Anglesey (e.g. number of houses affordable to local people)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

b. ***Different types of housing on Anglesey (e.g. flats, semi-detached, detached)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

c. ***Condition of housing on Anglesey (e.g. comfortable and attractive housing, in a good state of repair)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

11. Transport

a. ***Condition of roads on Anglesey (e.g. fixing of potholes and road surface degradation, suitable width)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

b. ***Reliability of public transport on Anglesey (e.g. enough buses or trains per hour, arriving on time)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

c. ***Amount of traffic on roads on Anglesey***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

12. Trust

a. ***Having trust in local representatives in Anglesey (e.g. local politicians, MPs)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

b. ***Having trust in local authorities in Anglesey (e.g. Anglesey County Council, Police)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

c. ***Having trust in large companies operating on but not based in Anglesey (e.g. energy companies)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

13. Provision of local services and facilities

a. ***Business, finance and retail (e.g. banks or solicitors, food or clothes shops)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

b. ***Leisure and entertainment (e.g. swimming pools or cinemas)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

c. ***Education and health (e.g. libraries or museums, GP surgeries and dentists)***

Matters very little to me 1----------2----------3----------4 Matters a lot to me

In the spaces provided below, please write the three social issues that matter the *most* to you, and the three social issues that matter the *least* to you, from the issues included in the previous sections of the questionnaire.

Matter the Most:

1. ……

   ……

2. ……

   ……

3. ……

   ……

Matter the Least:

1. ……

   ……

2. ……

   ……

3. ……

   ……

Finally, please state any social issues on Anglesey which you deem to be important *which were not mentioned in the questionnaire* in the box below. Please request more paper if needed.

Volunteer Debriefing

Thank you very much for your participation, the time you have taken to participate in this PhD research study is greatly appreciated. If you have any questions about the study at a later date please do not hesitate to contact the researcher.

Appendix 3. Research Questionnaire

Anglesey Research Questionnaire

Thank you for your participation in this research. This questionnaire aims to identify the social issues that are most important to you as an Anglesey resident. Social issues can be defined as issues affecting members of a society.

Please indicate the degree to which you agree or disagree with the following statements, which relate to various social issues. Please circle the response that is most applicable to you personally. Please consider 3 on the scale as 'no opinion'.

1. Community

a. ***Feeling a sense of community (e.g. feeling 'part of' a community) is important to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

b. ***My social links and networks (e.g. friends, family, clubs, interest groups) within Anglesey are important to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

c. ***Having trust in other local residents (e.g. neighbours, those who live in your town or village) is important to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

2. Local culture

a. ***Welsh culture is important to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

b. ***Maintaining Welsh heritage (things inherited from the past, e.g. land, buildings) is important to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

c. ***The Welsh language (at least maintaining its current level of use in Anglesey) is important to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

3. Population changes

a. ***The amount of younger people leaving Anglesey is important to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

b. ***The amount of people moving onto Anglesey from elsewhere is important to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

c. ***The number of Welsh speakers in Anglesey is important to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

4. Crime and safety

a. ***I am concerned about the amount of crime to or in homes (e.g. vehicle theft, theft of possessions, damage to home) in my town/ village***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

b. ***I am concerned about the amount of crime against people (e.g. verbal or physical assault, robbery whilst mobile or in town) in my town/ village***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

c. ***I am concerned about the amount of crime that affects my town/ village (e.g. damage or theft of communal property, graffiti) in general***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

5. Health

a. ***I consider my physical health (e.g. being physically fit and healthy, a balanced diet, doing exercise) to be of paramount importance for me to be happy in life***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

b. ***I consider my social health (e.g. ability to interact with others in social setings) to be of paramount importance for me to be happy in life***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

c. ***I consider my mental health (e.g. memory, awareness) to be of paramount importance for me to be happy in life***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

6. Employment

a. ***Having a variety of employment in Anglesey (e.g. different types of jobs, a lot of choice) is important to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

b. ***The quality of employment in Anglesey (e.g. highly paid, highly skilled) is important to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

c. ***The amount of employment in Anglesey (e.g. number of available job positions) is important to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

7. Quality of life

a. ***The enjoyment of time spent working (e.g. paid or unpaid work , education)***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

b. ***The ability (time and physical capacity) to do hobbies or activities unrelated to work/ school is important to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

c. ***The enjoyment of my leisure time (time spent not working/ at work/ at school) is important to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

8. Training/skills courses

a. ***The variety of training/skills courses on Anglesey (e.g. different types of courses) is important to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

b. ***Access to training/skills courses on Anglesey (e.g. being aware of courses and training, courses being open to anyone), related to employment, is important to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

c. ***The amount of training/skills courses on Anglesey (e.g. the number of courses being run) is important to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

9. Local participation

a. ***Taking part in voluntary activities in Anglesey (e.g. conservation work, helping elderly residents) is important to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

b. ***Taking part in local decision-making in Anglesey (e.g. part of a local board, attend council meetings or meetings about large developments) is important to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

c. ***Taking part in community events in Anglesey (e.g. St. David's Day celebrations, local festivals) is important to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

10. Housing

a. ***The amount of affordable housing on Anglesey (e.g. number of houses affordable to local people) is important to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

b. ***Having different types of housing on Anglesey (e.g. flats, semi-detached, detached) is important to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

c. ***The condition of housing on Anglesey (e.g. comfortable and attractive housing, in a good state of repair) is important to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

