Public Attitudes to Fusion Energy: A Qualitative Study in the UK

Megan Connolly

PhD

University of York

Environment and Politics

August 2025

Abstract

Energy is at the forefront of society, central in economic, political and societal systems (Boudet, 2019). Due to this, energy choices have a broad impact on society, meaning that new technologies often incite public reactions (ibid.), highlighting the importance of understanding public opinions regarding energy sources. This is particularly vital regarding emergent technologies such as fusion energy. There has been very limited previous research regarding public attitudes towards fusion energy. Most previous work has focused on attitudes throughout Europe, finding that attitudes towards fusion are linked with participants attitudes towards nuclear fission.

Fusion energy is the same process that fuels the sun and stars and is a developing energy source that offers a safe, green and abundant energy supply (DEBIS, 2020). In 2019, the UK Government agreed £220 million worth of funding for a new spherical tokamak fusion plant (STEP) that aims to demonstrate the ability to generate net electricity from fusion (UKAEA, 2022). Five sites were considered to host this plant, including Ardeer, Scotland. However, West Burton in Nottingham was announced as the chosen site in October 2023 (Roe and Smith, 2023). This project uses local and stakeholder interviews within two case study locations, the potential host site of Ardeer and the chosen STEP location of West Burton, to understand attitudes to fusion, including the perceived benefits and risks, as well as what heuristics publics use to understand this complex technology. This research also includes a national and local media analysis, exploring how fusion is framed.

The main aim of this study is to gather social intelligence regarding fusion generally and the STEP development more specifically offering the first in-depth UK-based qualitative study focused on the STEP development. This research shows that while there is general support for fusion, concerns often stem from broader scepticism towards novel and large scale technology innovations, as well as a wider mistrust in government and the lasting effects of deindustrialisation on local communities. Interestingly, in West Burton, some participants preferred fusion over proposed solar developments, suggesting nuclear technologies may not always be met with resistance. By combining interviews, media analysis and participant observation, this thesis offers a unique, in-depth perspective on public attitudes to fusion energy. Its findings provide valuable insights for stakeholders involved in the STEP project and future energy developments, showing how early, open, and locally sensitive engagement can build trust, challenge misconceptions, and support more socially informed decision-making around emerging technologies.

Table of Contents

Abstract **2**
List of Tables **8**
List of Figures **9**
Acknowledgements **10**
Author's Declaration **11**
Chapter 1. Introduction **12**
1.1. Fusion in the UK 15
1.2. Current Perceptions of Fusion 16
1.3. Rationale and Research Questions 18
1.4. Research Contributions and Recommendations 20
1.5. Thesis Structure and Overview of Findings 21
Chapter 2. Literature Review **23**
2.1. Introduction 23
2.1.1. Theoretical Approaches to Public Opinion Research 26
2.1.2. Theoretical Approaches to Exploring Attitudes Towards Fusion Energy 28
2.2. Why Is Public Acceptability So Important? 34
2.2.1. Why do Publics Matter? 34
2.2.2. Public Acceptance vs Acceptability 36
2.2.3. Justice 39
2.2.4. The Role of Information 41
2.2.5. The Role of Prior Knowledge 45
2.2.6. Risk Literature 47
2.3. Drivers In Shaping Public Opinion 50
2.3.1. The Media 50
2.3.2. (Mis)Trust in Government 52
2.3.3. Public Consultation 56
2.3.4. Perceived Benefits and Risks 59
2.3.5. Environmental Impact 61
2.3.6. Climate Change 62
2.3.7. Energy Security 64
2.3.8. Scientific Controversy 65
2.4. Place 67
2.4.1. Social Constructions of Place 68

2.4.2. Complexities of Place 70
2.4.3. Geographical Pride 71
2.4.4. Geographical Stigma 73
2.4.5. Deindustrialisation Effects 75
2.5. Heuristics 77
2.5.2. Trade Offs 82
2.5.2.1. Environmental Impact vs Energy Production 82
2.5.2.2. Cost vs Reliability 84
2.6. Positioning the Research Within the Literature 85
Chapter 3. Methodology and Methods 87
3.1. Introduction 87
3.2. Qualitative Methods 89
3.3. Research Rationale 90
3.4. Interview Methods 91
3.4.1. Participant Overview 93
3.5. Media Analysis Methods 94
3.6. Participatory Observation 97
3.7. Theories and Data Analysis 98
3.7.1. Framing Theory 98
3.7.1.1. Framing Theory in Relation to Fusion Energy Media 99
3.7.2. Thematic Analysis of Interviews and News Articles 102
3.7.3. Sentiment Analysis 104
3.8. Ethical Considerations 105
3.8.1. Positionality and Reflexivity 105
3.9. Research Challenges and Further Reflections 106
Chapter 4. Contextualisation of Case Study Areas 107
4.1. Why Understand Histories? 108
4.2. Case Study Background 110
4.2.1. West Burton History 110
4.2.2. Ardeer History 114
4.3. Case Study Rationale 118
Chapter 5. Public Perceptions and Place-Based Perspectives on Fusion Energy: Interview and Observation Data. 121
5.1. General Themes 123
5.1.1. Climate Change 123

5.1.2. Renewable Energy 125
5.1.3. Energy Security 127
5.1.4. Perceived Benefits 130
5.1.5. Perceived Risks 132
5.1.6. Public Engagement 136
5.1.7. General Themes Summary 141
5.2. Place 143
5.2.1. West Burton Specific Themes 143
5.2.1.1. Changing of the Site 143
5.2.1.2. Community Impacts 146
5.2.1.3. Community Events 149
5.2.2. Ardeer Specific Themes 151
5.2.2.1. Visual and Landscape Impact 151
5.2.2.2. Disappointment 153
5.2.3. Place Summary 155
5.3. Heuristics 157
5.3.1. Comparison With Fission 157
5.3.2. Knowledge Gaps 161
5.3.3. Lesser of Two Evils 164
5.3.4. Government Influence 166
5.3.5. Achievability 168
5.3.6. Heuristics Summary 170
5.4. Chapter Summary 172
Chapter 6. Media Framing 173
6.1. Key Findings 174
6.1.1. Low Carbon Alternative 174
6.1.2. Sustainability and Climate Change 175
6.1.3. Fission Contrast and Heuristics 177
6.1.4. Technical Pessimism VS Optimism 179
6.1.5. Safe and Reliable 181
6.1.6. Socio-Economic Positive 182
6.2. National media 184
6.2.1. Scientific Language 184
6.2.2. Global Impacts 185
6.2.3. Energy Security 186

6.2.4. Urgency Climate and Energy Security 187
6.3. Local Media Pre STEP Site Being Chosen 188
6.3.1. Positive Local Impacts 188
6.3.2. Negative Local Impacts 190
6.3.3. Opposition Justification 191
6.3.4. Future Generations 193
6.3.5. Government Influence 194
6.3.6. Safety Risks 195
6.3.7. Environmental Risks 197
6.4. Local Media Post the STEP Site Being Chosen 199
6.4.1. Chosen Site 199
6.4.2. Unsuccessful Site – Disappointment 200
6.4.3. Unsuccessful Site – Positive 201
6.5. Sentiment Analysis 203
6.5.1. Positive Emotive Language 203
6.5.2. Negative Emotive Language 204
6.6. Fusion, Media and Sociotechnical Imaginaries 206
6.7. Chapter 6 Summary 207
Chapter 7. Synthesis Chapter 210
7.1. Introduction 210
7.2. Fears, Misconceptions and Opposition 211
7.3. Reluctant Acceptance 215
7.4. Geographical Context and Place Identity 217
7.5. Complexities of Public Engagement 218
7.6. Support and Optimism 219
Chapter 8. Conclusion 222
8.1. General Attitudes Towards Fusion 222
8.2. The Influence of Place and Heuristics Used by Publics 223
8.3. Media Framings and Their Influence 224
8.4. Contributions to Theory, Methods and Empirical Knowledge 225
8.5. Stakeholder Recommendations 227
8.6. Opportunities for Further Research 229
8.7. Final Conclusions 230
References 231
Appendix 1 – Information and GDPR 288

Appendix 2 – Consent Form..... 291
Appendix 3 – Interview Structure..... 293
Appendix 4 – Initial Coding Framework 296

List of Tables

Table Page Number

1. Participant Overview 93
2. Stratified Sample of Media Articles 95

List of Figures

Figure Page Number

1. Five Main Drivers of Acceptance 30
2. Map of West Burton 111
3. Satellite Map of West Burton 113
4. Map of Ardeer 114
5. Satellite Map of Ardeer 116
6. Map of the UK 119

Acknowledgements

I would like to express my deepest gratitude to my academic supervisors, Dr. KP Parkhill and Dr. Simona Davidescu, for their invaluable guidance, encouragement, and constructive feedback throughout this journey. Your expertise and insights have been instrumental in shaping this work, and I am profoundly grateful for your support. I am particularly thankful for your patience and understanding where my confidence wavered and when I suffered the loss of my nan.

I am equally indebted to my industry supervisor, Chris Warrick, for his mentorship and practical insights, which have greatly enhanced the depth and applicability of this project. Beyond this, I am especially grateful for his understanding and encouragement during challenging moments. His genuine care and belief in my abilities has been a source of reassurance and motivation. I would also like to extend my thanks to the UK Atomic Energy Authority (UKAEA) and the University of York, via the Fusion CDT for funding this research.

This work would not have been possible without the participation of both publics and stakeholders, within both West Burton and Ardeer, who generously shared their time and perspectives during interviews. Your contributions provided the foundation for this research, and I am sincerely thankful for your engagement.

On a personal note, I am eternally grateful to my parents for their unwavering support, especially for allowing me to move back home during my final year. Your support made this process easier to manage.

To my girlfriend, now fiancée, thank you for your endless patience, your willingness to listen, and your sharp eye for proofreading. Your love and support have kept me grounded throughout this process, and I cannot imagine having done this without you by my side. I am forever grateful for you.

Finally, I want to thank my best friend, Emily, for being a constant source of friendship and strength from the very beginning of my academic journey. From our undergraduate and three years of living together to our shared return to York for my PhD and your masters, your support and friendship has been invaluable.

This thesis is as much a reflection of the incredible people around me as it is of my own efforts, and I am deeply grateful to each and every one of you.

Author's Declaration

I declare that this thesis is a presentation of original work and I am the sole author. This work has not previously been presented for a degree or other qualification at this University or elsewhere. All sources are acknowledged as references.

Chapter 1. Introduction

Securing public trust and support is widely recognised as a cornerstone of successful energy infrastructure development (Akpan and Olanrewaju, 2023). In the UK, public contestation has played a decisive role in shaping the trajectory of energy projects, with several developments being delayed, reconfigured, or abandoned due to vocal local opposition (Sovacool et al, 2022). A prominent example is the proposed Moorside nuclear power station development, which was abandoned partly due to the very vocal local opposition group to the development (British Broadcasting Corporation (BBC), 2016). Influential contestation has also been seen in onshore wind developments, particularly after a rule introduced in 2015 under Prime Minister David Cameron's Conservative Government gave local communities more power to block new onshore wind farms, with one planning opposition able to derail a development (Horton, 2024). As a result of this rule, no new onshore wind farms had been constructed since 2015 until it was overturned by the new Labour Government in July 2024 (CIEEM, 2024). This policy, however, highlights how publics can significantly influence the trajectory of energy developments.

Energy is at the forefront of society, central in economic, political and societal systems (Boudet, 2019). Due to this, energy choices have a broad impact on society, meaning that new technologies often incite public reactions (ibid.), highlighting the importance of understanding public opinions regarding energy sources. Nuclear power plays a key role in the future energy mix and future energy security of the country, ensuring there is enough supply for the ever-increasing demand (IEA, 2022). This highlights the importance of research surrounding nuclear and understanding any contestation new developments may face from the public. The current Labour government led by Kier Starmer state that nuclear power is a critical part of the of the UK's future energy mix and pledges to keep investing, with £410 million of funding to be provided in 2025 (Watson, 2025). This investment can also help pave the way for new forms of nuclear energy including fusion energy, allocating time for infrastructure, expertise and funding research.

Fusion energy, also known as nuclear fusion, is an emergent technology, meaning it is rapidly developing, not yet commercially available, and not well understood amongst publics (Griffiths et al, 2022). Fusion is the same process that fuels the sun and stars, where atoms are fused together at high temperatures to generate energy (DEBIS, 2020). Fusion is a developing new energy source that offers a safe, green and abundant energy supply (ibid.). Fusion has low carbon emissions and is sustainable, as it uses hydrogen fuels, where supplies are estimated to last millions of years. Fusion is energy efficient, as at equal mass, fusion releases nearly four million times more energy than the burning of coal, oil or gas and four times more energy per kilogram than nuclear fission reactors (DEBIS, 2020). Fusion does not produce long lived radioactive waste like fission, with radioactive materials safe to be recycled in 100s of years, much less than fissile waste. Fusion is also safe, as it does not require a chain reaction, like nuclear fission does. If there was any interruption to the reaction or working configuration of the reactor, the process would stop within a few seconds, meaning nuclear accidents, as per nuclear fission reactors are not possible, thus making fusion energy inherently safe (International Atomic Energy Agency, IAEA, 2024).

Fusion energy is fundamentally different from nuclear fission in both its underlying physics and its risk profile, yet these distinctions are often poorly understood by publics. Whereas fission splits heavy atoms such as uranium in a self-sustaining chain reaction, fusion works by fusing light hydrogen isotopes, deuterium and tritium, under extremely high temperatures and pressures to form helium, releasing energy in the process (UKAEA, 2023a; IAEA, 2024). Crucially, fusion reactions are not chain reactions: if external heating or magnetic confinement is interrupted, the reaction stops within seconds, removing the possibility of runaway accidents of the kind associated with fission reactors (UKAEA, 2023a). Fusion fuel is also fundamentally different, with deuterium extracted from water and tritium bred within the reactor from lithium, meaning there is no requirement for fissile materials and no production of long-lived, high-level radioactive waste (IAEA, 2024). Instead, the principal known radiological risks arise from neutron activation of reactor materials, which can become radioactive over time, and from the handling of tritium, a radioactive isotope of hydrogen (UKAEA, 2023b). These risks are considered manageable within existing industrial safety practices, although they will require robust containment, monitoring and regulatory oversight, particularly during operation and decommissioning (Jenkins et al., 2024). At the same time,

important uncertainties remain because fusion has not yet been deployed at commercial scale, including long-term waste characterisation, the durability and recyclability of activated materials, and the adequacy of regulatory frameworks that were largely developed for fission rather than fusion (Chen, 2016; UK Government, 2023). These known risks and unresolved unknowns are central to understanding how publics make sense of fusion, particularly given widespread confusion with fission and the transfer of risk perceptions from nuclear accidents to fusion through heuristics and media framings. Clarifying these distinctions is therefore not only a technical necessity but an analytical one, as it directly informs how safety, waste and uncertainty are socially constructed, framed and interpreted within the public attitudes explored throughout this thesis. Against this technical and risk backdrop, the UK Government's decision to invest in a first-of-a-kind fusion power plant through the Spherical Tokamak for Energy Production (STEP) programme represents not only a major scientific milestone, but also a critical social moment in which public perceptions, risk framings and trust in governance will play a decisive role in shaping the technology's future trajectory.

The UK Atomic Energy Authority (UKAEA) is a government funded world leading organisation for research into fusion energy, contributing to 75% of the UK fusion research outputs from 2009-2018 (DEBIS, 2020). Given UKAEA's leading role in fusion energy research their work is pivotal in shaping public awareness and attitudes towards this emergent technology. This study, in collaboration with UKAEA, explores current public attitudes towards fusion energy, examining key factors in shaping opinion and engagement.

The aim of this thesis is to understand public attitudes towards fusion energy, understanding the influence of place, the media and what heuristics are used by publics. This study specifically explores the opinions of publics within two chosen case studies, Ardeer and West Burton, as well as national and local media. To my knowledge there are no other studies exploring such opinions and the media framing of fusion, therefore this research aims to fill such gaps.

1.1. Fusion in the UK

The UK Government's climate target as of September 2022 aims to reduce greenhouse gas emissions at least 68% by 2030, in comparison to 1990 levels, and be net zero by 2050. (Burnett et al, 2024). In 2020 the Government released their "Ten Point Plan for a Green Industrial Revolution", where point three is 'Delivering New and Advanced Nuclear Power' (GOV, 2020. Pp 12). This shows the government believe nuclear power plays a key role in delivering significant decarbonisation of the electricity system within the UK (ibid.). On the 4th of July 2024, this Conservative government was voted out in a general election, with a new Labour government being voted in (Cracknell et al, 2024). The new Labour government under Prime Minister Keir Starmer has reaffirmed that nuclear power is central to the UK's green future and energy security, committing to continued investment in the sector (Labour, 2024).

Fusion in the UK has seen significant developments over recent years, with funding for future long-term projects. The UKAEA started operating the European JET project in 1983, which was designed to study fusion in conditions approaching those needed for a power plant (UKAEA, 2021). This experiment produced its first plasma in 1983. This ran for over 40 years before closing in 2023, trying out different fuels and having numerous upgrades (ibid.). In 2019 the government agreed £220 million worth of funding for a new spherical tokamak fusion plant, named STEP, that aims to demonstrate the ability to generate net electricity from fusion (UKAEA, 2022). It will also determine how the plant will be maintained through its operational life and prove the potential for the plant to produce its own fuel.

In 2020 an open call was announced for local authorities and other bodies to put forward sites that could host the new plant (ibid.). In June 2021 a long list of 15 of these sites to be explored was announced. This list was then narrowed to just 5 feasible sites: Moorside, Cumbria; Severn Edge, Gloucestershire; Goole, East Riding of Yorkshire; Ardeer, North Ayrshire; and finally, West Burton, Nottinghamshire. These sites were then investigated through feasibility studies, public consultation, and other criteria (UKAEA, 2022). UKAEA then submitted their reports and made a recommendation, with the final decision being made by the then Secretary of State for Business, Energy and Industrial Strategy, Sir Jacob Reese Mogg MP (Roe and Smith,

2023). Mogg announced West Burton as the future host of the STEP experiment on the 3rd of October 2023 at the Conservative Party Conference (ibid.). With West Burton being selected as host, there is the opportunity, through a case study approach, to explore public perceptions of fusion energy both nationally and within the local community.

1.2. Current Perceptions of Fusion

In this field of research, there have been very limited studies exploring public attitudes to fusion energy. The frequency of research has increased in recent years (Turcanu, 2020), however, there is still a scarcity of research, particularly in comparison to other low carbon technologies, such as wind energy (Fournis and Fortin, 2017; Hübner et al, 2023). One of the earliest studies into public attitudes of fusion energy found that fusion had the highest standard of social acceptability; meaning it was widely perceived as safe, beneficial and aligned with societal values, and could compete with other energy sources in terms of social and environmental costs (Toschi, 1997). This suggests that there are factors that increase the acceptability of fusion amongst publics, in comparison to other energy sources.

Social research into fusion energy in the EU has found that for public attitudes to be understood, participants first need an understanding of the technology itself (Prades et al, 2018). Similar results were found through a study conducted in the Czech Republic, where respondents were given information about fusion prior to gathering their opinions (Čábelková et al, 2021). The study again found that when respondents were given information regarding fusion energy, the overall opinions were considerably more positive than studies who did not provide information (ibid.). Such results indicate that the social acceptability of fusion will increase as information regarding the technology becomes more widespread within publics. This therefore highlights the need for stakeholder engagement with publics in order to understand what information about fusion energy is known, so that future engagement can be targeted.

Prades et al (2018) explored the influence of stakeholders upon publics. The paper found that the promotion of stakeholder engagement with the community, can have a significant positive

impact upon public attitudes to fusion energy (Prades et al, 2018). The influence of stakeholders suggests that publics should be informed of stakeholder involvement and steps should be taken to ensure there are significant opportunities for engagement.

As fusion is an emergent technology it is important to understand the most influential predictors of attitudes towards fusion. Emergent technologies are new and rapidly growing developments that have the potential to significantly impact society and industries (Rotolo et al, 2015). Turcanu et al (2020) found that the most significant predictors of attitudes towards fusion energy are public's attitudes towards nuclear fission, their attitudes towards science/technology, and the perceived cost and time required to develop fusion technology (Turcanu et al, 2020). This study also found that knowledge of fission played a key role in participants' understanding fusion, through comparison between the two. This highlights the influence of existing nuclear perceptions on fusion attitudes, raising important questions about how public understanding is shaped. Exploring these factors further is key to understanding public attitudes towards fusion energy, which this study aims to investigate.