11. Transport

a. ***The condition of roads on Anglesey (e.g. fixing of potholes and road surface degradation, suitable width) is an important issue to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

b. ***The reliability of public transport on Anglesey (e.g. enough buses or trains per hour, arriving on time, enough stops) is an important issue to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

c. ***The amount of traffic on roads on Anglesey is an important issue to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

12. Access and communication

a. ***Having access to and being able to communicate with local representatives in Anglesey (e.g. local politicians, MPs) is important to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

b. ***Having access to and being able to communicate with local authorities in Anglesey (e.g. Anglesey County Council, Police) is important to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

c. ***Having access to and being able to communicate with large companies operating on but not based in Anglesey (e.g. energy companies) is important to me***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

13. Provision of local services and facilities

a. ***Business, finance and retail (e.g. banks or solicitors, food or clothes shops)***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

b. ***Leisure and entertainment (e.g. swimming pools or cinemas)***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

c. ***Education and health (e.g. libraries or museums, GP surgeries and dentists)***

Strongly agree 1----------2----------3----------4----------5 Strongly disagree

Please turn over at this point

14. What is your gender? (Please circle)

Male ***Female*** ***Prefer not to say /other***

15. Please identify your occupation (Please circle)

Student ***Teacher*** ***Farmer/Agriculturalist***

16. Which town or village do you live in or closest to?

(Please write the name as clearly as possible:……)

17. For how many years have you lived in Anglesey?

(Please answer to the nearest whole year:……)

18. Is Welsh your first language? (Please circle)

Yes ***No***

Please turn over at this point

This section asks you to rank the three most important and three least important social issues to you personally, **6 in total** from the 39 listed in the questionnaire.

1 indicates the most important, 2 the second, and 3 the third most important.

39 indicates the least important, 38 the second, and 37 the third least important.

Please write your ranking scores in the boxes next to your selections below.

☐ 1a) Sense of community
☐ 1b) Social links and networks
☐ 1c) Trust in local residents

☐ 2a) Welsh culture
☐ 2b) Welsh heritage
☐ 2c) Welsh language

☐ 3a) Number of young people leaving Anglesey
☐ 3b) Number of people moving onto Anglesey
☐ 3c) Number of Welsh speakers on Anglesey

☐ 4a) Crime to or in homes
☐ 4b) Crime against people
☐ 4c) Crime to local area

☐ 5a) Physical health
☐ 5b) Social health
☐ 5c) Mental health

☐ 6a) Variety of employment
☐ 6b) Quality of employment
☐ 6c) Amount of employment

☐ 7a) Enjoyment of time spent working
☐ 7b) Ability to do hobbies or non-work activities
☐ 7c) Enjoyment of leisure time

☐ 8a) Variety of training/skills courses
☐ 8b) Access to training/skills courses
☐ 8c) Amount of training/skills courses

☐ 9a) Taking part in voluntary activities
☐ 9b) Taking part in decision-making
☐ 9c) Taking part in community events

☐ 10a) Amount of affordable housing
☐ 10b) Different types of housing
☐ 10c) Condition of housing

☐ 11a) Condition of roads
☐ 11b) Reliability of public transport
☐ 11c) Amount of traffic on roads

☐ 12a) Access to local representatives
☐ 12b) Access to local authorities
☐ 12c) Access to large companies

☐ 13a) Business, finance & retail services
☐ 13b) Entertainment & leisure services
☐ 13c) Educational, health & care services

Finally, in the box below please state any social issues on Anglesey that you deem to be important which were not mentioned in this questionnaire, and any reasons why they are important to you. Please also use this space to expand or comment upon any of your answers in the questionnaire, beginning with the question number and the letter (e.g. 1a).

Volunteer Debriefing

Thank you very much for your participation. The time you have taken to participate in this PhD research study is greatly appreciated.

Appendix 4. Consent Form (1st Session)

PhD Research (Questionnaire) - Volunteer Consent Form

The research questionnaire provided should take approximately 15 minutes to complete. If you are happy to take part in this study, please fill out the following consent form and return it to the researcher with the questionnaire. Please remember that you may refuse or omit to answer any question. Annonymity will be strictly maintained.

The purpose of this form is to ensure that you are willing to take part in this study and to let you understand what it entails. Signing this form does not commit you to anything you do not wish to do. If you wish to withdraw from the questionnaire prior to completion, please inform the researcher of your decision to withdraw. You may speak to or contact the researcher at any time at imparry@uclan.ac.uk with any questions.

Please indicate your response to the following questions by circling your answer:

Have you read the Volunteer Information?	Yes / No
Have you been given the opportunity to ask questions?	Yes / No
Do you understand that your anonymity is ensured?	Yes / No
Do you understand that you are not obliged to take part in this study?	Yes / No
Do you agree to take part in the study?	Yes / No

Signature*:……

*For consent only – your name will not be disclosed to any third party

Appendix 5 – Information and Invitation Sheet (1st Session)

PhD Research – The importance of different social issues to Anglesey residents

Research Information and Invitation

My name is Ioan Mihangel Parry and I am a PhD researcher from the University of Central Lancashire in Preston. I have prepared this information sheet to inform you of my PhD research and extend an invitation to participate in it. Part of my PhD research looks to examine the degree to which different social issues matter to people living in Anglesey and whether there are similarities or differences between various social groups in Anglesey.

Anglesey is a unique and diverse island, and there are changes and developments planned for Anglesey in the coming decades. This research proposes that it is important that your social priorities and values as Anglesey residents are identified and understood, as these decisions may affect your lives and the lives of those around you. **The research proposes that by understanding what is important to Anglesey residents, the decisions made regarding these developments can be more locally informed and more locally beneficial, now and in the long term.**

I am providing you with an opportunity to inform me, through the completion of a short questionnaire, of the social issues which are most important to you as an Anglesey resident. **This questionnaire should take 15 minutes to complete and is anonymous; it will not be possible to identify you if the results are published in the future.**

I invite you to take poart in the research and would greatly appreciate your participation. Howeverm participation is voluntary, and if you do not wish to participate in the research or workshop, please notify me that you do not wish to participate.

I can be contacted at the email address imparry@uclan.ac.uk with questions or queries regarding the research study. My PhD supervisor, Dr. John Whitton, may also be contacted at the email address jwhitton@uclan.ac.uk with questions or queries you may have regarding the research.

Thank you very much.

(researcher signature)

Mr Ioan Mihangel Parry

Appendix 6 - Consent Form (2nd Session)

Understanding social group priorities and the impact of, and decision-making for, nuclear energy developments on Anglesey

Workshop Two – Group discussion

Participant Consent Form

If you would like to take part in this workshop, please fill out the following consent form and return it to the researcher. Please remember that anonymity will be strictly maintained, and whilst contributions to the discussion are encouraged by all, you will not be forced to contribute. Please be aware that group discussions will be audio recorded and that these recordings will be confidential.

The purpose of this form is to ensure that you are willing to take part in this study and to let you understand what it entails. Signing this form does not commit you to anything you do not wish to do. If you wish to withdraw from the group discussion during the workshop, you are free to do so. All data from these workshops will be private and confidential, and will be securely stored on University premises. The data will only be used for research purposes.

Please write your initials next to each of the following statements if they are correct and sign where indicated to confirm your participation:

I confirm that I have read the Participant Information Sheet ……

I confirm that I have been given the opportunity to ask questions ……

I confirm that I understand that my anonymity is ensured ……

I confirm that I understand that I am not obliged to take part in this study ……

I confirm that I agree to take part in the study ……

Signature*:_____

*For consent only – your name will not be disclosed to any third party.

Appendix 7 – Information and Invitation Sheet (2nd Session)

Understanding social group priorities and the impact of, and decision-making for, nuclear energy developments on Anglesey

Research Information and Invitation to Participate in Workshop 2

My name is Ioan Mihangel Parry and I am a PhD researcher from the University of Central Lancashire in Preston. I have prepared this information sheet in inform you of my PhD research and extend an invitation to participate in the second workshop of the series. I would also like to take this opportunity to thank you again for participating in the first workshop where you completed a research questionnaire, which informs this second workshop.

The research proposes that it is important that your social priorities and values as Anglesey residents are identified and understood, as the decision-making processes associated with these developments may affect your lives and the lives of those around you. **The research proposes that by understanding what is important to Anglesey residents, the decisions made regarding these developments can be more locally informed and more locally beneficial, now and in the long-term.**

I will be visiting you in the near future to run a second short workshop. The workshop will involve a group discussion about:

- The social issues which are important to you;
- How proposed energy developments on Anglesey, particularly related to nuclear energy, may impact these social aspects of your lives, and;
- How decision-making related to these developments might be improved by greater public participation.

The workshop discussion requires between 6 and 8 people. I invite you to take part in the discussion and would greatly appreciate your voluntary participation. It is expected to last no longer than one hour, during which there will be a short break with refreshments provided. Participation is anonymous and the workshops will be audio-recorded with your consent.

Please notify …(name of group contact)… as soon as possible if you would like to take part in the group discussion, who will also inform you of the date and time of the workshop.

Workshop Details

The workshop will involve discussing social issues which are important to you as a group with other members of the group. This discussion will be based upon the information provided in the questionnaires completed during the first workshop. You have the right not to answer any questions or take part in discussion which you do not wish to. All data will be confidentially and securely stored in locked cabinets or computers. Workshop data in computer files will be password protected.

If you are not happy with the way you are treated during this workshop, please contact my PhD supervisor Dr. John Whitton, whose contact details are shown below, with your complaint. If you wish to withdraw from the study, please make this known to the researcher before remaining in or leaving the workshop. The data collected (e.g. contributions to discussion) up to the point of a participant withdrawing will be used unless requested by the participant that it not be used in the research, using the researcher's email address below. Please remember that your participation is voluntary and that you will not be financially rewarded for participating in this research.

Research Details

The research is fully approved and is part of an Environmental and Physical Sciences Research Council (EPSRC) funded CASE Award with the National Nuclear Laboratory, in partnership with the University of Central Lancashire.

I can be contacted at the email address imparry@uclan.ac.uk with questions or queries regarding the research study. My PhD supervisor, Dr. John Whitton, may also be contacted at the email address jwhitton@uclan.ac.uk with any questions or queries you may have regarding the research.