The emergent nature of fusion energy presents challenges in public acceptability of the technology. One of the most recent studies exploring public attitudes to fusion energy found that the unproven nature of fusion energy presents concerns regarding the feasibility of the technology (Jones et al, 2024). This study also states that this unproven nature raises questions regarding funding, given the current climate emergency (ibid.), therefore suggesting that publics may show more support for investment in proven low carbon technologies rather than the experimental nature of fusion energy.

Overall, it can be observed that there is generally a substantial amount of support for fusion energy amongst publics. However, this support is limited by a number of factors, particularly in relation to the emergent status of fusion. This prior research regarding fusion energy provides a basis for this study, as it is based in various countries and concerns fusion technology as a concept. By way of contrast, this research project explores the very real development of an experimental fusion power plant and how UK publics perceive this, taking into consideration local opinions and national media coverage.

1.3. Rationale and Research Questions

As fusion energy is an emergent technology it requires upstream engagement with publics and other stakeholders. The aim of upstream engagement is to involve publics early in the decision-making process, fostering dialogue, building trust, and shaping policies before they are fully developed (Escobar, 2014). This approach helps address concerns, gather diverse perspectives, and ensure more inclusive and accepted outcomes (Rowan et al, 2024). This project therefore aims to understand perceptions of fusion energy held by publics. In addition, emergent technologies, like fusion, often generate significant media attention, which can also shape public perceptions and influence policy decisions (McCombs and Valenzuela, 2020). This makes media analysis a valuable method for understanding factors that may shape public attitudes. Therefore, this research will provide understanding of how this technology is framed by both publics and the media and what benefits and risks are perceived by publics. The findings of this study will be presented back to UKAEA, providing social intelligence on public attitudes and media framing, while providing recommendations to stakeholders on future public engagement.

Given the above, plus the recent developments in fusion energy nationally, this PhD aims to explore public perceptions of fusion within the UK. The specific aim and objectives are:

Aim; To explore and understand public attitudes towards fusion energy within the UK.

Objectives:

- To develop an understanding of public attitudes towards fusion energy, in particular the perceived benefits and risks, and whether these attitudes are influenced by place attachment.
- To understand how fusion is framed by publics including the heuristics they use.
- To explore how fusion energy is framed within the media.
- To gather social intelligence and provide stakeholder recommendations regarding fusion energy and the STEP development for a UK Government research authority within the sector (UKAEA).

Given these objectives the following questions have directed this research in order to help those developing the technology to understand the concerns the public have, allowing mitigation strategies to be devised:

1) In what ways do the public believe fusion technology could benefit or hinder their life and do the negatives (if any) outweigh the positives in terms of providing their support for future developments?
2) Does where an individual lives influence their attitudes towards fusion energy and how do these attitudes differ, if at all, between the chosen case studies West Burton and Ardeer?
3) How is fusion energy framed by publics and what mental shortcuts (heuristics) are used to understand this technology, and how can these heuristics influence opinion?
4) How is fusion energy framed within UK media and what is the discourse surrounding the technology? Does this vary between national media and local media surrounding each of the proposed STEP sites?
5) How can this research help UKAEA, providing recommendations and social intelligence for this organisation?

Public attitudinal research is often conducted using positivist methods such as surveys and opinion polls (Young, 2017). Despite being able to gather large quantities of data over large geographical areas, surveys and quantitative research methods are not the best approach for this research project, due to the emergent nature of fusion energy (Phellas et al, 2011). This is because the rigid nature of surveys can overlook the nuanced insights into emergent technology that can be explored further through qualitative methods (Knott et al, 2022). Whereas more constructivist qualitative methods such as the interviews used within this research are more appropriate for gathering opinions of emerging technologies such as fusion energy (Mojtahed et al, 2014). These methods are more pertinent as they allow the collection of detailed information, they also allow a richer understanding of these topics where there is not much previous research (Adams, 2015).

1.4. Research Contributions and Recommendations

Research on public attitudes to fusion in the UK can provide insights into public awareness, support, and concerns regarding fusion energy. This helps in shaping effective communication strategies and guiding policy decisions (Macintosh, 2004). Through identifying potential barriers to acceptance, this research will help in the design of initiatives that align with public values and expectations, ultimately facilitating smoother adoption of fusion technology as the technology develops. This project hopes to aid UKAEA and other fusion developers in understanding public opinions and concerns and how these can be mitigated through the ongoing fusion projects within the UK.

Chapter 8 section 4 of this thesis, provides a comprehensive list of stakeholder recommendations. These recommendations detail where education and information are needed, based on the knowledge gaps uncovered within the research. The ways in which this education can be conducted will also be provided. The recommendations will also detail the information that is required to be disseminated in order to alleviate the misconceptions held by publics. Understanding what publics view as most beneficial regarding fusion technology allows for recommendations on further development and information dissemination of these elements. Conversely understanding what publics view as the biggest risks, allows suggestions for developers on how to mitigate these to ensure cooperative development of this technology.

The media analysis allows for the development of targeted communication strategies, allowing concerns highlighted within the media to be addressed. This also provides insight on how to generate proactive media engagement allowing directors to develop relationships with journalists and media outlets to provide accurate and frequent publications and aim to dispel misinformation regarding the technology.

1.5. Thesis Structure and Overview of Findings

The chapter following this introduction, chapter 2 provides a detailed literature review, providing a basis for this project. The chapter discusses the importance of public acceptability, what drivers shape public opinion, the relevance of place theory and also heuristics.

Chapter 3 lays out the methodology used within this project, including the methods for interviews, media analysis and public observation. These data collection methods are detailed alongside the methods for data analysis and the ethical considerations taken throughout. The data and findings from this research are detailed within three chapters. Chapter 4, will provide context for the choice of these case studies, understanding why histories matter and a rationale for this case study research. Chapter 5 details the fieldwork insights exploring the findings from the interviews and participant observation, specifically the influence of place and heuristics. Chapter 6 is dedicated to the media analysis presenting the data from both national media and local media, exploring the specific themes that occur within each of these genres of media outlet. Chapter 7 provides a synthesis chapter that brings together the fieldwork and media analysis, detailing the fears, misconceptions and opposition to fusion energy. This chapter also highlights the presence of reluctant acceptance of the technology and ends with the data regarding publics providing support and optimism.

Chapter 8 provides the conclusion to the thesis, giving an overview of headline findings and detailed conclusions that can be drawn from this study. This chapter provides a concise list of indicative stakeholder recommendations and proposes opportunities for future research.

This thesis shows that public attitudes towards fusion energy are shaped by a range of factors, including where people live, their past experiences, and the ways they understand new technologies. Misunderstandings between fusion and fission are common, and these often lead to concerns about safety that are not based on the realities of fusion technology, but also present as broader uncertainties towards unfamiliar technologies.. Trust in government also plays a major role, with historic mistrust making people more cautious about new developments. Through comparing West Burton and Ardeer, the research highlights how local

histories of deindustrialisation have led to different views on the potential benefits of fusion. This research uses theories such as place attachment, heuristics, and media framing to understand how publics form their opinions and make decisions about fusion energy. Overall, the findings argue that genuine public engagement, clear communication about benefits and risks, and a better understanding of local contexts are crucial for the success of fusion projects. The next chapter will explore how these themes fit into wider research on public acceptability, attitudes to technology, and the role of place and trust.

Chapter 2. Literature Review

2.1. Introduction

Public attitudinal research is a broad field that encompasses various theories and approaches, with numerous frameworks being utilised. Research within this area often draws upon multiple different theories and methodologies to gain a comprehensive understanding of attitudes and opinions (Oskamp and Schulz, 2005). This project aims to understand the attitudes and opinions to fusion energy in the UK; therefore, this chapter aims to explore the different theories applied to public attitudinal research and assess which ones are relevant to answering the research questions outlined in this study. This chapter of the thesis will explore why public attitudes matter and should be considered, what factors can influence these, and the theories and concepts that are involved within public attitudinal research, which are relevant to the study of attitudes regarding fusion energy. Fusion energy is an emergent technology, meaning it is new, fast growing and there is little awareness of it amongst publics (Rotolo et al, 2015), thus the role of emergent technologies on public attitudes will also be explored.

Due to fusion energy being an emergent technology there is extremely limited research regarding this specific topic. As such, literature regarding public attitudes to other emergent technology is crucial in understanding the theoretical contributions this research can offer. A number of significant impacts on public opinion have been observed from this new technology literature such as perceptions of risk, knowledge, and environmental impact (Emmerich et al, 2020). This chapter explores the importance of public acceptability regarding such emergent technologies, discussing why publics matter and the role of information and prior knowledge. Also discussed within this chapter are the drivers that shape public opinion, the influence of place on public attitudes, and the heuristics that are used by publics to understand fusion energy.

Public acceptability is widely recognised as an important issue influencing the widespread implementation of renewable energy technologies and the achievement of policy targets

(Devine-Wright, 2024; Lai et al, 2025; Lucas et al, 2021; Stadelmann-Steffen et al, 2021). Policy studies look at acceptability as being crucial for policy design and compliance and ultimately for the success of public policies (Dermont et al, 2017). This is because acceptability can provide legitimacy for decisions and make implementation easier and less costly (Beyers and Arras, 2020). The literature refers also to other terms such as public participation in decision-making, which includes consultation (ibid.). Public acceptability of renewable energy can be viewed as a triumvirate of socio-political, community and market acceptance (Wüstenhagen et al, 2007). There are a number of different dynamics of social acceptance, a number of which are rooted in the political nature of developments (Ellis et al, 2023). These include dynamic interactions between stakeholders and governments at different scales. Additionally, it is important to consider the role of power in terms of political influences. The role of power and the different ways it can be manifested and utilised is crucial for gaining a full understanding of public acceptability (Ellis et al, 2023).

This chapter analyses public attitudinal literature, exploring the theoretical lenses used by these researchers and the drivers that influence public opinion. Public attitudinal literature is relevant to this research as the main aim is to understand public attitudes towards fusion energy within the UK. Examining previous literature regarding this helps to understand the theoretical frames that have been utilised to explore attitudes towards energy developments previously but also allows the research gaps to be highlighted (Dunne, 2011). Theories such as the social cognitive theory and agenda setting have been explored throughout this chapter. Political leaders and institutions, economic conditions, cultural and social norms, education, and information are just some drivers that affect public opinion, with the media also being one of these (Burstein, 2003).

Public acceptance and public acceptability will also be explored within the literature review, examining why publics matter, the concept of heuristics and the role of information and knowledge in public acceptance. Literature pertaining to emergent technology will be thoroughly explored, delving further into the main themes uncovered, such as the risk literature, the impact of knowledge on risk, the environmental impact of emergent technology, leading into the exploration of the trade-offs that are relevant for this project. The literature regarding drivers that shape said public acceptance will be analysed, including trust, public

consultation, the impacts of perceived benefits and risks and the influence of climate change and energy security (Boudet, 2019; Perlaviciute and Steg, 2014). Finally, the theories relevant to this project will be explored, the specific theories and concepts will be discussed, such as framing theory, discourse analysis and place attachment theory. The literature surrounding each of these concepts and theories will be outlined in order to help situate this project exploring public attitudes to fusion energy in the UK, within the existing literature. The chapter aims to discuss the current published literature exploring each of these theories, and how they relate to this study of fusion energy. The chapter concludes by summarising the relevance of exploring general attitudes, place identity and heuristics, before moving on to the methods chapter.

Given the complex and emergent nature of fusion energy, this chapter draws together several different strands of literature to build a comprehensive framework for the research. It first explores why public attitudes matter for energy developments, especially new technologies, before moving on to the different drivers that shape public opinion, such as trust, information, and perceived risk. Following this, the chapter considers the role of place attachment, helping to explain how local identity and history influence views on technological change. Finally, the chapter explores how publics use heuristics to understand complex topics, and how the media frames new technologies like fusion energy. Although these areas are wide-ranging, each is necessary to capture the full picture of how attitudes towards fusion are formed. The structure of the chapter follows this logic, moving from broader concepts of public acceptability to more specific influences like place and media, helping to set up the analytical approach taken later in the thesis.

Together, the literature reviewed in this chapter provides the conceptual and empirical foundations for analysing public attitudes to fusion energy, situating the study within debates on energy acceptability, place, risk, information and governance, while also highlighting gaps in existing research on emergent low-carbon technologies such as fusion.

2.1.1. Theoretical Approaches to Public Opinion Research

Public opinion holds a pivotal role in shaping the trajectories of technological and societal development, particularly when it comes to emergent technologies like fusion energy. Historically, public attitudes have significantly influenced the adoption, regulation, and acceptance of technologies, and fusion energy is no exception (Jacobsson and Lauber, 2006). As Stirling (2005) argues, engaging with the public introduces diverse forms of knowledge and perspectives into the debate, challenging dominant technocratic narratives and enabling a more democratic approach to innovation. This "opening up" of discussions invites scrutiny of the assumptions and implications of technological developments, ensuring that they align with broader societal values rather than remaining confined to technical or expert domains (ibid.).

Lippmann, one of the first prominent figures in public opinion research, highlighted the role of media in shaping individual opinions and the inherent limitations people face in forming fully rational opinions due to the complexities of the world (1922). His work laid the foundation for later theories, such as the agenda-setting theory developed by McCombs and Shaw (1972), which explores how media influences public perceptions of what issues are deemed important. This connection between media and public opinion is critical in understanding how emergent technologies like fusion energy are framed and communicated to the public.

Public engagement also serves as a mechanism for accountability and transparency. Fiorino (1990) emphasises the democratic value of public participation, arguing that the involvement of citizens brings essential insights, holds decision-makers accountable, and reduces the risks of alienation or opposition that can arise when technological advancements are imposed without adequate consultation. For fusion energy, which is characterised by its complexity, long development timelines, and significant public investment, understanding and addressing public attitudes is critical to its successful implementation.
Different theories help explain the dynamics of public opinion formation. Social constructivism, for instance, highlights the role of cultural and social factors in shaping individual perceptions and beliefs (Amineh and Asl, 2015). It provides the theoretical lens through which this research is interpreted, recognising that public attitudes towards fusion

energy are influenced by social and cultural contexts. Another theory, symbolic interactionism, developed by Blumer, emphasises the importance of symbols - such as language, gestures, and objects - in shaping human interactions (1986). Blumer (1986) argued that meanings are constructed and modified through social interactions, which has implications for understanding how public perceptions evolve over time. However, symbolic interactionism has limitations in exploring public attitudes toward fusion energy, as it lacks focus on broader cultural and historical factors, which limits its applicability (Stryker and Vryan, 2003).

Bandura's (1999) social cognitive theory provides another important perspective on public opinion. This theory explores how individuals learn by observing others, which is highly relevant in understanding how public opinion on fusion energy is shaped through exposure to media, events, or community engagement (ibid.). Social cognitive theory emphasises the role of observational learning, cognitive processes, and factors like beliefs and self-perception in shaping behaviour (Bandura,1999). For this research, the theory offers a useful framework for interpreting observational data collected at community fusion events, as well as understanding how public opinion can be influenced through education and engagement initiatives. Studies in renewable energy opinion formation have demonstrated how self-rewarding strategies, as informed by social cognitive theory, can motivate young adults to participate in energy transitions (Komendantova, 2018).

Jasanoff (2004) proposed the concept of sociotechnical imaginaries which further highlights the importance of public opinion, showing how shared visions of the future influence technological development and governance. Fusion energy, as both a symbol of scientific progress and a potential solution to the global energy crisis, is shaped by these imaginaries. Public engagement ensures that these imaginaries are inclusive and reflect shared values, rather than being shaped exclusively by technical or political elites (Kuchler and Stigson, 2024).

While several theoretical perspectives help frame broader academic discussions around public opinion, this research draws lightly on two in particular: social constructivism and social cognitive theory. Social constructivism offers a useful lens for understanding how attitudes towards fusion energy are shaped by cultural, social, and historical contexts (Amineh and Asl, 2015). Social cognitive theory is applied in a limited way to interpret observational

insights from engagement events, especially in relation to how learning through exposure and social interaction may shape opinions (Bandura, 1999). These theories provide a loose conceptual grounding for the analysis, supporting an interpretive and context-sensitive approach.

From a methodological perspective, understanding public opinion requires a multidisciplinary approach (Klein, 2007). Public opinion is a vital concept across various disciplines – human geography, politics, sociology, psychology, and Science and Technology Studies (STS) - each of which offers unique insights into how attitudes are formed and how they influence societal outcomes (Price, 1992). Researching public attitudes toward fusion energy has the potential to inform not only policy decisions but also the design of public education and engagement strategies, ensuring that technological innovation aligns with democratic values and societal priorities.

Collectively, these theories and perspectives highlight the multifaceted nature of public opinion and its critical role in shaping the trajectories of emergent technologies. While each theory has its strengths and limitations, their integration provides a holistic framework for exploring how public attitudes toward fusion energy are formed, influenced, and negotiated. This research contributes to both academic and practical understandings of public opinion of fusion energy, offering pathways to align technological innovation with societal needs and fostering more inclusive and sustainable energy futures.

2.1.2. Theoretical Approaches to Exploring Attitudes Towards Fusion Energy

All social science research has specific epistemological and ontological approaches (Ejnavarzala, 2019). Ontology is a set of philosophical assumptions concerning the nature of reality, whereas epistemology is concerned with philosophical assumptions regarding knowledge (Slevitch, 2011). There are two aspects of ontology, objectivism, and subjectivism (Jahn and Dunne, 2007). Ontological objectivism puts forward that social phenomena and their explanations exist outside of human beings' minds (Lawson, 2019). The downside of an ontological objectivist approach in this research project is that it refutes that individuals'

experiences can be different and thus form differing opinions on a topic (Tsang, 2013). Whereas ontological subjectivism understands that human beings' experiences can be different and thus can form different opinions (Raddon, 2010). This research aims to explore public attitudes to fusion energy; therefore, an ontological subjectivism approach is most appropriate.

This research is also incorporated with an ontological constructivist approach, through understanding how publics form their opinions and gather their information. The inclusion of a constructivist approach understands the value of human participants and believes that human beings construct their own knowledge and experience (Lee, 2012). This is particularly important when exploring the heuristics participants use to understand fusion energy. This is due to ontological constructivism focusing on factors such as social context and culture influencing the construction of attitudes, again directly relevant to this research exploring public attitudes to fusion energy (Packer and Goicoechea, 2000).

The epistemology within this research is concerned with beliefs and knowledge and how this can be communicated with other people (Pryor, 2001). This research will follow an interpretivist epistemological approach as this highlights that all human beings are different with different viewpoints (Pryor, 2001). A positivist epistemological approach believes that legitimate knowledge can only be drawn from quantifiable scientific methods, which does not fit with the 'opening up' of knowledge as outlined above (also see Adams et al, 2005). An interpretivist approach allows for a more relaxed data collection method, compared to positivist which is structured (Morris & Smyth, 2007). Therefore, this research draws on subjectivist and interpretivist ontology and epistemology respectively, while examining results through human geography and psychology lenses, such as place attachment and heuristics. The interpretivist nature of this research also allows for flexible and nuanced analysis, meaning the subjective experiences and opinions that emerge from participants, are analysed in ways that reflect their personal and social contexts.

Building on the flexibility and nuance this approach provides, the analysis will explore how participants' subjective experiences and opinions are shaped by broader social contexts, including social norms, place identity, and historical and cultural influences. Social norms, as

shared expectations within a community, inform individuals' values and behaviours, which in turn affect their perspectives on technologies like fusion energy (Denicolo and Bradley-Cole, 2016: Manzo and de Carvalho, 2020). Place identity, or the emotional and cultural connections people have to specific locations, will also be examined to understand how individuals' sense of belonging and attachment to particular places influences their views on technological change. Additionally, the research will consider the impact of historical and cultural contexts, recognising that participants past experiences with industrialisation, energy use, or technological shifts shape their current attitudes. Together, these factors provide a rich, context-sensitive interpretation of how individuals and communities relate to emerging technologies, reflecting the complexity of human experience in shaping technological adoption and resistance.

Hübner et al. (2023) present the Integrated Acceptance Model (IAM), shown in figure 1 below, a conceptual framework designed to explain social acceptance of wind energy. This model identifies five significant factors that influence public acceptance, which include economic effects, attitudes towards energy transition and the planning process, perceptions of procedural justice, environmental impacts (such as the effects on nature, landscape, noise, and traffic), and social norms (ibid.). According to IAM, economic benefits - such as job creation and positive impacts on tourism - can positively shape public attitudes toward wind energy. Similarly, public attitudes toward the energy transition process itself, along with perceptions of procedural justice, play a crucial role in whether the public supports the technology (Hübner et al, 2023). The model further emphasises the importance of minimising negative impacts on local environments and residents. Lastly, social norms, or the prevailing attitudes and behaviours in a society, significantly affect how energy technologies are received (ibid.). While the IAM is a valuable framework for understanding wind energy acceptance, it has limitations, particularly in its failure to address the historical, cultural, and place-based factors that can influence public attitudes (Howley and Korein, 2024). Other research has applied the IAM to various contexts, finding that while it offers a solid foundation for understanding acceptance, it may require adaptation to consider local contexts and the unique experiences of different communities.