Thank you very much.

(Scanned signature here)

Mr Ioan Mihangel Parry

Appendix 8 - Consent Form (3rd Session)

Understanding social group priorities and the impact of, and decision-making for, nuclear energy developments on Anglesey

Workshop Three – Sustainability Indicators Feedback and Discussion

Volunteer Consent Form

If you are happy to take part in this workshop, please fill out the following consent form and return it to the researcher. Please remember that anonymity will be strictly maintained, and whilst contributions to the discussion are encouraged by all, you will not be forced to contribute. Please be aware that group discussions will be audio recorded and that these recordings will be confidential.

The purpose of this form is to ensure that you are willing to take part in this study and to let you understand what it entails. Signing this form does not commit you to anything you do not wish to do. If you wish to withdraw from the group discussion during the workshop, you are free to do so. All data from these workshops will be private and confidential, and will be securely stored on University premises. The data will only be used for research purposes.

Please write your initials next to each of the following statements if they are correct and sign where indicated to confirm your participation:

I confirm that I have read the Participant Information Sheet ……

I confirm that I have been given the opportunity to ask questions ……

I confirm that I understand that my anonymity is ensured ……

I confirm that I understand that I am not obliged to take part in this study ……

I confirm that I agree to take part in the study ……

Signature*:_____

*For consent only – your name will not be disclosed to any third party.

Appendix 9 – Information and Invitation Sheet (3rd Session)

Understanding social group priorities and the impact of, and decision-making for, nuclear energy developments on Anglesey

Research Information and Invitation to Participate in Workshop 3

My name is Ioan Mihangel Parry and I am a PhD researcher from the University of Central Lancashire in Preston. I have prepared this information sheet in inform you of my PhD research and extend a continuing invitation to participate in the third workshop of the series. I would also like to take this opportunity to thank you again for participating in the first and second workshops.

The research proposes that it is important that your social priorities and values as Anglesey residents are identified and understood, as the decision-making processes associated with these developments may affect your lives and the lives of those around you. **The research proposes that by understanding what is important to Anglesey residents, the decisions made regarding these developments can be more locally informed and more locally beneficial, now and in the long-term.**

I will be visiting you in the near future to run a third and final workshop, where the researcher will present a series of sustainability indicators to reflect and measure over time the social issues prioritised by you. It will provide you with an opportunity to discuss and give feedback on these, to ensure that they reflect what is important to you. The workshop will also give you an opportunity to provide feedback on the workshop series, on what worked well and what could be improved or changed if the process was to be carried out again in the future. Finally, any suggestions you have for future Anglesey research projects will also be discussed.

I invite you to take part in this final workshop and would greatly appreciate your voluntary participation. It is expected to last no longer than 45 minutes, during which there will be refreshments provided. Participation is anonymous and the workshops will be audio-recorded with your consent.

Please notify …(name of group contact)… as soon as possible if you would like to take part in the workshop, who will also inform you of the date and time of the workshop.

Workshop Details

The workshop will involve discussing researcher-developed sustainability indicators with other members of the group. This discussion will be based upon the information provided during the group discussions in the second workshop. You have the right not to answer any questions or take part in discussion which you do not wish to. All data will be confidentially and securely stored in locked cabinets or computers. Workshop data in computer files will be password protected.

If you are not happy with the way you are treated during this workshop, please contact my PhD supervisor Dr. John Whitton, whose contact details are shown below, with your complaint. If you wish to withdraw from the study, please make this known to the researcher before remaining in or leaving the workshop. The data collected (e.g. contributions to discussion) up to the point of a participant withdrawing will be used unless requested by the participant that it not be used in the research, using the researcher's email address below. Please remember that your participation is voluntary and that you will not be financially rewarded for participating in this research.

Research Details

The research is fully approved and is part of an Environmental and Physical Sciences Research Council (EPSRC) funded CASE Award with the National Nuclear Laboratory, in partnership with the University of Central Lancashire.

I can be contacted at the email address imparry@uclan.ac.uk with questions or queries regarding the research study. My PhD supervisor, Dr. John Whitton, may also be contacted at the email address jwhitton@uclan.ac.uk with any questions or queries you may have regarding the research.

Thank you very much.

(Scanned signature here)

Mr Ioan Mihangel Parry

Appendix 10. ANOVA Results; Local Culture

ANOVA

Theme	Comparison	df	F ratio	Sig.
Local_Culture_Culture	Between Groups	3	4.492	.007
	Within Groups	56		
Local_Culture_Heritage	Between Groups	3	2.969	.040
	Within Groups	56		
Local_Culture_Language	Between Groups	3	2.099	.111
	Within Groups	56		

Multiple Comparison

Theme	Group	Groups	Sig.
Local_Culture_Culture	YUB S	YSTJ S	.201
		YSTJ T	.080
		CTGYM F	.080
	YSTJ S	YUB S	.201
		YSTJ T	.003
		CTGYM F	.003
	YSTJ T	YUB S	.080
		YSTJ S	.003
		CTGYM F	1.000
	CTGYM F	YUB S	.080
		YSTJ S	.003
		YSTJ T	1.000
Local_Culture_Heritage	YUB S	YSTJ S	.386
		YSTJ T	.060
		CTGYM F	.299

	YSTJ S	YUB S	.386
		YSTJ T	.007
		CTGYM F	.060
	YSTJ T	YUB S	.060
		YSTJ S	.007
		CTGYM F	.386
	CTGYM F	YUB S	.299
		YSTJ S	.060
		YSTJ T	.386
Local_Culture_Language	YUB S	YSTJ S	.698
		YSTJ T	.125
		CTGYM F	.125
	YSTJ S	YUB S	.698
		YSTJ T	.056
		CTGYM F	.056
	YSTJ T	YUB S	.125
		YSTJ S	.056
		CTGYM F	1.000
	CTGYM F	YUB S	.125
		YSTJ S	.056
		YSTJ T	1.000

Appendix 11. ANOVA Results; Community

ANOVA

Theme	Comparison	df	F ratio	Sig.
Comm_S_O_C	Between Groups	3	4.508	.007
	Within Groups	56		
Comm_Links_Networks	Between Groups	3	1,340	.271
	Within Groups	56		
Comm_Trust_Residents	Between Groups	3	8.056	.000
	Within Groups	56		

Multiple Comparison

Theme	Group	Groups	Sig.
Comm_S_O_C	YUB S	YSTJ S	.448
		YSTJ T	.016
		CTGYM F	.002
	YSTJ S	YUB S	.448
		YSTJ T	.091
		CTGYM F	.016
	YSTJ T	YUB S	.016
		YSTJ S	.091
		CTGYM F	.448
	CTGYM F	YUB S	.002
		YSTJ S	.016
		YSTJ T	.448
Comm_Links_Networks	YUB S	YSTJ S	.117
		YSTJ T	.074
		CTGYM F	.177

	YSTJ S	YUB S	.117
		YSTJ T	.821
		CTGYM F	.821
	YSTJ T	YUB S	.074
		YSTJ S	.821
		CTGYM F	.651
	CTGYM F	YUB S	.177
		YSTJ S	.821
		YSTJ T	.651
Comm_Trust_Residents	YUB S	YSTJ S	.085
		YSTJ T	.000
		CTGYM F	.000
	YSTJ S	YUB S	.085
		YSTJ T	.017
		CTGYM F	.026
	YSTJ T	YUB S	.000
		YSTJ S	.017
		CTGYM F	.861
	CTGYM F	YUB S	.000
		YSTJ S	.026
		YSTJ T	.861

Appendix 12. ANOVA Results; Population Change

ANOVA

Theme	Comparison	df	F ratio	Sig.
Pop_Change_Young_Leaving	Between Groups	3	8.147	.000
	Within Groups	56		
Pop_Change_Onto Ang	Between Groups	3	4.174	.010
	Within Groups	56		
Pop_Change_Welsh Speakers	Between Groups	3	3.143	.0.32
	Within Groups	56		

Multiple Comparison

Theme	Group	Groups	Sig.
Pop_Change_Young_Leaving	YUB S	YSTJ S	1.000
		YSTJ T	.000
		CTGYM F	.002
	YSTJ S	YUB S	1.000
		YSTJ T	.000
		CTGYM F	.002
	YSTJ T	YUB S	.000
		YSTJ S	.000
		CTGYM F	.554
	CTGYM F	YUB S	.002
		YSTJ S	.002
		YSTJ T	.554

Pop_Change_Onto Ang	YUB S	YSTJ S	.513
		YSTJ T	.011
		CTGYM F	.254
	YSTJ S	YUB S	.513
		YSTJ T	.002
		CTGYM F	.075
	YSTJ T	YUB S	.011
		YSTJ S	.002
		CTGYM F	.144
	CTGYM F	YUB S	.254
		YSTJ S	.075
		YSTJ T	.144
Pop_Change_Welsh Speakers	YUB S	YSTJ S	.582
		YSTJ T	.103
		CTGYM F	.047
	YSTJ S	YUB S	.582
		YSTJ T	.031
		CTGYM F	.013
	YSTJ T	YUB S	.103
		YSTJ S	.031
		CTGYM F	.714
	CTGYM F	YUB S	.047
		YSTJ S	.013
		YSTJ T	.714

Appendix 13. ANOVA Results; Crime

ANOVA

Theme	Comparison	df	F ratio	Sig.
Crime_Safety_Amount_Home	Between Groups	3	2.310	.086
	Within Groups	56		
Crime_Safety_Amount_People_Town	Between Groups	3	1.503	.224
	Within Groups	56		
Crime_Safety_Amount_Town_General	Between Groups	3	1.800	.158
	Within Groups	56		

Multiple Comparison

Theme	Group	Groups	Sig.
Crime_Safety_Amount_Home	YUB S	YSTJ S	.887
		YSTJ T	.570
		CTGYM F	.069
	YSTJ S	YUB S	.887
		YSTJ T	.670
		CTGYM F	.051
	YSTJ T	YUB S	.570
		YSTJ S	.670
		CTGYM F	.018
	CTGYM F	YUB S	.069
		YSTJ S	.051
		YSTJ T	.018