A study by Devine-Wright (2005) applied the IAM to explore community acceptance of wind energy in rural UK areas. While the model effectively highlighted the importance of economic effects and environmental considerations, it did not fully account for the deep-rooted sense of place and the historical context of these rural communities. This gap suggests that, especially in the case of emergent technologies like fusion energy, the IAM can be useful but needs to be expanded to incorporate factors like place identity and historical-cultural influences. These elements play a crucial role in shaping local attitudes and responses to technological developments, emphasising the need for a more nuanced understanding of public acceptance that reflects both social and cultural dimensions.

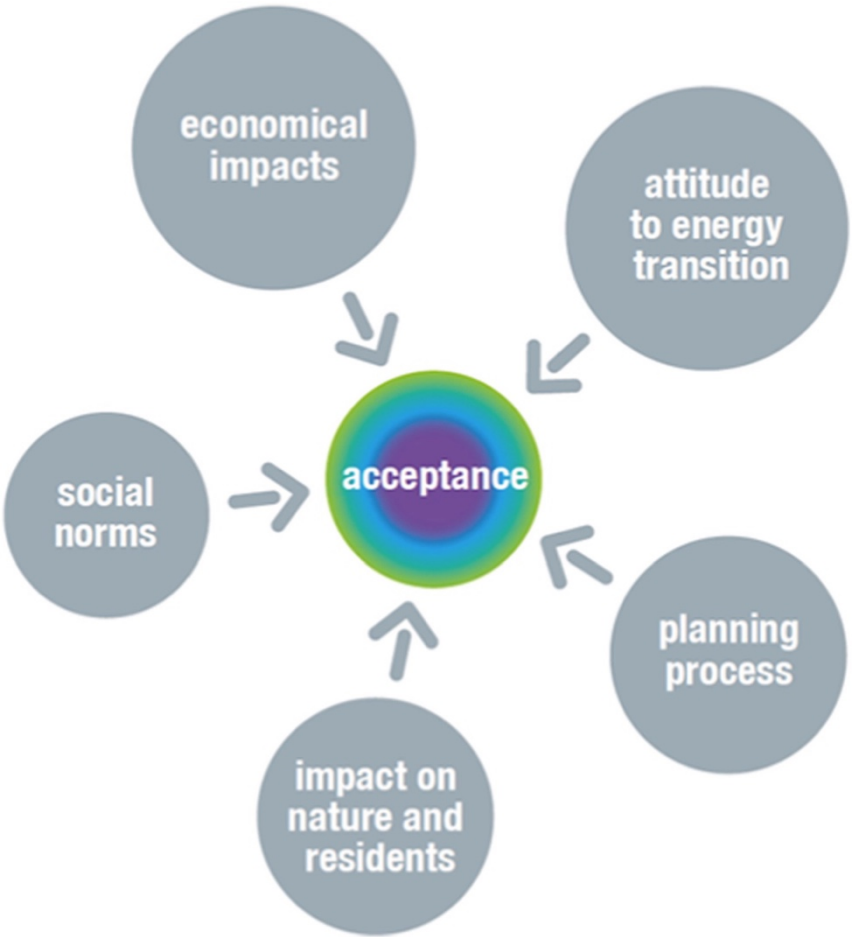

Figure 1: *A figure showing the five main drivers of the acceptance of local wind developments (Hübner et al, 2023).*

Küpers and Batel (2023) highlight the importance of time and history in shaping public attitudes toward renewable energy developments. Their study suggests that people's previous experiences with renewable energy projects can significantly influence both their responses to current developments and their perspectives on future projects. This historical context can

shape how the public perceives and reacts to new energy initiatives, as past successes or failures may resurface and impact acceptance of future developments. However, this paper also highlights the importance of time, in terms of the speed of decision making and planning, with this being too quick having a negative impact on public trust and therefore acceptance (Küpers and Batel, 2023). Therefore, Küpers and Batel (2023) highlights the importance of understanding the history within a location while also demonstrating how fragile public trust can be in terms of time. This study provides a basis for studying public attitudes to fusion energy, highlighting the importance of exploring the history of each case study location.

Overall, this project will draw on subjectivist and interpretivist ontology and epistemology respectively, while examining results through human geography and psychology lenses, such as place attachment and heuristics. This thesis will extrapolate elements from the Hübner et al. (2023) model and the Küpers and Batel (2023) paper as a framework for understanding public acceptance and interpreting the findings, while acknowledging that these studies are focused on wind energy and may not directly apply to emergent low-carbon technologies such as fusion. When using these papers, it is also important to consider that these do not paint the entire picture, meaning that there are other influences of public acceptance such as cultural impacts and place attachment, which will be explored fully throughout this thesis. The following section continues by examining why public acceptability is important in the first place, and why it matters within the context of this study.

Building on this framing, the thesis adopts an explicitly interdisciplinary approach that brings together insights from human geography and psychology to examine how public attitudes towards fusion energy are formed, expressed and negotiated. Human geography provides a place-based lens through which to understand how historical context, place attachment, place identity and experiences of deindustrialisation shape responses to new energy developments, particularly in communities where energy infrastructures have long social and economic legacies (Devine-Wright, 2009; Cresswell, 2015; Küpers and Batel, 2023). These concepts are especially pertinent in the context of fusion, where proposed developments are embedded within specific localities that carry distinct industrial histories and future-oriented aspirations. Psychology-related concepts, including heuristics, cognitive shortcuts and risk perception, complement this perspective by offering insight into how individuals make sense

of a complex, unfamiliar and uncertain technology such as fusion, often drawing on prior knowledge and analogy, rather than detailed technical understanding (Slovic, 2000; Pidgeon et al., 2008). Taken together, these disciplinary perspectives enable a more holistic analysis that recognises public attitudes as both spatially situated and cognitively mediated. By integrating human geography and psychology, the thesis moves beyond singular explanations of acceptance or opposition, instead capturing how place-based meanings, cultural context and institutional trust interact with cognitive processes and risk heuristics to shape public responses to fusion energy.

2.2. Why Is Public Acceptability So Important?

Public acceptability is a vital factor in the development of new energy technologies. Technological change can impact many different publics and therefore lead to opposition, which can in turn effect many aspects of new energy developments, such as funding, decisions and even the execution of the development itself (Cohen et al, 2014). This section therefore aims to explore the literature regarding the nuances of why public acceptability is so important, examining the difference between acceptance and acceptability, and why publics matter. This section of the literature review will also explore the concept of heuristics, what they are, the different types and which ones are relevant to this project. The subsection ends with an investigation into the role of information on acceptability and what role prior knowledge of technology has too. These concepts and facets will be examined within the context of their relevance to this project exploring public attitudes to fusion energy.

2.2.1. Why do Publics Matter?

Publics are crucial in the implementation of new energy developments because their support and acceptance can influence policy decisions, funding, and investment (Wüstenhagen et al, 2007). This section will explore how publics can influence policy and regulation, and how public acceptance is essential for market success and the need for community involvement. This section will also explore the role of public in investment and innovation, with each of these factors explored in terms of fusion energy.

Public opinion and acceptance can significantly shape energy policies and regulations, with governments responding to the demands and concerns of their constituents (Bergquist et al, 2020). Public pressure can accelerate the adoption of clean energy policies and phase out fossil fuels (Rogge and Johnstone, 2017). One of the most notable examples of public campaigning influencing policy is Germany's Energiewende. This involved a public outcry against extending Germany's nuclear phase out deadline, causing the government to respond to public pressure and abolish their new plans (Beveridge and Kern, 2013; Morris and

Jungjohann, 2016). This highlights the critical role that public opinion plays in shaping energy policy, as governments must take into account the values, concerns, and demands of their constituents to ensure both political legitimacy and effective, widely supported policy decisions.

Publics also matter in terms of the market success of new energy technologies. Consumers drive demand for renewable energy products and services, with publics increasingly likely to pay attention to where their energy is from and how environmentally responsible this is (Capozza et al, 2021). It has been discovered that public perception of the impact of climate change impacts is a key determinant of public preferences on low carbon technology, with those who are worried about climate change, more likely to pay for renewable energy (Lee and Reiner, 2023). Therefore, as demand for renewable energy increases, energy companies will look to move to more sustainable energy sources and away from fossil fuels, including, perhaps fusion.

Community involvement is vital for the integration of new energy projects. Local communities often host renewable energy installations like wind and solar farms (Fast and Mabee, 2015). Public opposition to such developments can lead to huge delays or even cancellations of such projects (Van de Grift and Cuppen, 2022). There have been some instances where developments have continued despite strong negative reactions, such as fracking for shale gas in the UK, however this presents issues regarding environmental justice (Cotton, 2017). Environmental justice focuses on ensuring that the environmental benefits and burdens of developments are distributed fairly (Gebeyehu et al, 2019), this concept will be explored further within section 2.2.3. These studies therefore outline how community engagement and participatory planning play a vital role in building trust and reducing opposition (Jami and Walsh, 2017). Understanding this in terms of an emergent technology such as fusion, can shape how future engagement is carried out and avoid potential delays.

Publics play a vital role in driving the implementation and success of new energy developments, as public support fosters innovation and strengthens public-private partnerships within the energy sector (Martins et al, 2011). Collaborative efforts between the public sector, private companies, and research institutions are crucial for innovation (Shahbaz

et al, 2020). This is relevant due to fusion developments in the UK currently being government funded through UKAEA, however there is an increasing number of private companies within the sector. However, to achieve STEP and other future developments, this organisation is looking to collaborate with private investors. Public enthusiasm for green technologies not only provides a catalyst for increased funding but also supports the innovation needed to accelerate progress. As these technologies impact daily life, the integration of public knowledge and the acknowledgment of local concerns become essential. Therefore, public engagement and enthusiasm are not just beneficial for securing funding and advancing technologies, but also for ensuring that transitions are socially acceptable, ultimately ensuring the sustainability of new energy developments (Devine-Wright, 2011).

2.2.2. Public Acceptance vs Acceptability

Public acceptance is a complex phenomenon that requires the intersection of different factors to truly understand it (Busse and Siebert, 2018). However, when exploring public attitudes there is not just public acceptance to consider, there is also acceptability. The debate over the definitions of acceptance versus acceptability is a complex one, with some academics using the terms interchangeably (Warren et al, 2012). However, I argue that these terms should be explored and understood separately, as a technology may be technically acceptable, however, face challenges in public acceptability due to cultural or social factors (Cowell et al, 2010). Therefore, understanding these definitions is vital when exploring public attitudes of fusion energy, and how these results fit in with these themes.

It is important to distinguish between social acceptance and acceptability of an energy development because they represent different dimensions of how a community or society views and engages with such projects (Fournis and Fortin, 2017). Acceptance and acceptability are widely considered subjective, but the influence of the environment and internalisation of the experience (judgement, emotions, attitude, motivation, and so forth) by the individual are seen as important factors in the acceptance of energy technologies (Alexandre et al, 2018; Heiskanen et al, 2008). For a more specific definition, social acceptance refers to the overall approval or disapproval of an energy development by the

public (Wüstenhagen et al, 2007; Wolsink, 2012; Fournis and Fortin, 2017). Social acceptance involves broader societal attitudes, values, and beliefs regarding the necessity, benefits, and drawbacks of a particular energy project (ibid.). It considers the collective perception of the project's impact on various aspects of life, including environmental, economic, and social factors (Wüstenhagen et al, 2007; Wolsink, 2012; Fournis and Fortin, 2017).

Social acceptability, by way of contrast, is a more nuanced concept that delves into the specific conditions or criteria that individuals or groups consider when evaluating an energy development (Szarka, 2007; Fournis and Fortin, 2017). It comprises the process that individuals take to construct more objective opinions that eventually form social acceptance (ibid.). Acceptability can vary depending on factors such as environmental impact, safety concerns, economic benefits, cultural significance, and fairness in distribution of costs and benefits (Szarka, 2007; Fournis and Fortin, 2017). The inverse of acceptability is also explored by some researchers, defining this term as 'unacceptability' (Fournis and Fortin, 2017. P.2).

Understanding the difference between social acceptance and acceptability is important for several reasons, including recognising nuances, facilitating targeted engagement, mitigating conflicts, and enhancing sustainability (Gough and Mander, 2019). By acknowledging that social acceptance and acceptability represent distinct dimensions a deeper understanding of public perceptions and concerns related to energy developments, such as fusion energy can be gained. This distinction allows for a more nuanced approach to addressing the complexities of public opinion, helping to identify specific issues that may influence support or opposition to emerging technologies (Gough and Mander, 2019: Lennon et al, 2019). Targeted engagement suggests that by understanding what aspects of a project contribute to its acceptability or lack thereof, developers and policymakers can tailor their engagement strategies to address specific concerns and build support among publics (ibid.). Mitigating conflicts involves identifying areas where there is a lack of acceptability, which can help stakeholders address potential conflicts early in the project development process, leading to more effective decision-making and potentially avoiding costly disputes or delays (Gough and Mander, 2019: Lennon et al, 2019). Finally, enhancing sustainability summarises the concept that both social acceptance and acceptability can contribute to the development of more sustainable energy projects that better align with the values, needs, and preferences of the communities in which

they are located (ibid.). Therefore, with fusion energy being an emergent technology it is vital to understand the factors that affect social (un)acceptability of this technology, to ultimately understand the social (un)acceptance.

When exploring the role of community benefits in wind developments, Cowell et al (2011) found that the amount of benefits a development brings to a location has an impact on whether they are socially acceptable (also see Perlaviciute and Steg, 2014). A study into solar farms in the Netherlands also concluded that community benefits reduce local opposition and increase public acceptability of solar farms, provided they meet the local needs (Van den Berg and Tempels, 2022). However, Macdonald et al (2017) found that benefits alone do not encourage public acceptability of energy developments if they are not paired with effective community engagement in the planning process. This concept of justice will be explored further within section 2.2.3.

Energy developments are synonymous with presenting risks to local communities; this can therefore have a significant impact upon community acceptability of said developments. Perlaviciute and Steg (2014) investigated factors shaping the acceptability of energy alternatives and found that people with more environmental values were more likely to focus on the perceived risks of a development and therefore reduce acceptance. This highlights the fact that values, such as environmental values, can have a significant impact on public acceptability of energy technologies (Milchram et al, 2018).

Perlaviciute et al. (2018) found that public perceptions of risk can be amplified by levels of trust, particularly when it comes to public acceptability. If the public perceives that the benefits of a development do not outweigh the costs, or if they do not trust the information being provided by responsible parties, this can lead to a lack of support (ibid.). Therefore, it is crucial that those responsible for communicating with communities establish themselves as trusted sources of information (Perlaviciute et al. 2018). By fostering trust, these parties can ensure that the information shared is credible, which can positively influence public acceptability and support for the development (Liu et al, 2019). The concept of trust and the role of information will be unpacked further, later within this chapter in section 2.2.4.

When considering publics perceived benefits and costs, cost can be defined a number of ways. Cost can be considered in terms of publics saving money or losing money due to new energy developments, but also the monetary cost of these developments themselves (Knauf, 2022). Publics are seen to consider the current reliance on fossil fuels as a concern due to cost, but that developing and changing energy systems should take future costs into consideration (Parkhill et al, 2013). This review also considers the costs to local communities and how these costs should be spread fairly (ibid.), further indicating how cost can significantly influence public acceptability. This concept of cost being spread fairly links with the concept of justice which will be explored in section 2.2.3. Lennon et al (2019) also found that high levels of opposition to energy developments are linked with concerns regarding high local costs compared to local benefits, again suggesting that this has a significant impact over public acceptability and should therefore be a priority consideration for new energy developments such as fusion.

In summary, distinguishing between social acceptance and acceptability helps to better understand and address the complex array of factors that influence public perceptions and attitudes toward energy developments, ultimately leading to more informed decision-making and improved outcomes.

2.2.3. Justice

Justice plays a crucial role in shaping public attitudes towards emergent energy technologies, particularly in relation to issues of fairness and equity (McCauley et al, 2019). In the context of energy developments like fusion, justice is often considered in terms of procedural fairness (how decisions are made), distributive fairness (how costs and benefits are shared over time and space), environmental justice (distribution of environmental impacts) and intergenerational justice (how future needs are addressed) (Sovacool and Dworkin, 2015; Nijaki, 2015). When communities perceive energy projects as unfair, whether due to unequal distribution of costs or benefits, or a lack of involvement in decision-making, it can lead to resistance or low acceptance (Mundaca et al, 2015).

Procedural justice relates to how the process of implementing energy developments is perceived (Schlosberg, 2007). If the public feels they are excluded from decision-making or that the process lacks transparency, it can undermine trust and reduce acceptability. As seen in the work of Parkhill et al. (2013) and Lennon et al. (2019), communities are more likely to oppose energy developments if they believe the decision-making process is unjust or if they feel their concerns are not being considered (Haggett, 2011).

Distributive justice, on the other hand, focuses on how the costs and benefits of energy projects are distributed among different groups, particularly local communities (Sovacool and Dworkin, 2015). Publics are more likely to accept energy technologies like fusion if they believe that the benefits, such as jobs, energy security, or economic development, are equitably distributed and that any potential costs, such as environmental disruption or health risks, are shared fairly (ibid.). This is especially true in areas where energy projects may disproportionately impact certain groups, and failure to address these disparities can hinder public acceptance (Levenda et al, 2021).

Environmental justice is also highly relevant to this project, as it addresses the unequal environmental impacts that can arise from energy projects (Sovacool and Dworkin, 2015). Communities, especially those that are economically disadvantaged or already facing environmental burdens, may view energy developments as unjust if they perceive that the negative environmental impacts, such as pollution, habitat destruction, or health risks, are disproportionately borne by them, while wealthier or more privileged groups benefit from the energy produced (Jenkins et al 2016). Ensuring that the environment is protected for all communities and that they are not unfairly burdened by these impacts is key to fostering trust and acceptance (Lazarus, 1992).

Another important aspect is recognition justice, which involves acknowledging and respecting the diverse identities, values, and experiences of communities affected by energy developments (Bailey and Darkal, 2018; van Uffelen, 2022). This form of justice goes beyond simply including people in decision-making processes; it requires that individuals and groups, particularly those who have been historically marginalised, are treated with respect and not dismissed in public debate or policy design (Van Uffelen, 2022). In the context of energy

infrastructure, this means considering the local histories and attachments to place that shape how communities respond to new developments (Norris et al, 2024). This is particularly relevant in areas affected by deindustrialisation, where longstanding grievances may influence perceptions of fairness (ibid.). Conversely, this can also have the opposite effect, where communities used to industrial infrastructure can be more accepting of new infrastructure. Integrating recognition justice into energy planning can help ensure that the social and cultural dimensions of public attitudes are properly understood and addressed, contributing to more inclusive and legitimate decision-making (Bailey and Darkal, 2018).

Moreover, intergenerational justice, the concept that future generations should not be unduly burdened by the environmental and social impacts of current decisions, is also relevant to energy transitions (Sovacool and Dworkin, 2015). This perspective emphasises the need for sustainable and responsible energy solutions that not only address current needs but also protect the well-being of future generations (Spijkers, 2018).

Therefore, the link between justice and public attitudes is clear: fair and transparent processes, alongside an equitable distribution of costs and benefits, are essential for fostering public acceptability of emerging energy technologies (Mundaca et al, 2018). By integrating principles of procedural justice, distributive justice, environmental justice, recognition justice and intergenerational justice, energy developments can ensure that communities feel their concerns are addressed and that they are not unfairly burdened by the costs of transition (Sovacool and Dworkin, 2015). This, in turn, helps improve both acceptance and the broader social sustainability of new technologies like fusion energy.

2.2.4. The Role of Information

There are many factors that influence public opinion, and early research often assumed that gaps in knowledge and understanding were negatively correlated with public acceptance of energy technologies (Devine-Wright, 2007). There is a common framework for explaining public attitudes towards new technologies known as the information-deficit model (Bidwell, 2016). This model suggests that publics scepticism or rejection of a new energy technology is due to

their lack of knowledge (ibid.). Therefore, this model suggests that if publics are provided with more information and education about a specific energy technology then they will simply accept it (Bidwell, 2016). However, this model is widely critiqued within social science research, with many arguing that this model oversimplifies the relationship between science and society, neglects the role of cultural beliefs and values, political beliefs, and fails to acknowledge the importance of public engagement among many other factors that contribute to public attitudes (Simis and Madden, 2016; Boudet, 2019; Barnett et al, 2012). As Wynne (1992;2001) demonstrates, public responses to scientific and technological innovation are often grounded in contextual, experience based judgements about credibility, uncertainty and governance rather than ignorance. Thus, the Information Deficit Model is too simplistic for use within the exploration of public attitudes to fusion energy, and the role of the other factors listed must be explored. This section therefore aims to explore the role that information plays within these broader context, the types of information that publics receive and how this is disseminated, followed by the role of public engagement.

Information plays a significant role in public understanding of new energy developments. Understanding new energy developments is essential for publics to make informed decisions, evaluating all the information they have been provided (Stern and Dietz, 2008). However, the relationship bwtween being 'well informed' and acceptance is not linear or straightforward. Zhang et al (2023) found that information regarding power generation benefits did not have any impact over public opinion, but that information regarding green energy benefits significantly improved public opinion of hydropower. This therefore shows that information is interpreted selectively and relationally, depending on how it resonates with existing values, concerns and imaginaries. In addition, Parkins et al (2018) suggests that general factual knowledge and socio-economic indicators fail to predict public support, further challenging the information deficit model.

There are a number of different types of information relevant to new energy developments such as: technical information, environmental impacts, benefits and risks, economic implications and so forth (Yildiz et al, 2015). Each of these types of information play a role in shaping public opinion, not in isolation, but in relation to broader social and institutional contexts. Technical information can have a significant impact on public opinion with the over-use of technical and

scientific language having the potential to cause confusion and negatively impact public opinion by making publics feel removed and not included within a specific technology (Nisbet, 2009). This reinforces arguments that how information is framed and communicated is often more significant than the volume of information provided.

With regard to emergent technologies Druckman and Bolsen (2011) explored the role of factual information in publics forming opinions about emergent technologies. The study found that simply providing factual information is not the best route to provide an unconditional road to rational opinion formation (ibid.). Rather once publics already have an opinion, they process factual information in a biased manner. Therefore, the study suggests the best way to facilitate rational opinion making is to provide publics with different frames of thinking around emergent technologies (Druckman and Bolsen, 2011). This finding further undermines the information deficit model, therefore providing support for deliberative and interactive methods of public consultation. Importantly, this highlights that disagreement of scepticism should not be interpreted as misunderstanding, but as reasoned engagement in uncertain circumstances. This study, however, also suggests that the impact of facts can be useful in terms of information about risks, these can significantly increase their impacts due to their context (Druckman and Bolsen, 2011).

The discourse around benefits and risks of new energy developments can have a significant impact on public attitudes. Research regarding nuclear fission has found that the perceived benefits of this technology are one of the biggest factors encouraging public acceptance of the technology (Belmonte et al, 2023). This study also suggest that the discussion of risks has a direct negative impact on public perceptions of nuclear fission (ibid.). However, extrapolating directly from fission to fusion risks reproducing a deficit-based assumption that concern is rooted primarily in misunderstanding. Prior research on technological ‘dread’ and uncertainty suggests that novel technologies often evoke unease regardless of their technical risk profile, particularly when institutional trust is low (Stirling, 2008).

The way that information is disseminated can influence public acceptance of new energy developments (Wang et al, 2020), with the method of learning determining this for example if public gain their information from particularly the media, as well as experts, or social media.

Early communication is essential, but communicating when there is a lot of uncertainty can have the opposite effect (Cohen et al., 2023). This highlights that timing, transparency and acknowledgement of uncertainty are as important as the content. Therefore, the method and timing of information sharing is pivotal when exploring public attitudes.

Lachapelle et al (2014) state that information from experts may not dominate public opinion as suggested by Zaller (1992), but that this individual's receptiveness to experts is determined by other factors such as media framing and contact with such technologies. This is further supported by Wang et al (2020) who state that the credibility of information dissemination has a positive impact on public attitudes, but that this is also related to the perceived benefits and risks, rather than operating independently.

There are a number of barriers and common challenges to information dissemination such as misinformation, conflicting messages as well as the aforementioned technical complexity (La Bella et al, 2021). However, labelling public concerns as misconceptions risks overlooking the socially embedded nature of technological scepticism (Lucas et al, 2021). This is specifically relevant for fusion energy as Ho et al (2018) found that nuclear accidents were considered a major risk associated with fusion energy due to believing it is a dangerous technology. Rather than reflecting simple misunderstanding, such associations can be understood as expressions of broarder uncertainty and institutional mistrust surrounding emergent technologies. Therefore, it is vital to study public attitudes in order to understand how such meanings are constructed, rather than assuming they can be straightforwardly corrected through information provision alone.

Public engagement, in terms of consultation and involvement within the decision-making process, is said to positively impact public acceptance as this helps make more socially and morally accepted decisions, reduce opposition and improve public satisfaction, support, and acceptance (Wang et al, 2019; Parkins et al, 2018). Wang et al (2019) state that public engagement positively affects public acceptance of nuclear energy. However, engagement is increasing understood not as a tool for persuasion, but as a means of recognising lay expertise, addressing uncertainty and building institutional trust (Wynne, 1992; Jasanoff, 2004). The role of public engagement will be further explored in more detail later within this chapter.

In summary, information plays a crucial role in public opinion of new energy developments, but the importance is not in simply correcting lack of knowledge. Rather, the importance of information depends on how it is framed, the extent to which it is trusted and the social and cultural contexts in which it is received. This thesis therefore treats information as one factor among many that shape public attitudes towards fusion energy, alongside uncertainty, place-based experiences and attitudes towards governance, rather than a standalone solution to public concern.

2.2.5. The Role of Prior Knowledge

Prior knowledge significantly influences public opinion on renewable energy. Individuals who are well-informed about the environmental and economic benefits of renewable energy sources tend to support their development and adoption (Boudet, 2019). Knowledge about the negative impacts of fossil fuels and the potential for job creation in the renewable sector can also drive positive attitudes (Lucas et al, 2021). Conversely, misinformation or a lack of understanding about renewable technologies can lead to scepticism or opposition (Schmidt, 2023). Therefore, understanding what knowledge publics have of fusion energy can help shape education and awareness campaigns.

Prior knowledge of nuclear fission has been shown to have an impact on how supportive publics are, therefore, this could also apply to public opinions of emergent technologies such as fusion. Stoutenborough et al (2013) researched public support of nuclear energy one year after the Fukushima tragedy. This study among other findings, observed that publics with greater knowledge of nuclear energy are more likely to support nuclear energy policy proposals. This therefore highlights the importance of education and awareness when discussing technology. Particularly with emergent technologies such as fusion, the public understanding of such technology would already be lower than the likes of traditional nuclear. This is further supported by Qazi et al (2019) who in a review of public opinions of renewable energy sources, found that a lack of public awareness is a significant barrier to the acceptance

of new renewable energy technologies, therefore highlighting the importance and influence that knowledge can have.

The knowledge possessed by publics can have a significant impact upon their support for emergent technologies according to the literature within this topic. Lee et al (2005) state the assumption that knowledge ensures publics can accurately and objectively calculate the specific risks. This is supported by Wildavsky and Dake (1990) who state that pre-existing knowledge of an emergent technology has a direct influence over publics risk perceptions. This therefore provides a theoretical basis for gathering prior participant knowledge of fusion energy as this can have an influence over public opinion.

Regarding prior knowledge of nuclear energy, Ong et al (2022) discovered that support can vary based on the type of knowledge that publics possess. With this the study found that if publics have a greater awareness of the potential risk of nuclear power, then they are less likely to offer support to nuclear development (ibid.). Conversely, the study observed that if publics have a greater depth of understanding on the benefits of nuclear energy, then they are more likely to offer their support for nuclear developments (Ong et al, 2022). Further to the previous study, this research highlights the importance of not only outlining the factual information about these new technologies but also delineating the benefits and risks of these. Giving publics the knowledge of the benefits and risks allows them to form a balanced opinion regarding such emergent technologies.

This premise is further supported by a study exploring the effect of public communication on public acceptance of nuclear energy (Qi et al, 2020). This study observes that mass communication of both the benefits and risks of nuclear energy positively affects public trust in policy makers (ibid.). This positive impact on trust is observed to positively impact the perceived benefit of nuclear energy and thus positively affects public acceptance (Qi et al, 2020). This therefore supports the delineation of both the benefits and risks to the public, as this can further influence public opinion. The role of trust will be discussed in more depth within the next subsection.

The influence of prior knowledge is therefore useful when exploring public attitudes to fusion as this allows opinions to be considered based on whether participants have prior knowledge of fusion. This means that conclusions can be drawn on what effect prior knowledge has on these public opinions, and whether this influenced the perceived benefits and risks.

2.2.6. Risk Literature

The area of risk literature is vast, exploring the perceived and realised risks of nuclear energy, with limited research being conducted on fusion energy (Turcanu et al, 2020). This section explores risk literature, the theories that are employed within these studies and how they are relevant to this research on public attitudes to fusion energy in the UK. The main findings from this literature pertain to topics such as trust, information, and proximity to a nuclear site. This element of literature is relevant to the first aim of this project, to develop an understanding of public attitudes towards fusion energy, in particular the perceived benefits and risks.

On the topic of trust in the government, a study in Germany finding trust to be the key factor in publics accepting the new technology and overlooking their perceived risks (Seidl et al, 2022). Hence, this is an important aspect to consider when researching public attitudes to new technologies such as fusion, as understanding the perceived risks and level of trust can help policy makers through development. However, Stoutenborough et al (2013) contradicts this stating that trust was not a significant factor in influencing public opinion of nuclear energy. Therefore, providing a basis for further research to explore the influence of trust on public opinion of fusion energy. With current fusion developments in the UK being government funded it is important to understand the effects of government trust, and thus this factor will be explored further in section 2.4.

Regarding information, Ho et al (2018) found that nuclear accidents were considered a major risk due to believing it is a dangerous technology, when conducting a study in Thailand and Vietnam, but that a number of the risk perceptions were based on misconceptions. Thus, it is important to thoroughly understand public risk perceptions when researching fusion energy, as it is clear that some risks can be rooted in false information, these can potentially be mitigated with education and awareness. Researching how and where perceived risks develop among

publics can help policy makers to understand publics and what areas the need to address. This can be transferred to researching emergent technologies such as fusion energy, with emergent technologies having the most misconceptions surrounding them (Turcanu et al, 2020). Stoutenborough et al (2013) suggest that through knowledge and educational campaigns, the public may be able to overcome predetermined bias's and thus hold a more informed opinion. Therefore, understanding public opinion is necessary in order to mitigate any concerns that may be present.

One of the main themes uncovered from the risk literature is the concept of proximity, with the distance the public live from a nuclear power plant having an influence over their opinions. Venables et al. (2012) highlights the role of proximity and sense of place in shaping public perceptions of risk, finding that communities living near established energy sites, such as nuclear plants, often perceive less risk over time due to their increasing familiarity and integration of the site into their local identity. This concept is relevant to the STEP fusion project, as this is being developed on a former coal power station site, meaning the local community's existing sense of place could influence their acceptance of the new fusion technology. If the community has positive historical connections to the site, they may view the fusion project as a continuation of local energy infrastructure rather than a disruptive addition. Further studies by Devine-Wright (2005) and Wolsink (2007) support this, suggesting that communities with strong ties to energy sites often show greater acceptance of new projects, particularly when those projects align with local values or contribute to the community's wellbeing. However, these studies also note that proximity can lead to heightened resistance in communities that perceive new developments as risky or disruptive. Therefore, while the STEP project may benefit from the existing sense of place tied to the former coal station, it must carefully consider local values, historical ties, and potential concerns in order to foster greater acceptance and ensure the community feels their needs and identities are respected.

The knowledge possessed by publics can have a significant impact upon their support for emergent technologies according to the literature within this topic. Lee et al (2005) state the assumption that knowledge ensures publics can accurately and objectively calculate the specific risks. This is supported by Wildavsky and Dake (1990) who state that pre-existing knowledge of an emergent technology has a direct influence over publics risk perceptions. This

therefore provides a theoretical basis for gathering prior participant knowledge of fusion energy as this can have an influence over public opinion.

Providing scientific knowledge to publics has been uncovered as a significant driver in public acceptance of emergent technologies (Hobman and Ashworth, 2013). Research into other emerging technology such as nanotechnology found that public acceptance is directly linked to their perceptions and therefore highlights the importance of effective public communication and information dissemination (Lee et al, 2005). A study in the Czech Republic found that more communication is needed in order to increase the acceptance of fusion energy, however this communication needs to be focused on the layperson and not the science and technology (Čábelková et al, 2021). Overall, this suggests that the dissemination of knowledge to publics is a significant driver in public acceptance, therefore understanding what knowledge publics hold regarding fusion energy can inform the communication that is needed to increase public support, subsequently influencing policy and education.

Overall, the risk literature provides valuable insights into public attitudes towards emergent technologies, highlighting key factors such as trust, information, and proximity that influence risk perceptions and acceptance. The importance of trust in government, particularly in the context of publicly funded technologies like fusion, highlights the need for transparent communication and informed decision-making to foster public support. Additionally, misconceptions about risks, as seen in studies of nuclear energy, demonstrate the critical role of education and knowledge dissemination in shaping more accurate public perceptions. Proximity to existing energy sites further emphasises the influence of sense of place in risk assessments and public acceptance. As emerging technologies like fusion energy face heightened scrutiny, understanding the pre-existing knowledge and risk perceptions held by the public becomes essential in guiding effective communication strategies and ensuring informed and balanced opinions. By addressing these factors, policymakers can mitigate concerns, build trust, and ultimately enhance public acceptance of fusion energy, paving the way for its successful integration into the energy landscape.

2.3. Drivers In Shaping Public Opinion

There are a number of drivers that shape public opinion, understanding these drivers is essential for developing public engagement and education strategies, and understanding potential opposition that developments in fusion may face (Revez et al, 2022). Some of the key factors influencing public attitudes towards fusion energy, relevant to the aims of this research, include: the media, (mis)trust in government, public consultation and perceived benefits and risks. Also relevant is the influence of both climate change and energy security, as these can both have a significant influence over public opinion of energy technologies (Corner et al, 2011). This section will explore the literature regarding each of these factors, helping to position my research amongst prior studies.

2.3.1. The Media

The media plays a crucial role in shaping public opinion by influencing the way people perceive and interpret information (McCombs and Valenzuela, 2020). Media literacy and the ability to analyse and evaluate information are crucial in navigating how the media can influence public opinion (Potter, 2018). This section explores a short history regarding the role of the media in the formation of opinions, followed by a discussion of the agenda setting theory, which suggests the media influences what people think about, by choosing which stories to highlight as important (Boydstun, 2013).

The role of the media in the formation of public opinion has been indirectly studied by the work of Chomsky and Herman (2002). This work explored the use of media and propaganda, providing a critical perspective on how the media can shape public opinion. Chomsky and Herman (2002) suggest that the media often serves the interests of powerful elites rather than publics. These elites can be one of four types: coercive/physical elites, manipulative/financial elites, expert/technical elites, or commanding/ regulatory elites (also see Sovacool and Brisbois, 2019). In the context of exploring public attitudes to fusion energy, expert/technical elites are scientists, researchers and engineers, and commanding/regulatory elites are politicians, both of which would be considered the more influential categories. The work by

Chomsky can also be considered when examining how elites shape public discourse through the agenda setting theory (McCombs and Shaw, 1972). Chomsky's work encourages researchers to assume a critical lens when examining the construction of public opinion and the role of the media and elites in shaping these attitudes and perceptions.

Agenda setting is a theory in public opinion research that explores the role of the media in influencing the publics' perception of what issues are important. The theory was first introduced by McCombs and Shaw (1972) and has since become a foundational concept in understanding how the media can shape public opinion (Moy and Bosch, 2013). The theory suggests that media outlets serve as gatekeepers by selecting and highlighting certain news stories and topics while ignoring or downplaying others (Boydstun, 2013). Therefore, the media agenda can influence what information is accessible to the public (McCombs and Valenzuela, 2020). First level agenda setting focuses on the media's ability to determine the importance of issues by featuring them prominently in news coverage (McCombs, 2005). This theory suggests that when the media consistently covers a particular topic, the public is more likely to perceive it as important (McCombs and Valenzuela, 2020). Second level agenda setting considers how the media shapes the public's interpretation of issues. This level suggests the way the media presents a story can influence how people think about the issue and the specific aspects they focus on (McCombs and Ghanem, 2001).

Agenda setting theory intersects with framing theory in that the media not only sets agendas, but it also frames issues in particular ways, affecting how the public responds to these issues (Shah et al. 2009). This theory is also often applied in the context of politics and policy making (Birkland, 2017; Boydstun, 2013). Agenda setting helps explain how the media can influence political agendas and policy priorities by directing attention to specific topics (Boydstun, 2013). This again is relevant to the current project as an outcome of this research is an influence on policy making understanding where specific action is needed and influencing education programmes. Agenda setting alone however will not be used to explore the results of this research as this follows a more positivist approach meaning it utilises more quantitative research methods (Dawadi et al, 2021). Whereas this project takes a human geography and psychology approach, this is an original contribution to this field, with no other studies using such methods when conducting media analysis in regard to fusion energy.

2.3.2. (Mis)Trust in Government

Trust in government plays a pivotal role in influencing public opinion as it underpins publics confidence in the ability of governing institutions to address societal challenges and meet the needs of publics (Venables et al, 2012; Thaker et al, 2019). Devine-Wright (2007) suggests that empirical evidence shows that political beliefs are directly correlated with social acceptance of different low carbon technologies. This is intrinsically linked with levels of trust within the government and developers. Upham and Shackley (2006) when researching opposition to biomass developments in the UK found low levels of trust in key actors, such as the government, local authority, and the developer, which directly impacted public responses and in turn support. This section therefore aims to highlight the role trust plays in public opinion of energy developments, definitions of trust, factors influencing trust and how this can in turn shape public opinion.

Trust is a multifaceted concept that can be understood in various ways within political and social science research (Valentini, 2021). Trust influences public attitudes, governance, and policy acceptance, shaping how individuals engage with institutions and decision-making processes (Webler and Tuler, 2021). Trust can take different forms, including institutional trust, which refers to confidence in organisations such as governments and the media, and system trust, which relates to faith in broader political and economic policies (Valentini, 2021; Rompf, 2014). Political leader trust focuses on the credibility and integrity of individuals in power, while performance-based trust depends on the effectiveness of institutions in delivering expected outcomes (ibid.). Affective trust, meanwhile, is rooted in emotional connections and shared values between the public and political figures or institutions (Valentini, 2021; Rompf, 2014). Recognising these distinctions is crucial when examining public responses to policy decisions, technological developments, and societal change.

Institutional trust refers to the confidence that individuals have in specific organisations involved in low carbon energy developments, such as government agencies responsible for implementing policies, regulatory bodies overseeing the industry, or energy companies involved in renewable energy projects (Walker et al, 2010). Institutional trust encompasses

publics' perceptions of these institutions' effectiveness and transparency in promoting and managing these developments.

System trust reflects individuals' confidence in the broader framework of policies, regulations, and governance structures involved in energy developments (Kitt et al, 2021). Unlike institutional trust, which focuses on specific organisations, system trust is concerned fairness, legitimacy, and responsiveness of the political system in addressing environmental concerns, promoting sustainable energy transitions, and ensuring equitable access to clean energy resources (Rayner, 2010). Strong system trust is particularly important when governments introduce emergent technology developments, as public confidence in the regulatory environment can influence acceptance (Flynn, 2007).

Trust in political leaders involved in low carbon energy developments pertains to individuals' confidence in the integrity, competence, and commitment of elected officials, policymakers, or industry leaders responsible for shaping energy policies and driving clean energy transitions (Grüdinger, 2017). Public trust in leaders plays a key role in shaping attitudes towards energy policies, as these figures are often the most visible advocates for new technologies and regulatory changes (Nisbet, 2009). When political leaders are seen as knowledgeable, consistent, and guided by scientific evidence, they can effectively foster support for clean energy initiatives (Haas, 2004). However, if leaders are perceived as untrustworthy, driven by short-term political gains, or influenced by corporate interests, public resistance to energy transitions can increase (Grüdinger, 2017).

Performance-based trust evaluates public confidence in the ability of governments, policymakers, and industry stakeholders to deliver on promises and achieve desired outcomes in low carbon energy developments (Martos et al, 2016). It focuses on perceptions of progress in reducing carbon emissions, expanding renewable energy capacity, enhancing energy efficiency, and achieving broader environmental and social objectives associated with clean energy transitions (Martos et al, 2016; Liu et al, 2019). When publics observe that clean energy policies are effective, cost-efficient, and beneficial to society, they are more likely to accept new technologies and support ongoing transitions (Karlstrøm and Ryghaug, 2014). However, if energy projects fail to meet expectations, whether due to delays, cost overruns, or perceived

lack of benefits, public trust can erode, leading to increased scepticism and resistance (Forsyth, 2016).