Crime_Safety_Amount_ People_Town	YUB S	YSTJ S	.569
		YSTJ T	.669
		CTGYM F	.121
	YSTJ S	YUB S	.569
		YSTJ T	.321
		CTGYM F	.321
	YSTJ T	YUB S	.669
		YSTJ S	.321
		CTGYM F	.050
	CTGYM F	YUB S	.121
		YSTJ S	.321
		YSTJ T	.050
Crime_Safety_Amount_ Town_ General	YUB S	YSTJ S	.413
		YSTJ T	.891
		CTGYM F	.059
	YSTJ S	YUB S	.413
		YSTJ T	.340
		CTGYM F	.276
	YSTJ T	YUB S	.891
		YSTJ S	.340
		CTGYM F	.044
	CTGYM F	YUB S	.059
		YSTJ S	.276
		YSTJ T	.044

Appendix 14. ANOVA Results; Health

ANOVA

Theme	Comparison	df	F ratio	Sig.
Health_Physical	Between Groups	3	2.310	.024
	Within Groups	56		
Health_Social	Between Groups	3	1.793	.159
	Within Groups	56		
Health_Mental	Between Groups	3	3.224	.029
	Within Groups	56		

Multiple Comparison

Theme	Group	Groups	Sig.
Health_Physical	YUB S	YSTJ S	.847
		YSTJ T	.024
		CTGYM F	.057
	YSTJ S	YUB S	.847
		YSTJ T	.015
		CTGYM F	.037
	YSTJ T	YUB S	.024
		YSTJ S	.015
		CTGYM F	.699
	CTGYM F	YUB S	.057
		YSTJ S	.037
		YSTJ T	.699

Health_Social	YUB S	YSTJ S	.543
		YSTJ T	.313
		CTGYM F	.029
	YSTJ S	YUB S	.543
		YSTJ T	.685
		CTGYM F	.109
	YSTJ T	YUB S	.313
		YSTJ S	.685
		CTGYM F	.226
	CTGYM F	YUB S	.029
		YSTJ S	.109
		YSTJ T	.226
Health_Mental	YUB S	YSTJ S	.021
		YSTJ T	.012
		CTGYM F	.012
	YSTJ S	YUB S	.021
		YSTJ T	.813
		CTGYM F	.813
	YSTJ T	YUB S	.012
		YSTJ S	.813
		CTGYM F	1.000
	CTGYM F	YUB S	.012
		YSTJ S	.813
		YSTJ T	1.000

Appendix 15. ANOVA Results; Employment

ANOVA

Theme	Comparison	df	F ratio	Sig.
Employment_Variety	Between Groups	3	1.290	.287
	Within Groups	56		
Employment_Quality	Between Groups	3	.448	.720
	Within Groups	56		
Employment_Amount	Between Groups	3	.740	.533
	Within Groups	56		

Multiple Comparison

Theme	Group	Groups	Sig.
Employment_Variety	YUB S	YSTJ S	.449
		YSTJ T	.133
		CTGYM F	.800
	YSTJ S	YUB S	.449
		YSTJ T	.449
		CTGYM F	.314
	YSTJ T	YUB S	.133
		YSTJ S	.449
		CTGYM F	.081
	CTGYM F	YUB S	.800
		YSTJ S	.314
		YSTJ T	.081

Employment_Quality	YUB S	YSTJ S	.804
		YSTJ T	.322
		CTGYM F	1.000
	YSTJ S	YUB S	.804
		YSTJ T	.456
		CTGYM F	.804
	YSTJ T	YUB S	.322
		YSTJ S	.456
		CTGYM F	.322
	CTGYM F	YUB S	1.000
		YSTJ S	.804
		YSTJ T	.322
Employment_Amount	YUB S	YSTJ S	.493
		YSTJ T	.173
		CTGYM F	.255
	YSTJ S	YUB S	.493
		YSTJ T	.493
		CTGYM F	.648
	YSTJ T	YUB S	.173
		YSTJ S	.493
		CTGYM F	.819
	CTGYM F	YUB S	.255
		YSTJ S	.648
		YSTJ T	.819

Appendix 16. ANOVA Results; Quality of Life

ANOVA

Theme	Comparison	df	F ratio	Sig.
QOL_Enjoy_Work_School	Between Groups	3	4.065	.011
	Within Groups	56		
QOL_Ability_Hobbies	Between Groups	3	.734	.536
	Within Groups	56		
QOL_Enjoy_Leisure_Time	Between Groups	3	5.281	.003
	Within Groups	56		

Multiple Comparison

Theme	Group	Groups	Sig.
QOL_Enjoy_Work_ School	YUB S	YSTJ S	.085
		YSTJ T	.002
		CTGYM F	.011
	YSTJ S	YUB S	.085
		YSTJ T	.130
		CTGYM F	.384
	YSTJ T	YUB S	.002
		YSTJ S	.130
		CTGYM F	.513
	CTGYM F	YUB S	.011
		YSTJ S	.384
		YSTJ T	.513

QOL_Ability_Hobbies	YUB S	YSTJ S	.361
		YSTJ T	.254
		CTGYM F	1.000
	YSTJ S	YUB S	.361
		YSTJ T	.819
		CTGYM F	.361
	YSTJ T	YUB S	.254
		YSTJ S	.819
		CTGYM F	.254
	CTGYM F	YUB S	1.000
		YSTJ S	.361
		YSTJ T	.254
QOL_Enjoy_Leisure_ Time	YUB S	YSTJ S	.326
		YSTJ T	.805
		CTGYM F	.009
	YSTJ S	YUB S	.326
		YSTJ T	.460
		CTGYM F	.000
	YSTJ T	YUB S	.805
		YSTJ S	.460
		CTGYM F	.004
	CTGYM F	YUB S	.009
		YSTJ S	.000
		YSTJ T	.004