Affective trust in the context of low carbon energy developments refers to the emotional attachment and support that individuals feel toward efforts to transition to sustainable energy sources (Steg et al, 2015). It encompasses feelings of solidarity, pride, and commitment to environmental stewardship, which may influence public attitudes, behaviours, and support for policies and initiatives promoting low carbon energy technologies (Russell and Firestone, 2021).

There are many factors that affect trust in governments and regulators. Some of these factors include demographic variables and a belonginess to social networks (Tanny and Al-Hossienie, 2019). When exploring trust in government Christensen and Lægreid (2014) found that political-cultural variable, such as norms and beliefs, have the strongest overall effect on publics trust in government, with the biggest factor being general satisfaction with democracy. It was also concluded that satisfaction in specific public services have a positive impact on trust in public institutions, and that trust is also influenced by demographic factors such as age, education, and occupation (Christensen and Lægreid, 2014).

Trust in political leaders and institutions are another driver in shaping public opinion. The influence of politicians and politics in general has been developed by a number of researchers. Jamieson has produced significant research in political communication and the effects of political advertising on public opinion, which has been influential in the field of political science (1993).

Regarding public opinion in relation to political information Zaller presents a comprehensive theory that people draw on their existing beliefs and values when responding to survey questions or processing political information (1992). Zaller states that individuals' opinions can be fluid and context dependent. Zaller introduced the "Receive-Accept-Sample" (RAS) model which provides a framework for understanding how people receive and process political information (2012). The model states that once an individual receives information, they decide whether to accept or reject it based on their existing beliefs and take note of their accepted

information to form opinions (2012). This theory is significant when exploring public opinion formation in regard to receiving information. This is particularly relevant when exploring public opinions of fusion energy as there are continuous information streams about this process via the media in the form of news (print and digital), press releases and education events, that can influence how the public perceive this technology.

Jamieson (1993) has explored the role of political communication influence on public opinion. Jamieson has also produced research into how the media's framing and presentation of political information can shape the way publics perceive political issues. Media literacy has been highlighted by Jamieson (1993) as significant in enabling individuals to critically evaluate the political information they perceive and make informed decisions based on this. This research is extremely valuable in understanding how media content and political communications can shape public opinion. However, later studies have expanded on Jamieson's work by exploring the increasing role of digital media and social networks in shaping political discourse (Guess et al., 2020; Bennett & Pfetsch, 2018). Researchers have also examined the limits of media literacy, noting that while it can empower individuals, it may not fully counteract the effects of misinformation (Vraga & Tully, 2021). Furthermore, some researchers argue that political communication is not solely shaped by media framing but is also influenced by psychological factors, social identity, and pre-existing beliefs (Stroud, 2008). While Jamieson's research remains foundational, these developments highlight the evolving complexity of media influence.

Trust can significantly impact public opinion, more trust in regulators was linked to lower perceived risks and, consequently, to higher acceptability of nuclear power and a radioactive waste repository. Trust was found to be particularly influential when people knew little about a (potential) hazard, which suggests that trust served as a heuristic for their evaluations (Perlaviciute and Steg, 2014). On the topic of trust in the government, a study in Germany finding trust to be the key factor in publics accepting the new technology and overlooking their perceived risks (Seidl et al, 2022). Hence, this is an important aspect to consider when researching public attitudes to fusion energy, as it underpins public engagement and confidence with the technology. Understanding the perceived risks and level of trust can also help policy makers develop consultations and increase public willingness to participate in

such events. However, Stoutenborough et al (2013) contradicts this stating that trust was not a significant factor in influencing public opinion of traditional nuclear energy. These conflicting studies provide a basis for further research to explore the influence of trust on public opinion of fusion energy.

2.3.3. Public Consultation

It is essential to understand the role that public consultation plays in public acceptance of new developments. In the UK it is law for planning authorities and developers to undertake formal public consultation processes (UK Government, 2018); such processes offer an important insight into local public opinion, however often this is only the opinions of invited publics (Catt and Murphy, 2003). For larger developments, for example new power stations, the Planning Act (2008) ensures that the site should be both appropriately publicised and a consultation period has taken place. Public consultation is essential for new energy developments as it ensures transparency, accountability and inclusivity in decision making processes (Cantarero, 2020). It allows all stakeholders, including local community groups, developers, and experts, to contribute their perspectives and concerns on proposed projects (Devine-Wright, 2011). Studies suggest that when communities perceive the consultation process as meaningful, where their concerns are genuinely considered and influence decision-making, acceptance of renewable energy projects tends to be higher (Aitken, 2010; Wolsink, 2007). However, there is also evidence that public consultation can sometimes be perceived as a tokenistic exercise, where decisions are seen as predetermined, leading to frustration and resistance (MacArthur, 2016).

From a procedural justice perspective, the fairness of the planning process is crucial. Research indicates that when communities feel included in decision-making, trust in planning authorities and developers increases, making them more likely to accept new energy projects (Walker and Baxter, 2017). Conversely, when the process is seen as lacking transparency or favouring developers over local interests, opposition can intensify (Bourdin and Nadou, 2020).

In this context, the distinction between public consultation and public engagement is vital, as the depth and nature of public involvement can significantly influence perceptions of fairness

and legitimacy in energy planning (Jami and Walsh, 2014). Public consultation and public engagement, while often used interchangeably, are distinct processes with differing implications (Shipley et al, 2012). Public consultation typically involves gathering opinions or feedback from the public on specific proposals, often through surveys, hearings, or written submissions, with decision-makers ultimately retaining control over how this input is used (ibid.). This approach can be limited in fostering deeper public involvement, as it tends to be a one-way process (Wilsdon & Willis, 2004). In contrast, public engagement is a more interactive and iterative process that encourages dialogue, collaboration, and co-creation, allowing the public to have a more active role in shaping technological development and policy (Stilgoe, Owen, & Macnaghten, 2013). Research suggests that engagement fosters greater public trust and acceptance by incorporating diverse perspectives early in the research and development process (Chilvers & Kearnes, 2019).

There are numerous factors that influence the effectiveness of public consultation, including timing, purpose, accessibility, and political will. In regard to the purpose behind public consultation, it has been stated that there are different goals of participation which can be of conflict with each other (Khan, 2004). For example, when the aim of a participatory process is framed primarily as deliberation between participants, the exercise may be positioned as a search for joint solutions or consensus, which can in practice reduce incentives for meaningful engagement if participants perceive that their input has limited influence over outcomes (Khan, 2004; Escobar, 2011). Conversely, research suggests that participatory approaches are more likely to be effective when the purpose of engagement is clearly defined from the outset, including explicit acknowledgement of the scope, limits and potential impact of public involvement, as this helps to manage expectations and foster trust in the process (Few, 2007).

Public consultation around emergent energy technologies can bring about a number of benefits, including increased transparency and strengthened trust. Disillusionment and trust is considered one of the biggest benefits to public engagement, however this is only possible with the right approach (Reed, 2008). It is argued that the acts of public engagement need to have foundations that emphasise equity, trust, and learning (Reed, 2008). This public engagement should also be considered early within the process and ensuring all stakeholders are represented systematically (Reed, 2008; Innes and Booher, 2004).

A study by Kerley and Star (2000) in Australia researched whether public consultation adds value to developments or impeding them. The study explores the perceived benefits of public consultation outlined by the OECD (organisation for economic cooperation and development) which are stated as; better quality regulations, increased options of viable policy, lower costs of administration, concurrence and compliance, responsiveness to change and finally, improve the credibility and legitimacy of government action (Kerley and Starr, 2000). The study, however, states that these benefits vary based on public consultation methods, stating that in order to ensure a valuable contribution is made the consultation mechanisms must be critically explored based on the reasons for said consultation.

An interesting aspect of public consultation is consulting publics on matters where they do not have scientific expertise and may not be fully aware of the technologies discussed. Levitt (2003) explores the purpose of engaging in public consultation with those that do not have scientific expertise. Levitt (2003) states that there is a need to engage with these publics to enable researchers and policy makers to understand what the public do not know, thus enabling them to plan education to help reduce this knowledge gap. This aspect of public engagement is also considered important as it allows researchers to understand concerns from the public, so that public consultation and deliberation can be used to help alleviate and explain these concerns (Levitt, 2003). This research translates to researching public opinions of fusion energy, with fusion being an emergent technology for which there is limited awareness about the technology. Therefore, this research will help policy makers and developers to understand what perceived risks the public have, and where they need to conduct further public consultation.

In summary, public consultation is essential for understanding public attitudes toward emergent technologies like fusion energy, ensuring transparency, accountability, and inclusivity in decision-making (Cantarero, 2020). When consultation is meaningful, where public concerns genuinely influence outcomes, trust in planning authorities increases, leading to higher acceptance of energy projects (Aitken, 2010; Wolsink, 2007). However, consultation can sometimes be perceived as tokenistic, fuelling opposition if decisions appear predetermined (Devine-Wright, 2011). The distinction between consultation and engagement

is critical, as engagement fosters dialogue and collaboration rather than simply collecting feedback (Stilgoe, Owen, & Macnaghten, 2013). This is particularly important for fusion energy, where public awareness is limited; engaging with non-experts helps identify knowledge gaps, address misconceptions, and build trust (Levitt, 2003). Research highlights that early, well-structured public involvement strengthens credibility and leads to more accepted policy decisions (Reed, 2008). Ultimately, the effectiveness of consultation depends on clear objectives, accessibility, and political will (Khan, 2004), making it a crucial tool for integrating societal values and ensuring responsible innovation in fusion energy development.

2.3.4. Perceived Benefits and Risks

Crucial in the public acceptance of energy developments is the role of perceived benefits and risks, which can significantly influence public opinion. Perceived benefits encompass potential advantages such as economic growth, job creation, energy security, and technological advancements. Whereas, perceived risks include concerns related to environmental impacts, safety risks, and economic implications. The interaction between these perceived benefits and risks can shape the level of support or opposition to energy developments amongst publics (Devine-Wright, 2005). Understanding how individuals perceive these factors is crucial for policymakers, industry stakeholders, and community leaders seeking to navigate the complexities of public acceptance towards emergent energy technologies. Therefore, this section aims to understand the impacts of economic, environmental and safety implications on public acceptance, as well as, understanding this in the context of energy transitions.

Perceived economic benefits and risks can significantly influence public acceptance of energy developments. Potential benefits such as job creation and improved local infrastructure can significantly increase support for new energy developments. It is recorded that low carbon energy technologies create more jobs than fossil fuel technologies, they are also said to improve local infrastructure in terms of energy and water security (Sen and Ganguly, 2017). However, economic risks can also play a huge role in public opposition. Bayulgen and Benegal (2019) found that people had a stronger reaction to the prospect of renewable energy technologies presenting an economic cost to them, compared to the prospect of an economic

benefit. Therefore, suggesting that economic risks outweigh the potential of economic benefits.

Safety concerns are vital in shaping public acceptance of emergent energy technologies. When publics perceive such technologies as posing risks to their safety or health, resistance to adoption increases (Nazir et al, 2020). Stoutenborough et al (2013) discovered though their study on public attitudes to traditional nuclear that those publics who believe nuclear energy to be riskier, are less likely to be supportive of policy surrounding this topic. However, public consent and acceptance is vital in order for most developments to be approved, therefore the impact of the perception can be detrimental. However, Cowell et al (2011) concluded that public acceptance of wind farms generally improves once the development becomes operational, usually because their previous fears are proved unfounded. In regard to nuclear fission, it has been found that residents living in close proximity to power stations perceive them as part of everyday life, with the risk either normalised or familiarised over time (Parkhill et al, 2009). Normalisation refers to the process by which individuals come to accept potential risks as an ordinary and unremarkable aspect of their environment, reducing their sense of threat (ibid.). Familiarisation, on the other hand, involves developing an understanding of the technology through prolonged exposure, making it feel less foreign or alarming (Parkhill et al, 2009). This risk can be heightened, viewing the power stations as potential risks, by moments of anxiety that come and go throughout participants lives (ibid.). This suggests that while public acceptance of fusion energy may grow over time as familiarity increases, underlying concerns about risk may persist beneath the surface, occasionally resurfacing in moments of heightened anxiety or external triggers.

In conclusion, the influence of perceived benefits and risks on public acceptance of emergent energy technologies cannot be overlooked. Local communities evaluate the adoption of new energy developments by weighing the potential advantages against the possible risk. Recognising the importance of these perceptions is essential for ensuring effective public consultation and informed decision-making. Moreover, acknowledging that trade-offs often exist between benefits and risks is critical. The concept of trade-offs and those specific to public attitudes surrounding fusion energy will be explored further within this chapter.

2.3.5. Environmental Impact

Literature regarding public opinions of emergent technology has highlighted the impact on the environment as being a significant influence over public acceptance (Macnaghten and Davies, 2019). The theme of environmental impact is suggested as being negative when it comes to public opinion, with emergent technology considered to have a negative impact upon the environment (Renn and Benighaus, 2013).

Studies suggest that the public often associates new technologies with potential harm to the environment, leading to scepticism and opposition (Renn & Benighaus, 2013). Research indicates that opposition often arises from fears of environmental degradation, especially in cases where the full implications of a technology are not yet understood (Turley et al., 2022). Turcanu et al. (2020) found that as individuals become more knowledgeable about a technology, environmental concerns and cultural dispositions play a more significant role in shaping public acceptance than scientific literacy alone. This suggests that regardless of how well fusion technology is communicated, deeply rooted environmental values may continue to drive public attitudes. Therefore, addressing environmental concerns transparently and engaging the public in discussions about the sustainability and long-term ecological impact of fusion energy is crucial.

Studies have shown that one of the most important factors influencing how willing publics are to accept new renewable energy technologies is concern for the environment (Gârdan et al, 2023). Despite this concern for the environment and mitigating climate change there has been a slow uptake of renewable energy, suggesting that the global fuel mix might not change significantly between now and 2030 (Asif et al, 2023). This therefore highlights despite publics concern about environmental impacts, there is limited willingness to actually make attempts to adopt more renewable energy technologies.

2.3.6. Climate Change

The matter of climate change can influence public opinion, with climate concerns urging people to consider other technologies than traditional fossil fuels to help solve the issues. Public attitudinal research has found that there is very little unconditional support for traditional nuclear energy in the UK (Corner et al, 2011). This study draws on the results of a national British survey containing 1822 participants, with just 35% of participants having unconditional support (Corner et al, 2011). The same study found that publics who are more concerned about climate change are less likely to support nuclear energy (ibid.). However, when people were able to display their dislike for nuclear power while accepting it conditionally, under the framing reluctant acceptance, publics were more likely to support nuclear if they address environmental, with 55% of participants accepting nuclear under these circumstances (Corner et al, 2011). Reluctant or conditional acceptance, as developed by Bickerstaff et al. (2008), refers to a situation in which publics accept an energy technology they may otherwise view unfavourably, such as nuclear fission, because of the perceived necessity or broader benefits it offers, such as mitigating climate change (Alzahrani et al., 2023). This study, therefore, suggests that concerns around climate change can increase acceptance of traditional nuclear energy but only in limited situations.

Reluctant acceptance is a term used with traditional nuclear where nuclear is accepted as a trade-off to address climates change, with nuclear only being accepted as a mitigation measure (Bickerstaff et al, 2008). Therefore, it will be of interest to observe whether new nuclear technologies such as fusion energy fall under this same framing, or whether fusion has higher levels of acceptance as well as its potential to mitigate climate change, rather than only being accepted because it has potential to mitigate climate change.

When considering climate change and how this will evolve over the coming years, it is important to consider the energy mix and whether this will contribute to the worsening of the climate or whether low carbon technologies will be favoured. Research on public attitudes toward nuclear fission suggests a strong preference for alternative energy sources to combat climate change (Pidgeon et al, 2008). A study in Britain found that 78% of participants favoured

non-nuclear options for mitigation (Poortinga et al., 2006). This nationally representative survey of 1,491 respondents also revealed that while 41% would prefer to live with nuclear power rather than face the consequences of climate change, 54% supported the construction of new nuclear power stations (Poortinga et al., 2006). Furthermore, when nuclear energy is framed as a solution to climate change, public opinion tends to shift in its favour (Pidgeon et al., 2008). Given that fusion energy is increasingly positioned as a key technology for mitigating climate change, it is important to explore whether this framing influences public perception in a similar way.

A study conducted in Australia found similar results, with 42% willing to accept nuclear power if it would help tackle climate change (Bird et al, 2013). However, both of these studies were conducted prior to the Fukushima disaster (ibid.). When a follow up survey was carried out in 2012, the majority of participants at 40% were not willing to accept nuclear power as a solution to help mitigate climate change (Bird et al, 2013). With it being 12 years since the 2011 Fukushima disaster and fusion being a technology incapable of creating such a disaster (IAEA, 2023) it will be interesting to understand whether climate change is able to outweigh the fear of disaster when understanding public attitudes to fusion energy.

As awareness of climate change increases it has been observed by a study in China that this is linked with an increased willingness to pay for renewable energy (Ali et al, 2023). Similar results were discovered in both Slovakia and Cornwall, UK, where publics were asked about their support for renewable energy technologies, there were extremely high levels of support, correlating with their understanding of climate change (Beer et al, 2023). This therefore highlights how understanding of climate change and its impact, can have a significant influence over opinions of renewable energy technologies.

2.3.7. Energy Security

Along with Climate Change, energy security is also an issue that can influence public acceptability regarding new energy developments (Lucas et al, 2021). Publics are more likely to support reliable and stable energy sources that can minimise disruptions and encourage affordability (Boudet, 2019). This section will explore the influence of reliability, geopolitical stability and economic resilience on public acceptability. How energy security can influence policy will also be understood, with relation to fusion energy.

Energy security ensures the reliability and stability of energy supply, which is a key factor in the acceptance of new energy developments (Winzer, 2012). Reliability of energy sources is crucial for both consumers and businesses (Strielkowski et al, 2021). Having diverse renewable energy sources, including wind, solar and fusion energy can help to provide a resilient and reliable energy supply, without the need to reply on fossil fuels (Bostan et al, 2012). This reliability of renewable energy sources can alleviate concerns about energy intermittency and therefore enhance public acceptance (Zografakis et al, 2010).

New energy developments can reduce dependence on geopolitically unstable regions, thus enhancing energy security (Bradshaw, 2009). Reliance on fossil fuels often involves importing energy from politically volatile regions (Asif and Muneer, 2007). Russia's invasion of Ukraine caused energy in Europe to change drastically, reducing imports of Russian coal, oil and natural gas, causing a focus on more local energy sources (McWilliams et al, 2023). Therefore, highlighting how geopolitical risks can be reduced through the use of local renewable energy sources, which can increase public and governmental support for these developments.

Energy security through new energy developments can boost economic resilience by creating jobs and stabilising energy prices (Cherp et al, 2012). A diversified energy portfolio can protect economies from price shocks and supply disruptions (Bollino and Galkin, 2021). This economic resilience provided by renewable energy can enhance public and political acceptance (Lucas et al, 2021).

Energy security concerns can drive policy and regulatory support for new energy developments (Bahgat, 2011). Meaning, governments prioritise energy security in their energy policies and regulations (Ang et al, 2015). This policy support motivated by energy security concerns can facilitate the acceptance and growth of new energy technologies, by framing them as a potential solution to these issues (Corner et al, 2011).

2.3.8. Scientific Controversy

Scientific controversy surrounding new energy developments can significantly impact public attitudes (Karlstrøm et al, 2014). Conflicting research or debates among experts may create uncertainty and scepticism among the public (Corner et al, 2012). If controversies highlight potential risks or uncertainties regarding the safety, efficacy, or long-term impacts of new energy developments, public trust and acceptance can diminish (Poumadère et al, 2011). Conversely, transparent communication, thorough research, and regulatory oversight can mitigate concerns and build confidence (Corner et al, 2012. Addressing controversies through credible information and engaging with public concerns can foster informed support for innovative energy solutions (Sovacool et al, 2020).

Scientific controversy can play a crucial role in shaping public perception of new energy technologies (Devine-Wright, 2005). Public perception can be swayed by differing scientific opinions and debates (Hulme, 2009). For example, in the public opinion of nuclear, the state plays a role, viewed as a conflict of interest between the government and the citizens of a country (Jasanoff, 1995). Conflicting scientific viewpoints can lead to public scepticism or support, and the media plays a role in amplifying these controversies (Sarewitz, 2004).

Scientific controversy can also influence policy decisions regarding new energy developments (Droste-Franke et al, 2015). Policymakers rely on scientific evidence to form regulations and policies (Munro et al, 2020). However, in the UK policy making has become less reliant on science and more reliant on agendas, with the UK Government's austerity agenda shifting the focus of climate change from benefits to costs, resulting in a reduction of spending within this area (Sharman and Perkins, 2017). This has allowed climate sceptics to gather traction with

their arguments and the inaction of the government portrays the idea of giving their stance credibility (ibid.). Therefore, scientific controversies can lead to regulatory uncertainty and regulatory uncertainty can lead to scientific controversies, impacting the implementation of new energy projects (Taylor, 2022).