Appendix 17. ANOVA Results; Training/Skills courses

ANOVA

Theme	Comparison	df	F ratio	Sig.
Courses_Variety	Between Groups	3	1.258	.298
	Within Groups	56		
Courses_Access to	Between Groups	3	.768	.517
	Within Groups	56		
Courses_Amount	Between Groups	3	.872	.461
	Within Groups	56		

Multiple Comparison

Theme	Group	Groups	Sig.
Courses_Variety	YUB S	YSTJ S	.098
		YSTJ T	.155
		CTGYM F	.633
	YSTJ S	YUB S	.098
		YSTJ T	.811
		CTGYM F	.235
	YSTJ T	YUB S	.155
		YSTJ S	.811
		CTGYM F	.341
	CTGYM F	YUB S	.633
		YSTJ S	.235
		YSTJ T	.341

Courses_Access to	YUB S	YSTJ S	.341
		YSTJ T	.155
		CTGYM F	.633
	YSTJ S	YUB S	.341
		YSTJ T	.633
		CTGYM F	.633
	YSTJ T	YUB S	.155
		YSTJ S	.633
		CTGYM F	.341
	CTGYM F	YUB S	.633
		YSTJ S	.633
		YSTJ T	.341
Courses_Amount	YUB S	YSTJ S	.493
		YSTJ T	.113
		CTGYM F	.493
	YSTJ S	YUB S	.493
		YSTJ T	.362
		CTGYM F	1.000
	YSTJ T	YUB S	.113
		YSTJ S	.362
		CTGYM F	.362
	CTGYM F	YUB S	.493
		YSTJ S	1.000
		YSTJ T	.362

Appendix 18. ANOVA Results; Local Participation

ANOVA

Theme	Comparison	df	F ratio	Sig.
Local_Part_Voluntary	Between Groups	3	2.183	.100
	Within Groups	56		
Local_Part_Dec Making	Between Groups	3	2.733	.052
	Within Groups	56		
Local_Part_Comm Events	Between Groups	3	.830	.483
	Within Groups	56		

Multiple Comparison

Theme	Group	Groups	Sig.
Local_Part_Voluntary	YUB S	YSTJ S	1.000
		YSTJ T	.206
		CTGYM F	.206
	YSTJ S	YUB S	1.000
		YSTJ T	.206
		CTGYM F	.206
	YSTJ T	YUB S	.206
		YSTJ S	.206
		CTGYM F	.013
	CTGYM F	YUB S	.206
		YSTJ S	.206
		YSTJ T	.013

Local_Part_Dec Making	YUB S	YSTJ S	.211
		YSTJ T	.753
		CTGYM F	.119
	YSTJ S	YUB S	.211
		YSTJ T	.119
		CTGYM F	.006
	YSTJ T	YUB S	.753
		YSTJ S	.119
		CTGYM F	.211
	CTGYM F	YUB S	.119
		YSTJ S	.006
		YSTJ T	.211
Local_Part_Comm Events	YUB S	YSTJ S	.626
		YSTJ T	.197
		CTGYM F	.197
	YSTJ S	YUB S	.626
		YSTJ T	.418
		CTGYM F	.418
	YSTJ T	YUB S	.197
		YSTJ S	.418
		CTGYM F	1.000
	CTGYM F	YUB S	.197
		YSTJ S	.418
		YSTJ T	1.000

Appendix 19. ANOVA Results; Housing

ANOVA

Theme	Comparison	df	F ratio	Sig.
Housing_Amount_Affordable	Between Groups	3	.860	.467
	Within Groups	56		
Housing_Diff_Types	Between Groups	3	.411	.746
	Within Groups	56		
Housing_Condition	Between Groups	3	.715	.547
	Within Groups	56		

Multiple Comparison

Theme	Group	Groups	Sig.
Housing_Amount_ Affordable	YUB S	YSTJ S	.555
		YSTJ T	.172
		CTGYM F	1.000
	YSTJ S	YUB S	.555
		YSTJ T	.432
		CTGYM F	.555
	YSTJ T	YUB S	.172
		YSTJ S	.432
		CTGYM F	.172
	CTGYM F	YUB S	1.000
		YSTJ S	.555
		YSTJ T	.172

Housing_Diff_Types	YUB S	YSTJ S	.299
		YSTJ T	.405
		CTGYM F	.532
	YSTJ S	YUB S	.299
		YSTJ T	.835
		CTGYM F	.676
	YSTJ T	YUB S	.405
		YSTJ S	.835
		CTGYM F	.835
	CTGYM F	YUB S	.532
		YSTJ S	.676
		YSTJ T	.835
Housing_Condition	YUB S	YSTJ S	.263
		YSTJ T	.500
		CTGYM F	.180
	YSTJ S	YUB S	.263
		YSTJ T	.653
		CTGYM F	.822
	YSTJ T	YUB S	.500
		YSTJ S	.653
		CTGYM F	.500
	CTGYM F	YUB S	.180
		YSTJ S	.822
		YSTJ T	.500