Scientific controversy can both hinder and drive technological advancements and innovation in new energy developments (Hess, 2007). Controversy can lead to further research and development to resolve disputes (Van de Grift, 2022). This can be seen in the improvements made to solar panels, with issues such as efficiency and waste materials being addressed through constant advancement in order to increase the acceptability of the technology (Vijayan et al, 2023). However, scientific controversy plays a dual role, slowing down initial acceptance but potentially leading to more robust and improved technologies in the long run (Mathews, 2013).

Addressing scientific controversies through public engagement and education is crucial for the acceptance of new energy developments (Wilsdon and Willis, 2004). Clear communication and education can help the public understand and navigate scientific debates (MacArthur, 2016). Therefore, in order to successfully implement fusion energy it is vital that the scientific controversies are understood and addressed amongst both publics and stakeholders.

2.4. Place

The interviews conducted within this project were centred around two main locations, therefore the main theory relevant within the interview section of this project is place attachment theory. Place attachment theory refers to both emotional and functional bonds between place and people (Scannell and Gifford, 2017). It is widely considered that publics attachment to their area can significantly impact how they perceived proposed local projects, such as new energy developments (Boudet, 2019; Devine-Wright, 2009; 2011; Van Veelen and Haggett, 2017). Therefore, it is vital to understand the ways in which place can influence public attitudes, as it can be observed to have both positive and negative influences, in terms of acceptance. Therefore, this section aims to explore place attachment, the complexities of place as well as the influence of both geographical pride and stigma.

Place is a combination of the concepts of locale, location, and sense of place (Agnew, 1987). It is both a spatial location as well as having a social aspect, which includes the emotions that people associate with a specific place (Cresswell, 1996). The concept of 'in place' is used to separate people, objects, and places as 'fitting in' or belonging within a particular context, shaping perceptions of whether they are seen as appropriate or acceptable (Cresswell, 1996). Place-attachment and place-identity have been introduced as important psychological factors to explain people's evaluations and acceptability of energy alternatives in their close environment, and hence as an alternative to the over-simplified NIMBY approach (Perlaviciute and Steg, 2014). Devine-Wright (2005) implies that place attachments by publics can influence public acceptance of low carbon technologies, in that place attachment can motivate public support and opposition to such technologies, dependent on whether the proposed developments are viewed as a threat or an opportunity (Devine-Wright, 2005). Therefore, this section aims to explore the literature surrounding the complexities of place, geographical pride, and geographical stigma. This literature will be analysed in the context of new energy developments, as this can be extrapolated and compared to the findings within this research exploring public attitudes to fusion energy. These place-based perspectives are central to the thesis, as they provide the conceptual tools for analysing how local histories, identities and

experiences of industrial change shape divergent responses to the proposed STEP fusion development across the case study sites.

2.4.1. Social Constructions of Place

The concept of social constructions of place refers to how people and societies give meaning to different locations based on cultural, historical, economic, political, and physical factors (Halfacree, 2017; Gieryn, 2000). These meanings are not just shaped by human experiences but also by the physical features of a place, such as its landscape and natural resources (Kühne, 2018; Massey, 2005). Because of this, the way a place is understood can change over time as society and the environment evolve.

Historical events shape the social constructions of place, with past events, creating layers of meaning and memory attached to locations (Milligan, 1998). Historical sites, memorials, and commemorations that embody collective memory and historical narratives can all have an over influence publics sense of place (Lewicka, 2008). Historical constructions and backgrounds can also mould an individual and community sense of place, for example in former industrial towns, a sense of place tied to industry can persist even after industries like coal mining have disappeared (Mah, 2012). Milbourne and Kitchen (2014) highlight how rural and post-industrial communities, in particular, develop strong attachments to traditional industries and landscapes, which can shape their openness to new developments. In areas where industries like agriculture or mining have historically played a dominant role, local communities may be more resistant to large-scale energy projects that are perceived as disruptive to their established identity (Svobodova et al, 2021). Conversely, regions with a history of energy production, such as those with coal or nuclear facilities, may be more accepting of fusion energy, viewing it as a natural continuation of their industrial heritage (Pintus et al, 2024). This highlights how historical and cultural associations with place can strongly influence public attitudes towards emergent technologies and their perceived fit within the local landscape.

Economic activities contribute to the social constructions of place and influence social hierarchies (Ashraf et al, 2017). The local economic history can shape communities' sense of place, if a community has in the past faced economic hardship, then they are more inclined to

support new developments in the hope of regenerating their area and creating jobs (Bergguist et al, 2020). However, if a community is historically more affluent, they can be less likely to support new energy developments within their local area, as they do not see the benefits of it directly affecting them (ibid.). Therefore, understanding a local area's economic history before implementing new energy developments is important.

Political decisions and governance structures influence the social constructions of place (Alkon and Traugot, 2008). Political constructions can shape public spaces, citizenship, and belonging (Yuval-Davis, 2006). In terms of acceptance of new energy developments, the political construction of place can play a major role (Kemmis, 1990). With those communities who historically have a good political relationship with the government are more likely to accept new government developments within their area, however, those with historically negative experiences will be less likely to accept such developments (Boudet, 2019). The concept of defence of place further complicates this dynamic, as communities with a deep attachment to their local environment often resist when external developments threaten their sense of identity, heritage, or autonomy (Sanz-Hernández, 2020). The defence of place can drive people to take collective action, as they work to protect the cultural and social ties that shape their connection to the land and to one another (Low, 2009). This sense of place and the collective action it inspires is particularly relevant when considering new fusion energy developments, as communities may resist or support such projects based on how they perceive these innovations impacting their environment and identity.

Contemporary issues challenge and redefine social constructions of place (Vidal et al, 2012). Migration, environmental changes, and cultural transformations alter meanings and perceptions of places (Devine-Wright and Batel, 2017). This highlights that as people move around the country and migration occurs, communities' sense of place can be weakened (Fried, 2000). Therefore, place is a very complex theory that has many different social constructions, highlighting how different communities feel different attachments to their area. This means each locale will have varying responses to the implementation of new energy developments in their area, based on their perceive sense of place. In the case of fusion energy, these different perceptions of place and connections to the area, shaped by history, culture, and the environment, can play a big role in whether communities welcome or oppose such new technologies.

2.4.2. Complexities of Place

Perceptions and attitudes to place and its relationship with people is multifaceted and influenced by a variety of factors, historical context, socio-economic conditions, cultural influences, and can vary by social group (Wang et al, 2020). This section will explore these complexities of place within the literature.

Demographic influences can have a significant impact on a person's sense of place. Factors such as gender (Berkes, 2004), race (Kimpton et al, 2013), age (ibid.), income (Kimpton et al, 2013), education (ibid.), and occupation (Kimpton et al, 2013) can significantly shape an individual's perceptions of place. Different demographic groups may perceive the same place differently based on their unique experiences and perspectives. Scannell (2013) states that the kind of place attachments people develop with their local area are influenced by demographics, and that this can therefore influence support of new developments or changes to their local area. However, in the context of tidal energy developments, Devine-Wright (2011) found that demographic variables did not emerge as significant predictors in acceptance of tidal energy.

The historical aspect of place attachment can significantly influence public attitudes towards new energy developments (Wirth et al, 2016). Communities may have historical narratives related to environmental exploitation or past industrial development that influence their perceptions of new energy projects. For example, communities with a history of environmental degradation from coal mining have been found to be more sceptical or resistant to new energy developments perceived as potentially harmful to the environment (Brasier et al, 2011).

Personal experiences can also have a significant impact on place attachment. Devine-Wright and Howes (2010) found that personal levels of trust in key actors had a significant impact on place attachment and support for a proposed wind farm. This study also found that those with a strong place attachment found the prospect of this project a threat to their place identity and therefore negatively impacted support (ibid.).

The socio-economic conditions of a place can significantly influence public attitudes towards new energy developments in various ways. Socio-economic disparities within a community can shape attitudes as residents with higher incomes may prioritise environmental concerns and quality of life issues, whereas those with lower incomes may prioritise economic benefits and job opportunities (Larson et al, 2009). These differences can lead to divergent opinions and conflicts within the community. Socio-economic factors can also influence place attachments and public acceptance of energy developments in terms of property values. Perceptions of potential impacts on property values, such as visual blight or noise pollution, can lead to opposition from residents who fear negative financial consequences (Bond et al, 2013).

In conclusion, the complexities of place, encompassing demographic makeup and diverse perceptions of positive and negative aspects, significantly shape public attitudes towards new energy developments. Demographics influence how different groups perceive the potential benefits and drawbacks of such projects, as do personal experiences and socio-economic conditions. It is crucial to understand the complexities within this topic but also understand more specific aspects such as geographical pride and stigma which will be explored next. Successfully addressing these complexities can enhance public acceptance of new energy developments by ensuring that projects align with community values, needs, and aspirations.

2.4.3. Geographical Pride

Geographical pride is a concept within place attachment theory that refers to the emotional bond individuals or communities have towards a specific geographic location (Strzelecka et al, 2017). It encompasses a sense of belonging, identity, and positive feelings associated with a place. Geographical pride arises from various factors, including personal experiences, cultural heritage, shared history, and positive attributes of the environment (Dijink, 2002). Geographical pride plays a significant role in shaping individuals' perceptions, attitudes, and behaviours towards their environment (Torgler and Garcia-Valiñas, 2007). It enhances a sense of responsibility and ownership, encouraging individuals to invest in and contribute to the well-being of their community. Additionally, geographical pride can influence public support or

opposition towards development projects, as residents may advocate for initiatives that align with their values and enhance the character and identity of their place. In regard to fusion, pride can play a significant role in influencing acceptability of new developments, for example areas that have industrial pasts can be proud to keep this tradition and also be the face of new innovative technologies such as fusion.

There are many factors related to geographical pride that can influence publics acceptance of new energy developments, such as alignment with community values, sense of ownership and preservation of identity. New energy developments that align with the values and identity of a community are more likely to be accepted and supported (Gordon et al, 2022). The halo effect can play a significant role in this process, as residents who already feel a positive attachment to their community may extend this favourable perception to new projects that align with the community's identity (Bickerstaff and Walker, 2001). For instance, a community with strong geographical pride might view fusion energy projects more positively, associating them with innovation, local progress, and sustainability, reinforcing their support despite potential risks or challenges (Tversky and Kahneman, 1974). If low-carbon energy projects reflect the community's values around environmental stewardship and sustainability, residents may view them as beneficial contributions to their local area (Peters et al., 2010).

Projects that involve local participation, such as community-owned renewable energy initiatives, can help foster a stronger sense of pride and responsibility among residents (Berka and Creamer, 2018). When local residents are actively involved in the decision-making process for energy developments, they develop a greater sense of ownership over the outcomes. As a result, communities that feel they have ownership and control over new energy projects are more likely to embrace them (Kallis et al., 2021).

Geographical pride often includes desire to preserve the locations' identity and a love for the natural environment and a desire to protect it. Therefore, attitudes towards new energy developments can be influenced by perceptions of their environmental impact (Perlaviciute and Steg, 2015). Residents provide support for low carbon energy projects that they see as minimising harm to the landscape, wildlife, and ecosystems they cherish (Benedict and McMahon, 2012). However, residents may resist energy developments that they perceive as

threatening the character or identity of their community (Devine-Wright, 2011). If a proposed project is seen as conflicting with the landscape, cultural heritage, or aesthetic values of the area, it may face opposition from residents who take pride in preserving these aspects of their locality (Delicado et al, 2016). This desire to protect the place, known as place protection, emerges as a key factor in the resistance to developments that are perceived to alter or degrade the unique qualities of the environment or community (Beatley and Manning, 2013). Van der Horst (2007) found that those who have a more positive sense of identity with rural landscapes are more likely to oppose renewable energy developments, therefore suggesting that the sense of identity differs based on the location, e.g. rural and non-rural.

Overall, understanding the role of geographical pride is crucial for engaging local communities and gaining their acceptance of new energy developments. Developers and policymakers should consider the values, identity, and aspirations of residents when planning and implementing such projects, aiming to build consensus and create positive outcomes for both the community and the environment.

2.4.4. Geographical Stigma

Geographical stigma is a concept within place attachment theory that refers to the negative perceptions, stereotypes, or labels associated with a particular geographic location (Butler-Warke, 2021). This stigma can significantly shape public attitudes toward new energy developments, especially when the development is proposed in areas with a history of industrial decline or environmental degradation. Parkhill et al (2012) explores this through the idea of landscapes of threat, where landscapes that have been historically perceived as harmful or undesirable continue to carry negative associations, influencing publics perceptions of any new developments, this stigma can be transferred to objects, people and place. Geographical stigma can transfer from the historical, environmental, or socio-economic conditions of a place to the new energy projects proposed within it, often framing them as threats rather than opportunities (Bridge and Gailing, 2020). This transfer of stigma can hinder the acceptance of projects, as local communities may view them with scepticism or distrust, believing that they will not improve the community's situation or will further harm its image.

Perception of risk in areas with high geographical stigma can have a significant impact on public attitudes towards new energy developments. Stigmatised areas may already face challenges related to environmental pollution or health hazards, leading residents to be more sensitive to potential risks associated with new energy developments (Jacquet and Steadman, 2014). For example, communities located near industrial sites or polluted waterways may be wary of additional environmental burdens from new energy projects, such as air or water pollution (Bush et al, 2001).

Residents of stigmatised areas may have lower trust in government agencies, regulatory bodies, or energy companies due to past experiences of neglect, exploitation, or injustice (Nguyen and Batel, 2021). This lack of trust can lead to scepticism or opposition towards new energy developments, particularly if there are concerns about transparency, accountability, or the equitable distribution of benefits and burdens (Cantarero, 2020).

Geographical stigma can exacerbate concerns about the unequal distribution of environmental impacts and benefits (Gregory and Satterfield, 2002). Publics within stigmatised areas may feel unfairly burdened by new energy developments, while more affluent or politically influential communities are able to avoid or mitigate the negative consequences (Walker and Baxter, 2017). This perception of injustice can drive opposition to projects, particularly when residents believe these developments will disproportionately affect their community's identity and well-being (Devine-Wright, 2011).

The historical stigmatisation of certain areas, such as former industrial or marginalised neighbourhoods, can shape public attitudes towards new energy developments (Rudolph and Kirkegaard, 2019). Publics may view these projects through the lens of past injustices or environmental harm, leading to heightened scrutiny and resistance to perceived threats to the community and its identity (Shaw et al, 2015).

In summary, geographical stigma significantly influences public attitudes toward new energy developments, especially in areas with a history of industrial decline or environmental harm. As highlighted by Parkhill et al (2012), communities with a history of negative experiences may

view new projects as threats, further fuelled by concerns about risks and lack of trust in authorities (Jacquet and Steadman, 2014; Nguyen and Batel, 2021). Residents in stigmatised areas may feel that they are unfairly burdened by new developments, while more affluent communities avoid the negative impacts (Walker and Baxter, 2017). This sense of injustice can increase opposition, particularly when residents perceive new projects as threatening their community's identity and well-being (Devine-Wright, 2011). To gain public acceptance, it is crucial to address both the environmental concerns and the historical and social context of these communities, fostering trust and ensuring that benefits are equitably shared.

2.4.5. Deindustrialisation Effects

As traditional industries decline, communities may experience job losses and economic downturns, creating a drive for new economic opportunities (Atkins et al, 2011). New energy developments can be seen as a pathway to revitalisation, offering new jobs and investments in low carbon energy sectors (Carley and Konisky, 2020). However, there may also be resistance if communities fear that new energy projects will not fully replace the lost industrial jobs or if they associate them with economic instability (Boso et al, 2020). Therefore, this section aims to explore the deindustrialisation effects such as economic revitalisation, new growth, community participation and the view of health benefits, within the context of new energy developments.

Deindustrialised regions view new energy developments as opportunities for economic revitalisation (Thomas et al, 2022). New energy projects can bring investment and jobs to areas affected by industrial decline (Robins et al, 2019). When Germany encountered the decline in coal in the 1990's they implemented widespread retraining programmes to help coal workers find new jobs, often in the renewable sector (Gambhir et al, 2018). Therefore, the implementation of programmes like this and the promise of new opportunities can significantly influence public acceptance of new energy developments.

Deindustrialisation can also influence social attitudes towards new energy developments, with communities impacted by industrial decline being more open to alternative sources of growth

(Johnstone, 2017). A town in Ontario Canada highlighted that deindustrialised towns are more likely to support new energy developments in their local area due to historic links to a strong entrepreneurial ethic and a strong community spirit to create a united opinion (Dampier et al, 2014). This shows that a shift in social attitudes from traditional industries to sustainable energy can help facilitate acceptance.

Community support and participation are essential for the acceptance of new energy projects, particularly in deindustrialised regions (Thomas et al., 2022). Engaging local communities helps build trust and a sense of ownership over new initiatives, which can lead to greater acceptance (Goedkoop and Devine-Wright, 2016). For example, a community-led renewable energy project on the Scottish Island of Shapinsay gained widespread support, with residents describing the project as empowering (Van der Waal, 2020). However, this study also highlights the need for policy support to ensure the long-term viability of such projects (ibid.). This underscores the importance of involving communities in the planning and decision-making processes, especially when introducing new technologies like fusion energy. Similarly, a study in Port Talbot, a deindustrialised town, found strong community support for decarbonisation but also a deep sense of powerlessness, as residents felt excluded from decision-making processes (Norris et al., 2024). This reinforces the need for community events and consultations to ensure the public feels heard and engaged in the development of new energy projects.

In conclusion, the concept of place plays a crucial role in shaping public attitudes toward new energy developments, particularly in deindustrialised regions. Communities experiencing economic decline often see new energy projects as opportunities for revitalisation, job creation, and growth (Thomas et al., 2022). However, resistance can emerge if residents feel that these developments will not replace lost industrial jobs or if they associate them with economic instability (Boso et al., 2020). Engaging communities in the decision-making process and ensuring their voices are heard is essential to building trust and gaining acceptance (Goedkoop and Devine-Wright, 2016). The following chapter will explore how heuristics, or mental shortcuts, further influence public perceptions of new energy projects, offering insights into how people assess the risks and benefits based on their existing beliefs and experiences.

2.5. Heuristics

Research suggests that due to a lack of time and commitments, individuals tend to rely on shortcuts when making decisions (Payne et al, 1993). The term heuristics has become a key concept to describe human judgements, used in cognitive psychology as a "useful shortcut, an approximation or a rule of thumb for searching through a space of possible solutions" (Hoffrage and Reimer, 2004. P. 439). Essentially, heuristics are considered as the mental shortcuts and strategies that humans use to make decisions and understand complex phenomenon (Gigerenzer, 1999). Heuristics may be used in many everyday situations for example in purchasing situations (del Campo et al, 2016) They are also highly relevant in terms of public attitudes to fusion energy, as individuals often rely on simplified mental shortcuts to form opinions about new, complex technologies that they may not fully understand. It is important to understand the heuristics that are used by publics to understand fusion energy as this can help inform decision making, education and future public engagement. This section will explore the relevant literature surrounding heuristics, examining the key concepts as well as the different types of heuristics that are relevant to this research.

There are three key concepts and theories related to heuristics gathered from the literature: bounded rationality, dual processing, and ecological rationality (Basel and Brühl, 2013). The concept of bounded rationality was introduced by Simon (1990), suggesting that individuals make decisions within the constraints of their cognitive abilities, time limitations and available information. In the context of heuristics, bounded rationality suggests that individuals use simplified heuristics to navigate complex environments and make satisfactory decisions rather than optimal ones (Gigerenzer, 2004). In relation to public attitudes towards energy developments this means individuals may rely on said simplified heuristics to form quick judgements and decisions (Bessette, 2022). This theory also suggests that adaptive decision making may take place, where individuals may use heuristics to weigh the potential benefits and risk associated with different energy sources to make a decision regarding their acceptance to energy developments (Selten, 1990; Conlisk, 1996; Lejarraga et al, 2020).

A further concept within the heuristic's literature is dual processing (Petty and Briñol, 2011). This theory indicates that some situations are more conducive to heuristic processing, in these situations' heuristics are used to simplify decision making rather than systematically processing all the information available (Chen and Chaiken, 1999; Maheswaran et al 1992). The heuristics used are the likability of the source of information or the feelings generated by this information, however, the preferences that are formed are more unstable and likely to change (Petty and Briñol, 2011; Chen and Chaiken, 1999; Rijnsoever et al 2015). This is due to the interactions of system one and system two processing. System one processing relies on fast automatic and intuitive decision making, whereas system two is slower, more deliberative, and analytical reasoning (Evans, 2003; Evans and Stanovich, 2013). In regard to public attitudes towards energy developments, this suggests that those initial reactions publics provide are more intuitive and heuristic based, however, these opinions may change after system two has engaged and individuals have an opportunity to reflect on their given answers.