Appendix 20. ANOVA Results; Transport

ANOVA

Theme	Comparison	df	F ratio	Sig.
Transport_Condition_Roads	Between Groups	3	1.112	.352
	Within Groups	56		
Transport_Reliability_Pub_ Transport	Between Groups	3	2.051	.117
	Within Groups	56		
Transport_Amount_Traffic	Between Groups	3	1.254	.299
	Within Groups	56		

Multiple Comparison

Theme	Group	Groups	Sig.
Transport_Condition_ Roads	YUB S	YSTJ S	.788
		YSTJ T	.181
		CTGYM F	.420
	YSTJ S	YUB S	.788
		YSTJ T	.110
		CTGYM F	.283
	YSTJ T	YUB S	.181
		YSTJ S	.110
		CTGYM F	.590
	CTGYM F	YUB S	.420
		YSTJ S	.283
		YSTJ T	.590

Transport_Reliability_Pub _ Transport	YUB S	YSTJ S	.838
		YSTJ T	.069
		CTGYM F	.069
	YSTJ S	YUB S	.838
		YSTJ T	.106
		CTGYM F	.106
	YSTJ T	YUB S	.069
		YSTJ S	.106
		CTGYM F	1.000
	CTGYM F	YUB S	.069
		YSTJ S	.106
		YSTJ T	1.000
Transport_Amount_ Traffic	YUB S	YSTJ S	.336
		YSTJ T	.057
		CTGYM F	.336
	YSTJ S	YUB S	.336
		YSTJ T	.336
		CTGYM F	1.000
	YSTJ T	YUB S	.057
		YSTJ S	.336
		CTGYM F	.336
	CTGYM F	YUB S	.336
		YSTJ S	1.000
		YSTJ T	.336

Appendix 21. ANOVA Results; Access and Communication

ANOVA

Theme	Comparison	df	F ratio	Sig.
Access_Comm_Local_Rep	Between Groups	3	5.043	.004
	Within Groups	56		
Access_Comm_Local_ Authority	Between Groups	3	4.382	.008
	Within Groups	56		
Access_Comm_Large_ Companies	Between Groups	3	1.554	.211
	Within Groups	56		

Multiple Comparison

Theme	Group	Groups	Sig.
Access_Comm_Local_ Rep	YUB S	YSTJ S	.847
		YSTJ T	.003
		CTGYM F	.015
	YSTJ S	YUB S	.847
		YSTJ T	.005
		CTGYM F	.024
	YSTJ T	YUB S	.003
		YSTJ S	.005
		CTGYM F	.563
	CTGYM F	YUB S	.015
		YSTJ S	.024
		YSTJ T	.563

Access_Comm_Local_ Authority	YUB S	YSTJ S	.826
		YSTJ T	.010
		CTGYM F	.031
	YSTJ S	YUB S	.826
		YSTJ T	.006
		CTGYM F	.018
	YSTJ T	YUB S	.010
		YSTJ S	.006
		CTGYM F	.660
	CTGYM F	YUB S	.031
		YSTJ S	.018
		YSTJ T	.660
Access_Comm_Large_ Companies	YUB S	YSTJ S	.725
		YSTJ T	.118
		CTGYM F	.083
	YSTJ S	YUB S	.725
		YSTJ T	.222
		CTGYM F	.163
	YSTJ T	YUB S	.118
		YSTJ S	.222
		CTGYM F	.860
	CTGYM F	YUB S	.083
		YSTJ S	.163
		YSTJ T	.860

Appendix 22. ANOVA Results; Services and Facilities

ANOVA

Theme	Comparison	df	F ratio	Sig.
Serv_Fac_Busi_Finan_ Retail	Between Groups	3	4.667	.006
	Within Groups	56		
Serv_Fac_Leis_Enter	Between Groups	3	3.079	.035
	Within Groups	56		
Serv_Fac_Educ_Health_ Care	Between Groups	3	1.488	.228
	Within Groups	56		

Multiple Comparison

Theme	Group	Groups	Sig.
Serv_Fac_Busi_Finan_ Retail	YUB S	YSTJ S	.002
		YSTJ T	.002
		CTGYM F	.035
	YSTJ S	YUB S	.002
		YSTJ T	1.000
		CTGYM F	.285
	YSTJ T	YUB S	.002
		YSTJ S	1.000
		CTGYM F	.285
	CTGYM F	YUB S	.035
		YSTJ S	.285
		YSTJ T	.285

Serv_Fac_Leis_Enter	YUB S	YSTJ S	.008
		YSTJ T	.025
		CTGYM F	.254
	YSTJ S	YUB S	.008
		YSTJ T	.646
		CTGYM F	.112
	YSTJ T	YUB S	.025
		YSTJ S	.646
		CTGYM F	.254
	CTGYM F	YUB S	.254
		YSTJ S	.112
		YSTJ T	.254
Serv_Fac_Educ_Health_ Care	YUB S	YSTJ S	.098
		YSTJ T	.060
		CTGYM F	.155
	YSTJ S	YUB S	.098
		YSTJ T	.811
		CTGYM F	.811
	YSTJ T	YUB S	.060
		YSTJ S	.811
		CTGYM F	.633
	CTGYM F	YUB S	.155
		YSTJ S	.811
		YSTJ T	.633

Appendix 23. Author Publications