The final concept of heuristics gathered from the literature is ecological rationality. Ecological rationality considers the fit between decision-making strategies and the environmental or ecological context in which decisions are made, arguing that decision making strategies should be adapted to the specific demands of the decision environment (Luan et al, 2019; Todd and Gigerenzer, 2012). In the context of heuristics, ecological rationality suggests that heuristics can be rational and adaptive if they are well-suited to the structure of the decision problem and the informational cues available in the environment (Hafenbrädl et al 2016; Chase et al, 1998). In terms of public attitudes towards energy developments, ecological rationality suggests that if said developments are associated with positive outcomes for the environment or they are congruent with the individuals' beliefs then it is more likely to be considered favourably by publics.

Within the literature there are a number of different types of heuristics including; availability heuristics, representativeness heuristics, anchoring and adjustment, satisficing heuristics, and confirmation bias (Griffin et al, 2001). Availability heuristics are when people tend to judge the likelihood of events based on how easily they can recall examples or instances of those events (MacLeod and Campbell, 1992; Keller et al, 2006). In the context of low carbon energy, if individuals frequently hear about successful low carbon energy projects or initiatives in their

community or in the media, they may perceive low carbon energy as more viable and acceptable.

Representiveness heuristic involves making judgments based on how closely something resembles a typical example or prototype (Kahneman and Frederick, 2002). In terms of low carbon energy, individuals may judge the acceptability of low carbon energy sources based on their perceived similarity to familiar energy sources (e.g., comparing solar panels to traditional power plants). However, with fusion being an emergent technology with no operational plants, this heuristic cannot be explored.

Anchoring and adjustment heuristics refer to when people tend to rely on initial information (the anchor) when making judgments or estimates and then adjust their assessment from that starting point (Epley and Gilovich, 2006). In the context of low carbon energy, individuals' attitudes may be influenced by initial information they receive about the costs, benefits, or environmental impacts of low carbon energy technologies (Ürge-Vorsatz et al, 2016).

Satisficing heuristics involves making decisions that are "good enough" rather than seeking the optimal solution (Schwartz et al, 2011). When evaluating low carbon energy options, individuals may choose the first option that meets their basic criteria for affordability, reliability, or environmental friendliness without extensively researching all available alternatives.

In relation to heuristics, confirmation bias is regularly featured as adjacent within the literature, this is where individuals tend to seek out information that confirms their existing beliefs or preferences while ignoring or discounting information that contradicts them (Almond et al, 2012). When forming attitudes toward low carbon energy, people may selectively seek out information that supports their preconceived notions about its benefits or drawbacks.

There has been extremely limited research regarding fusion energy, and even less delving into the heuristics that are used. Regarding public perception of fusion energy and heuristics used, Gupta et al (2024) found that where publics have low levels of knowledge they turn to heuristics, particularly people associate fusion with feelings of dread, but this is due to their

prior feelings towards nuclear fission. Turcanu et al (2020) also found that publics can recall some knowledge of fusion, but this was heavily influenced due to heuristics drawn with fission energy. Therefore, highlighting the importance of understanding what heuristics are used by publics, in order to fully understand why publics, hold the opinions they do regarding fusion energy.

In summary, understanding heuristics and their role in public decision-making is crucial for informing how people form attitudes toward complex technologies like fusion energy. By exploring key concepts such as bounded rationality (Simon, 1990), dual processing (Petty & Briñol, 2011), and ecological rationality (Todd & Gigerenzer, 2012), along with the various types of heuristics (Griffin et al., 2001), we can better understand the cognitive shortcuts people use when evaluating new energy technologies. This understanding is particularly important for fusion energy, where existing knowledge is limited, and heuristics play a significant role in shaping public perception (Gupta et al., 2024; Turcanu et al., 2020). The following section will explore the concept of transfer heuristics, examining how existing biases or associations, such as those linked to nuclear fission, can influence public attitudes toward fusion energy (Upham et al., 2015). These insights into risk perception and heuristic reasoning are particularly relevant for fusion energy, which remains unfamiliar to most publics and is therefore likely to be interpreted through analogy, uncertainty and prior technological experience rather than detailed technical knowledge.

2.5.1. Transfer Heuristics

The transfer heuristic is a cognitive shortcut where individuals apply knowledge or strategies from one familiar context to a new, similar situation (Todd and Gigerenzer, 2000). Transfer heuristics can play a crucial role in shaping public perception of new energy technologies (Lennon et al, 2019). People use familiar concepts and experiences to understand and evaluate new technologies (Devine-Wright, 2005). Leveraging familiar concepts can enhance public acceptance and reduce resistance to new energy developments (Flynn, 2007).

Transfer heuristics facilitate the adoption of new energy technologies by making them more relatable and understandable (Kaaronen, 2017). Comparing new technologies to familiar ones

can ease the learning curve and increase acceptance (Kaldellis et al, 2013). For example, to encourage the increased uptake of electric vehicles, they are marketed using the familiarity of standard fuel powered vehicles, to show publics that there will not be much disruption to their everyday use, just better for the environment (Egbue and Long, 2012). Therefore, it is important that design and communication strategies regarding fusion leverage transfer heuristics to facilitate understanding and transition (Cox, 2010).

The use of transfer heuristics can help overcome resistance and misconceptions about new energy developments (Smith et al, 1994). Addressing fears and misunderstandings by drawing parallels with well-understood concepts can reduce opposition (Corner and Clarke, 2016). Public engagement campaigns regarding bioenergy used analogies to dispel myths about this energy source and helped publics to understand the energy source, this successfully helped public to understand this complex renewable energy source (Eaton et al, 2013). Therefore, highlighting how communication using transfer heuristics can build trust and support for new energy initiatives, which can be used to help publics understand other complex low carbon technologies such as fusion energy.

Transfer heuristics are particularly important in the context of fusion energy, where public perceptions are often influenced by existing biases towards nuclear energy, particularly nuclear fission. Due to the historical and ongoing concerns surrounding fission, such as safety issues, radioactive waste, and accidents like Chernobyl and Fukushima, these associations can shape the way people view fusion (Turcanu et al, 2020). Publics may apply their pre-existing knowledge or fears about fission to fusion, even though fusion is distinct in its technical characteristics and safety features (Turcanu et al., 2020). These biases can lead to scepticism and resistance, despite the fact that fusion technology offers potential benefits such as minimal waste and the absence of greenhouse gas emissions (Whitmarsh et al, 2011). To overcome these biases, it is essential that communication strategies utilize transfer heuristics to clarify the differences between fission and fusion, emphasising fusion's safety and environmental benefits (Upham et al., 2015). This approach can help to reduce public fear and misperception, making fusion energy more approachable and better understood.

In summary, transfer heuristics play a significant role in shaping public perceptions of fusion energy by drawing on familiar concepts, such as nuclear fission, to facilitate understanding. By leveraging these cognitive shortcuts, policymakers and energy developers can effectively address public concerns and enhance acceptance. The next section will explore the role of trade-offs in decision-making and how public perceptions of the costs and benefits of fusion energy are weighed against potential risks and uncertainties.

2.5.2. Trade Offs

Where energy developments are concerned there are a number of benefits and risks associated with them, however, when it comes to public acceptability there are a number of trade-offs that take place (Reitz et al, 2022). These trade-offs mean balancing benefits, and drawbacks and must be carefully considered (ibid.). These factors include economic, environmental, social, and geopolitical factors, all of which shape the acceptance of energy developments worldwide (Reitz et al, 2022). Understanding these trade-offs is crucial for policymakers, industry leaders, and developers to comprehend what is acceptable by publics. Trade-offs such as scalability versus local impact, land use and technological innovation versus regulatory compliance could also be explored (Bustamante et al, 2014), however, I did not feel they were as relevant to this project as the trade-offs below. In regard to technological innovation and regulatory compliance, as the project is both an experiment and not due to be constructed until after 2030, the conversations regarding design, technology and construction are only just beginning. Therefore, these trade-offs are more relevant for future research when the technology is more advanced. This therefore highlights why the trade-offs following this have been highlighted for further exploration, in the context of this project.

2.5.2.1. Environmental Impact vs Energy Production

The trade-offs between environmental impact and energy production involve balancing the need for reliable energy sources with minimising harm to ecosystems, biodiversity, and human health (Hertwich et al, 2016). Striking this balance requires careful consideration of the full lifecycle impacts of different energy technologies and implementing measures to mitigate

environmental risks while meeting energy demands (Pehl et al, 2017). Fusion has little environmental impact in terms of waste with the only byproduct being small amounts of helium, which can be safely released without causing environmental degradation (CCFE, 2024). However, the site will take significant land and require significant construction work, causing environmental impact in that capacity. In terms of energy production, the potential is huge, with both abundant fuels that can be extracted from water and lithium, and great energy efficiency, with just one kilogram of fusion fuel providing the same amount of energy as 10 million kilograms of fossil fuels (CCFE, 2024.).

Renewable energy sources like solar and wind power are generally favoured for their lower environmental impact compared to fossil fuels, renewable energy such as wind, solar etc are also available to produce energy now, compared to the potential 30 year wait for fusion energy.. However, they may require significant land use and can have environmental drawbacks such as habitat disruption or visual impacts. Therefore, there is competition between all low carbon sources, with those having the least impact on the environment but the best outcome in terms of energy production being preferred (Kosenius and Ollikainen, 2013). Kosenius and Ollikainen (2013) found that hydropower was favoured least due to the large extent of biodiversity deterioration by building in rivers. Similar findings have also been uncovered in opposition to solar farms, where land use and wildlife impacts have been major hurdles in the acceptability of this energy source (Roddis et al, 2020).

Fossil fuels, particularly coal and oil, have higher environmental costs in terms of greenhouse gas emissions, air, and water pollution. However, the trade-off is between environmental concerns and the need for reliable energy production (Ekins and Zenghelis, 2021). There is wide acceptance that a significant reduction in greenhouse gasses is necessary to combat the climate crisis, with one of the main methods of reducing them being reduced reliance on fossil fuels (ibid.). However, with the increased focus on energy security, moving from the current trusted sources presents a higher risk, this can therefore affect public acceptance of both renewable energy sources but also new energy developments such as fusion (Johansson, 2013).

In conclusion, the trade-offs between environmental impact and energy production are complex and multifaceted. While fossil fuels offer reliable energy generation, they come with significant environmental consequences. Renewable energy sources provide cleaner alternatives but also pose challenges such as space. Finding the right balance between energy production and environmental preservation is essential for achieving sustainable and resilient energy systems.

2.5.2.2. Cost vs Reliability

Cost-effectiveness and reliability are two fundamental pillars upon which energy systems are built, yet they often present competing priorities (Prindle et al, 2007). As societies seek to meet growing energy demands while navigating economic constraints and ensuring dependable supply, understanding the trade-offs inherent in energy production methods becomes paramount (ibid.). In regard to fusion, the current STEP development is estimated to cost approximately £20 billion to complete (Royce and Jefford, 2022), therefore the technology presents a huge initial cost. However, if successful the project could play a significant role in the UK's plan to tackle climate change, paving the way for potentially limitless clean energy in the future (ibid.).

Renewable energy sources often require significant upfront investments in infrastructure (e.g., solar panels, wind turbines), but they have minimal ongoing fuel costs (Timmons et al, 2014). However, their intermittency can pose challenges to grid stability and reliability, which may require additional investments in energy storage or backup systems (Mlilo et al, 2021). This can impact public acceptance of such technologies as publics may perceive this as further barriers, where the current system is perceived to be sufficient.

Public acceptance of fossil fuel-based energy sources is often influenced by perceptions of reliability and economic stability (Scheer et al, 2017). The consistent and reliable power provided by fossil fuels is typically favoured by the public, as it ensures uninterrupted energy supply for households, businesses, and critical infrastructure (Petrović, 2021). However, concerns arise when considering the inherent price volatility associated with fossil fuels

(Lefèvre, 2010). Fluctuations in fuel prices, influenced by geopolitical factors, market speculation, and supply-demand dynamics, can lead to unpredictable and sometimes sharp increases in energy costs for consumers (ibid.). Again, this can influence public acceptance as the reduced long-term cost of low carbon technologies is considered a significant benefit of switching, thus making it worth the risk in terms of the supposed unreliability (Tietjen et al, 2016).

In conclusion, the trade-offs between cost and reliability in energy generation significantly influence public acceptance of various energy sources. While fossil fuel-based energy offers reliability, concerns about price volatility and environmental impacts can impact public support. Conversely, renewable energy sources require significant upfront investments but offer minimal ongoing fuel costs. However, their intermittency can pose challenges to grid stability, necessitating additional investments in storage or backup systems. Public acceptance of renewable energy depends on perceptions of affordability, reliability, and trust in technology and institutions. Ultimately, striking a balance between cost-effectiveness and reliability while addressing environmental and societal concerns is crucial for building resilient and widely accepted energy systems.

2.6. Positioning the Research Within the Literature

In summary, public opinion research is a broad field that encompasses various theories and approaches, with numerous frameworks being implemented. There are a number of theories that can be employed throughout this research however this project will use both human geography and psychology approaches, exploring how theories such as place and heuristics can influence public opinion of emergent technologies, in particular fusion energy.

This project at the forefront of research within the realm of this emerging, exciting, ever developing technology of fusion energy and the results from this project can provide a vital insight into how the public view this technology that could play a huge role in our future. This places an emphasis on qualitative and interpretive approaches that allow for an in-depth exploration of the ways publics construct their understanding. Place attachment helps

interpret and understand the findings from the interviews conducted, understanding publics sense of place, and how a new development would impact this.

Therefore, this research will bring together human geography and psychology concepts drawing on subjectivist and interpretivist ontology and epistemology respectively. Exploring how fusion is framed by both the public close to the potential Ardeer site and the chosen West Burton site and the national and local media. Investigating the heuristics used by publics to understand fusion and finally the benefits and risks that are perceived by these publics. This research can help influence policy, education and communication surrounding this emergent technology of fusion energy.

The strands of literature reviewed in this chapter provide the foundation for the research design and analytical approach taken in this study. The literature reviewed in this chapter highlights that public attitudes to energy technologies are shaped by a combination of place-based meanings, perceptions of risk and uncertainty, trust in institutions, and broader social and cultural contexts. While the literature provides valuable insights, they have largely focused on established technologies such as nuclear fission and renewables, with limited previous research into emergent technologies such as fusion. This thesis addresses this gap by applying these conceptual frameworks to the case of fusion energy in the UK, as detailed in the methodology.The following chapter outlines the methodology and methods used to explore public attitudes towards fusion energy, explaining how the study was designed to capture the complexity and context-dependence highlighted throughout this review.

Chapter 3. Methodology and Methods

3.1. Introduction

Fusion energy, like many emergent low-carbon technologies, is characterised by complex and sometimes conflicting public attitudes, shaped by factors such as place identity, trust, risk perceptions, and media framing (Peterson et al, 2015; Devine-Wright and Batel, 2017; McCombs and Shaw, 1972). To fully address the research questions outlined in this study, in particular the perceived benefits and risks of fusion, the influence of place, the role of heuristics, and the impact of media, a mixed methods approach was necessary (Morrissey et al., 2020). Mixed methods allow for the combination of different types of data to explore these multi-dimensional issues more thoroughly (Morrissey et al., 2020). Public interviews capture personal experiences and local community opinions; stakeholder interviews provide insight into institutional perspectives; media analysis explores how fusion is publicly framed; and participant observation offers contextual understanding and triangulation of local opinions (Gibson, 2017). Together, these methods strengthen the reliability and validity of the findings by allowing for triangulation across sources (Gibson, 2017; Bamberger, 2012). This approach responds directly to the gaps highlighted in the literature review, where previous studies were often limited by narrow methods or single perspectives, and ensures a richer and more grounded understanding of public attitudes towards fusion energy.

Each method used in this study was selected to align with the specific research aims and to address gaps identified in the existing literature on public attitudes towards fusion energy. The first aim, to develop an understanding of public attitudes towards fusion, including the perceived benefits and risks, is addressed primarily through public interviews and participant observation. Previous research on nuclear and emergent energy technologies (such as Prades et al., 2018; Turcanu et al., 2020) has shown that qualitative interviews are crucial for uncovering the nuanced and often context-dependent ways in which publics understand and perceive these technologies. The second aim, to explore how fusion is framed by publics, including the use of heuristics, also builds on these qualitative approaches, as studies such as

Čábelková et al. (2021) highlight the value of in-depth engagement in revealing the shortcuts and comparisons publics use when faced with unfamiliar technologies.

The third aim, to examine how fusion is framed in the media and how this may influence public attitudes, is met through a systematic media analysis. Existing research (e.g., Devitt et al., 2019; Culley et al., 2010) shows that frame analysis has been widely used to understand the narratives around nuclear energy and their effects on public perception. These studies informed the decision to use frame and sentiment analysis as appropriate techniques for this project. Furthermore, by comparing the media analysis with insights from interviews and observations, this study addresses the challenge noted in the literature (e.g., Pidgeon et al., 2008) of understanding how media narratives interact with individual and community-level attitudes.

The final aim of gathering social intelligence on fusion energy and the STEP development for a UK government research authority (UKAEA) requires an integrated, mixed methods approach. Combining interviews, media analysis, and participant observation allows for the triangulation of data sources, strengthening the validity and depth of the findings. This approach not only addresses the gaps in fusion energy research, where studies often rely on single-method designs, but also responds to broader calls in the literature for more holistic investigations into the public acceptance of emergent technologies (Boudet, 2019; Turcanu et al., 2020).

This chapter outlines the research methods used throughout this study to acquire the data, as well as the methodology used throughout the primary research. Section 3.2 discusses the use of qualitative approaches and their pertinence within this study. Section 3.3 provides the rationale for this research. Sections 3.4, 3.5, 3.6 and 3.7 detail the research design and different methods for the data collection and analysis. Section 3.8 highlights the ethical considerations taken within this project and 3.9 discusses the research challenges and reflections.

3.2. Qualitative Methods

To gather data for this project I used qualitative methods. Qualitative methods are best used when exploring complex phenomenon, understanding publics experiences or gathering opinions (Fossey et al, 2002). Qualitative methods also allow a depth of understanding, leading to a more exhaustive understanding of nuanced social attitudes (Austin and Sutton, 2014). Therefore, qualitative methods were chosen for this study as they allow for a refined understanding of public attitudes towards the complex phenomenon that is fusion energy and how this differs between case studies.

Further described within the following context chapter, two case studies were chosen for this research, both due to their differences and similarities. Case studies are beneficial as they capture the opinions within real life scenarios, giving real world context and making the results applicable (Darke et al,1998). Case studies also allow an in-depth insight into complex phenomenon, therefore are useful within this context, providing a rich context-specific understanding of opinions regarding fusion energy (Susur and Karakaya, 2021). The rationale for completing this project and utilising these methods is further expanded in the following section.

3.3. Research Rationale

The use of case studies can help to understand the lived experience of participants and can explore deeper opinions among participants, gathering in depth opinions and nuances that may not be understood otherwise (George and Bennett, 2005). This is particularly important when exploring fusion energy, due to the emergent nature of this technology (Turcanu et al, 2020). Two case studies are used throughout this research as using multiple case studies allows for more reliable and convincing theories to be drawn as they are more intensely grounded within empirical evidence (Gustafsson, 2017). The use of multiple case studies allows the inclusion of more people from differing social groups and helps research to be more robust as it is more replicable (Rowley, 2002), this is particularly important when considering that this research is regarding a pioneering technology that is at the very beginning of a 20+ year construction phase (UKAEA, 2023). This means that in the future this study can be replicated to observe how public opinions change over the years, as the STEP fusion site becomes more established.

The case studies chosen for this research are the chosen STEP site (West Burton) and one of the proposed sites (Ardeer), to understand the attitudes held among publics in these areas and the difference between them. These sites were chosen as they offer a good contrast and comparison, two contrasting case studies mean that they can foster appreciation for deep structure, flexibility in the results and findings that can be transferable to other similar studies. This also provides a basis for future learning (Schwartz, 2018). Scotland also provides a good contrast as the Scottish government is traditionally anti-nuclear which could have an influence over public opinion (Scottish Government, 2023). The context of each of these studies and why they were chosen is explored thoroughly in chapter 4.

3.4. Interview Methods

Semi-structured interviews involve a set of standardised questions which are asked to each participant but gives the flexibility to explore themes that arise during the interview (Ahlin, 2019). Semi-structured interviews are appropriate for exploring public attitudes toward fusion energy in case study research because they provide a balance between consistency across participants and the flexibility to explore individual experiences in depth (Kvale and Brinkmann, 2009). In contrast to structured interviews, which can constrain responses, semi-structured formats allow the exploration of unexpected themes and follow up on specific local or contextual concerns that may emerge during the conversation, this is important when investigating how people understand fusion energy, histories, or place-based identities (Longhurst, 2016). Semi-structured interviews also follow the research philosophy of an interpretivist epistemological approach, as this method allows an understanding of different viewpoints (Pryor, 2001). The standard questions chosen to ask participants were aimed specifically at addressing the research aims and can be seen in Appendix 3.

Participants were recruited via local community pages and social media groups, allowing very specific local areas to be targeted. Social media allows a wide variety of participant demographics to be approached (Gelinas et al, 2017). However, this could eliminate demographics that are not computer literate. Therefore, a number of local community centres and churches were contacted to understand if they would know anyone willing to take part. These community centres and churches were provided with a poster to attach to their notice boards and direct service users to. Once participants expressed an interest in taking part, they were asked to complete a screening survey. This screening survey gathered both demographics and initial opinions around fusion and renewable energy as a whole. It was made clear to anyone unable to complete the interview via a computer that they would be able to take part over the phone, in order not to alienate any potential participants. This screening survey also ensured that participants included a wide range of demographics, provided in table 1 below. I am unable to pinpoint whether participants completed the survey via social media or community services, as they all completed the same screening survey, and were contacted based on this, no participants were contacted via phone call.

A number of stakeholder interviews (council officials, UKAEA, local conservation groups) were also conducted. Stakeholders provide a broad overview of opinions and may reveal hidden concerns or ideas that may not be expressed by the general public. These can help shape the questions used within interviews and determine what public engagement has already been conducted (Kandil, 2023). With stakeholders in both the West Burton and the Ardeer bid contacted, as well as UKAEA (UK Atomic Energy Authority) the organisation behind STEP. A list of stakeholders for each site was drawn up and members contacted for interview, these stakeholders were categorised based on involvement in the local bid, perceived opposition and involvement in the local environment. Those stakeholders who accepted the invitation were interviewed.

The interviews were conducted via Zoom. This allows participants to be comfortable within their own homes and can lead to richer conversation (Oliffe et al, 2021). The use of remote interviewing also allowed for flexibility, so that I could complete the interviews around participants schedules. Participants prior to the interviews were provided with an information and GDPR document (appendix 1) and a consent form (appendix 2). The interviews lasted approximately 40 minutes taking time to thoroughly answer the questions but also explore their answers in depth, discussing the different themes that arose. The shortest interview was 31 minutes and the longest was 46 minutes. Interviews with the public were concluded when it was considered that data saturation was reached. All interviews were transcribed using an online transcription software named Otter.Ai. The transcripts were checked at regular intervals to ensure the accuracy of the transcription, where there was a mistake, the transcription was edited.

3.4.1. Participant Overview

The overall number of public interviews conducted was 23, with 15 interviewees being local to West Burton and 8 being local to Ardeer.

Demographics (%)	**West Burton**			**Ardeer**		**Total for Age**
Gender	M	F	NB	M	F	
18-24	1	0	0	1	0	2 (8.7%)
25-54	3	5	1	3	2	14 (60.9%)
55-64	2	1	0	0	1	4 (17.4%)
65+	2	0	0	1	0	3 (13%)
Total for Gender	8	6	1	5	3	23 (100%)
Total	15 (65.2%)			8 (34.8%)		

Table 1: *A table to show the spread of demographics throughout the public interviews.*

Stakeholder interviews were also conducted, with three stakeholders from both Ardeer and West Burton involved, as well as UKAEA, who were included to provide a national perspective. As the developer of STEP but not the site selector, UKAEA offered a neutral view on local site debates, in terms of site selection and community concerns.

3.5. Media Analysis Methods

Following the interviews, media analysis was undertaken to complement and deepen the understanding of public attitudes towards fusion energy. While the interviews captured individual and stakeholder perspectives, the media analysis provided a broader view of how fusion was framed in national and local contexts, helping to reveal the wider narratives that publics might be exposed to. This analysis was conducted alongside the interview phase and was designed to support and strengthen the research project. Together, these methods contribute towards building a fuller, triangulated understanding of the research questions.

The media analysis consists of analysing articles published both locally and nationally (UK). The national media is split into 3 timescales: 01/01/2010 - 31/12/2014, 01/01/2015 – 31/12/2019 and 01/01/2020 – present (01/08/2022), with a stratified sample taken from each as shown in figure 1. The National media is split into these 3 timescales to allow comparison in terms of how the media reported around fusion. This also helps to make the data manageable; these timescales were chosen as there has been significantly more publications in the recent years compared to pre-2010. For example, there are just 358 articles published before 2010, with over 1500 published since. The software Nexis Advance UK was used to group articles together using the search term 'Fusion energy'. The articles were then filtered using the following pathway "**Content Type**: News **Industry:** Energy & Utilities **Publication Language:** English **Publication Location:** United Kingdom & Northern Ireland **Publication type**: Newswires & Press Releases or Web-based Publications or Newspapers **Timeline:** …". The results were then sorted by relevance as this gives an unbiased sample from throughout the timescale, with those of high similarity grouped. The sample number was then collected for each timescale downloading them to a zip file and ready for exportation to NVivo. A number of articles were also collected via daily google alerts for the term 'fusion energy' and downloaded using N-Capture. Using both Nexis Advance UK and N-Capture allows the capture of images and adverts from articles with N-Capture whereas, Nexis Advance UK allows a wide variety and large number of articles to be collected.

Time Scale	Method (total 1677)	Sample Number
01/01/2010 - 31/12/2014	266 / 1677 x 500 = 80	80 (16%)
01/01/2015 – 31/12/2019	508 / 1677 x 500 = 151	151 (30%)
01/01/2020 – present (01/08/2022)	903 / 1677 x 500 = 269	269 (54%)

Table 2: *A table to show the calculated stratified sample number of articles taken from each timescale.*

The local media samples were also collected via a similar method, including both case study sites, along with the three other proposed STEP sites (Goole, Severn Edge and Cumbria). Nexis advance UK was used with the search term 'Fusion energy' followed by the name of each of the proposed STEP sites. These results again were filtered using the following pathway "**Content Type**: News **Industry:** Energy & Utilities **Publication Language:** English **Publication Location:** United Kingdom & Northern Ireland **Publication type**: Newswires & Press Releases or Web-based Publications or Newspapers **Timeline:** 01 Jan, 2010 to 31 Sept, 2022". The total number of articles available for each site were downloaded and exported to NVivo. Each site had the following number of articles; Ayrshire (N = 65), Cumbria (N = 77), Goole (N = 45), Severn Edge (N = 52), West Burton search term Nottinghamshire used as this bid added later after Ratcliffe (also Nottinghamshire) ruled out (N = 62). N-Capture was also used to gather articles to provide pictures and advertisements associated with these. Approximately five local newspapers for each site were found with fusion searched on each of these websites, all articles available were exported to NVivo via N-Capture.

The method for collecting local media samples was also repeated post the decision being made for STEP, changing the date range to 31 Sept 2022 – 20 Jan 2023, with the decision being announced on the 6th October 2022. This allowed for the analysis of articles post the decision being made. This resulted in 43 articles from Nottingham local media, and just 14 from the other 4 sites, therefore these were categorised into Nottingham articles, and unsuccessful site articles.

The analysis of these articles was then conducted via NVivo. This allowed the articles to be separated into national and local sources, the elements of each article were assigned to a number of predetermined codes, such as energy security. This therefore allowed themes and patterns to be discovered.

Following the media analysis, participant observation was used to further deepen the understanding of public engagement with fusion energy. The following section outlines how participant observation was carried out within this project.

3.6. Participatory Observation

Participatory observation allows the researcher to be immersed within the context of the research, meaning the nuances and wider context of an issue can be understood (Ikejemba and Schuur, 2020). The use of participant observation also allows the researcher to gain local context and understand other comments made around a particular issue, for example comments made within local newspapers (Roddis et al, 2020). The main aim for gathering this observation data was to act as supplementary data to the primary interviews and media analysis. This allowed for the methodological triangulation of the data found, increasing the validity and the reliability of the results (Lauri, 2011).

This method was employed during the attendance of a community and council information event held in Gainsborough, close to the new STEP site. This event was held on the 14th June 2023, at the Trinity Arts centre in Gainsborough, from 2pm until 7pm. The event was aimed at both council members and general public, with the first hour being dedicated specifically to council members. A number of rooms were utilised within the centre, one for information and another for talks. The first room was surrounded with a number of informational posters giving an overview of the STEP project from 2020 up until 2050+. This also provided publics with the space to write questions upon maps, giving an opportunity to raise concerns. The first room was filled with UKAEA staff enabling those within the room to ask questions an interact with the developers. The other room used within the centre was an auditorium, hosting live information sessions such as: what is fusion, future supplier opportunities and timeframes, as well as showing the film 'STARMAKERS: the energy of tomorrow' which depicts how fusion works. Each of these live sessions were followed by a Q&A session, where publics were able to get answers to their concerns.

Throughout the day my aim was to record the majority of questions and concerns raised by those attending, to gather a general understanding of local public opinion towards the development. This also allowed me to gather the main concerns and questions presented regarding fusion energy. These were then analysed by exploring the various different themes and how these compare with the data from the interviews.

3.7. Theories and Data Analysis

This section explores the theories and data analysis methods that have been employed when analysing the media and interview data. Exploring methods literature and understanding the relevance of these in comparison to the research methods used within this project. The section begins looking at the use of framing theory within a media analysis, followed by the relation of this to fusion by exploring relevant studies. The chapter then explores the various methods of analysis used to gain analytical insight into the themes and discourse surrounding fusion energy and how these are portrayed in both the media and among the public. This section details thematic analysis and sentiment analysis, and how these were used to understand the results gathered from the media analysis, interviews and participant observation.

3.7.1. Framing Theory

Framing theory is a widely used perspective in public opinion research that focuses on how the media and communicators present information in a way that influences how audiences perceive and comprehend issues (Scheufele, 1999). This has been explored through the media analysis by understanding the most emphasised themes and whether these are portrayed in a positive or negative context. This theory is often associated with Goffman (1974) and later elaborated by Entman (1993), emphasising the role of frames in shaping public opinion. This theory can be used to interpret the results from both the media analysis and the interviews, looking at what framings are used by both the media and the public, comparing, and contrasting these and understanding how this reflects in public opinion. Sharon Dunwoody explored the complex interaction between media, science, and public opinions, highlighting that the way information is framed can impact societal discourse (Dunwoody, 1999).

Framing theory is applied to studying public opinion through different stages. The first stage is to define the frames. Frames are mental structures that organise information and guide interpretation (D'Angelo, 2017). In public opinion research, frames are the central themes, narratives, or perspectives used to present issues in the media, public discourse, and political

communication (Schäfer et al, 2017). Framing theory explores how media outlets and communicators select particular frames when covering news stories (D'Angelo, 2017). The choice of frames can influence how an issue is perceived (Brüggemann, 2014). This theory acknowledges that frames can either amplify or attenuate certain aspects of an issue (Chong and Druckman, 2007). Amplification draws attention to specific aspects, while attenuation diminishes their importance (Dewulf, 2013). Frames can emphasise different dimensions of an issue (ibid.).

Framing theory is often used to analyse how different frames affect public opinion, helping researchers understand how individuals' opinions and attitudes can be influenced by the way issues are framed (Brewer, 2002). This theory can be used to understand the findings from this research. Frames within the media analysis can be discovered, and whether there are similarities discovered though the interviews.

3.7.1.1. Framing Theory in Relation to Fusion Energy Media

This section explores the media framing of nuclear energy, which provides valuable insights for understanding how similar methods can be extrapolated applied to the media analysis of fusion energy. Given the complexity of public attitudes towards emergent energy technologies, it was important to carefully consider a range of approaches, including content analysis, discourse analysis, comparative analysis, frame analysis, and sentiment analysis. Each offers a different lens for examining media coverage, but not all were equally suitable for the aims of this research. While methods such as content analysis and comparative analysis have been widely used in energy studies, this project found that frame analysis and sentiment analysis were most effective for uncovering the nuanced and often conflicting narratives shaping public opinion towards fusion energy. These methods best align with the overall research aim to understand how fusion is framed within the media.

Content analysis, which systematically quantifies the presence of particular words, themes, or concepts in texts, has often been used in energy research to measure media attention and topic frequency (Krippendorff, 2018). However, content analysis focus on frequency over

meaning; simply counting mentions of "fusion" or "risk" would not capture the more subtle ways media shape public understanding. Discourse analysis, which explores how language constructs social realities (Fairclough, 1995), provides deeper insight into the power relations and ideologies underpinning media texts. However, discourse analysis often requires an extensive and detailed engagement with fewer texts, which was not suitable given the broader sample needed to capture national and local variation in media framing around STEP. Comparative analysis, meanwhile, typically compares media representations across different countries, regions, or media types (Voltmer, 2000). While comparative approaches are valuable, this project's primary focus is on UK media, particularly contrasting local site-specific reporting with national narratives, rather than cross-national comparisons. Therefore, while these theories were considered, frame and sentiment analysis were selected because they best allowed exploration of meaning, context, and sentiment across a broad sample.

Frame analysis is particularly relevant because it provides a systematic way to examine how issues are presented to publics, highlighting what aspects are emphasised or downplayed (Entman, 1993). Several studies highlight the utility of frame analysis in understanding public attitudes toward energy. David et al. (2011) demonstrate how cluster frame analysis and holistic frame coding, when applied to a set of newspaper articles, can reveal both distinct and overlapping frames, underscoring the importance of selecting an appropriate method to capture the complexity of public opinion. This study shows that a holistic approach, while incorporating broader themes, can effectively understand subtle nuances in public perceptions, which is crucial when analysing attitudes toward fusion energy, where the framing of environmental concerns, safety, and innovation may overlap.

Similarly, Linstrom and Marais (2012) offer a detailed seven-stage process for identifying frames in media texts, emphasising the need for thorough qualitative analysis, including multiple readings and in-depth interpretation of articles. This methodology, which incorporates rhetorical and technical devices such as metaphors and headlines, is particularly relevant for fusion energy, as it allows for the exploration of various themes, such as technological promise, risk, and environmental impact, through the lenses of different media outlets (ibid.). By identifying the dominant frames within fusion media coverage, this approach can reveal how these narratives influence public perceptions of fusion as a viable energy source.

Devitt et al. (2019) and Culley et al. (2010) further illustrate the value of frame analysis in examining media narratives around nuclear energy, particularly in the context of climate change. Devitt et al. (2019) focus on the impact of incidents like Chernobyl and Fukushima on nuclear energy's public perception, finding that negative portrayals are more prevalent than positive ones. This points to the critical role that environmental framing plays in shaping public opinion about energy technologies. Culley et al. (2010) take a similar approach, analysing print media coverage of nuclear power developments in Georgia, USA, and identifying three core frames: pro-nuclear, anti-nuclear, and informational. These studies emphasise the importance of media framing in guiding public debates on complex issues, which can similarly apply to fusion energy, especially when considering how publics may perceive new fusion energy technologies.

Pidgeon et al. (2008) also employ a risk framing analysis to assess public acceptance of nuclear energy in the context of climate change. These findings suggest that public opinion is shaped by perceptions of risk and the trade-offs associated with nuclear power (ibid.). Although acceptance of nuclear power is often reluctant, the idea that nuclear energy might contribute to climate change mitigation may increase its public acceptance. As the development of fusion energy progresses, similar trade off related frames could emerge, highlighting concerns about safety, environmental impact, and the technological feasibility of fusion as a low-carbon energy solution.

To further strengthen the methodological foundation of this study, debates within framing theory itself must be acknowledged. As Carnahan, Hao, and Yan (2019) argue, framing methodology can vary significantly depending on whether researchers adopt an issue-specific or generic approach to frame construction. This project takes a blended approach, focusing on issue-specific frames (e.g., safety, innovation, climate change) within the broader context of energy media framing practices. Borah (2011) also highlights the conceptual complexity of framing theory, noting that frame identification can be subjective and varies depending on whether emphasis is placed on production (how frames are constructed by media organisations) or reception (how audiences interpret frames). This project adopts a

production-focused perspective, analysing the frames embedded within media texts rather than measuring audience interpretations directly.

In summary, while various media analysis techniques offer useful tools, this project finds that frame analysis and sentiment analysis offer the most appropriate methods for examining the complex media narratives surrounding fusion energy. These methods allow for a deeper understanding of the frames and sentiments that shape public attitudes, providing critical insights for the study of fusion energy's media representation. The following section will detail the specific approach used in this study to conduct a thematic analysis of fusion energy media coverage, building on the principles established in the studies reviewed here.

3.7.2. Thematic Analysis of Interviews and News Articles

Thematic analysis was used to analyse both the data from the Interviews and the media analysis. Thematic analysis is a comprehensive process that allows the cross referencing of data patterns and research themes (Alhojailan, 2012). Thematic analysis is appropriate for use in this research as it allows information to be extracted to determine the relationship between variables and also allows the comparison of different sets of data within the same study (ibid.). Thematic analysis can allow for both inductive and deductive coding which will both be used in this research. Inductive coding involves generating coding themes from the data once the research has been conducted and deductive coding generates coding themes from the literature before the research has taken place (Fereday and Muir-Cochrane, 2006).
The analysis of the interviews was conducted using NVivo, enabling the organisation of data by location or stakeholder groups. A coding framework was established, beginning with deductive codes derived from a review of relevant literature, ensuring alignment with existing research on themes such as climate change and renewable energy (Fereday and Muir-Cochrane, 2006). The coding framework can be seen in Appendix 4. As the interviews progressed, inductive coding was incorporated to capture emerging themes that were not initially anticipated but were significant in participants' responses (ibid.). This combination of deductive and inductive coding ensured balancing established theoretical frameworks with new insights, facilitating the understanding of patterns and themes within the data.

Each interview was manually analysed by reading the article entirely and assigning phrases and sentences to codes that they aligned with. The codes were developed as the interviews progressed, as the analysis ran concurrently with the interviews taking place. Therefore, utilising inductive coding (Chandra et al, 2019). Once all transcripts were thoroughly read and coded, the codes were then addressed to observe the nuances within them so they can be categorised into overarching themes and discussed within the data chapter.

The methods used for interview analysis were also applied throughout the media analysis, ensuring consistency in the overall approach. Both analyses were conducted concurrently, allowing for a shared set of inductive codes to emerge, while the deductive codes varied slightly based on the distinct nature of each dataset. Prior to completing the full media analysis, a scoping study was completed, where a number of academic and media articles were studied to create a coding framework. This involved figuring out which themes, also known as frames, were most frequently apprearing within the initial study, then understanding these through the academic articles. A number of codes were documented within the initial framework; however, these were added to once the full media analysis took place, with further common themes being uncovered. Therefore, this analysis used both deductive and inductive coding. The use of both inductive and deductive approaches to the coding framework increases the scientific rigor of the media analysis by allowing the process to be iterative and reflexive (Boyatzis, 1998; Crabtree and Miller, 1999).

Each media article, after being imported into NVivo, was read thoroughly. While reading, these articles were cross referenced with the coding framework, allowing sentences and phrases within each article to be assigned to various codes. Once coding was complete, NVivo facilitated an in-depth exploration of each code by compiling all related excerpts, allowing for a comprehensive understanding of emerging patterns. These findings were then examined in relation to academic literature and discussed in the data chapter, providing insights into how different frames within media coverage may shape public perceptions of fusion energy.

3.7.3. Sentiment Analysis

Sentiment analysis is integral to this study as it allows for the identification of emotions and attitudes expressed within media texts, providing valuable insights into the public's perception of fusion energy. By determining whether media coverage is predominantly positive, negative, or neutral, sentiment analysis helps to understand how fusion energy is framed emotionally within the media (Lui, 2020). This analysis can support the research objectives by revealing the underlying sentiments that influence public opinion, thereby contributing to a deeper understanding of how fusion energy is perceived by different audiences.

Sentiment analysis can be carried out in various ways, with computational methods such as natural language processing (NLP) and machine learning algorithms offering automated solutions (Kahn et al., 2016). However, these machine-driven approaches often struggle with detecting nuances like sarcasm, irony, and context-dependent language (Poria et al., 2020). Given the importance of accurately capturing these subtleties in understanding public sentiment, manual sentiment analysis was chosen for this study. By involving human judgement and interpretation, nuanced sentiments and context-dependent nuances, such as sarcasm or irony, can be more effectively identified (Van Atteveldt et al., 2021). Additionally, the relatively small number of articles being analysed makes manual sentiment analysis a feasible and appropriate method for this study.

Once the articles had been analysed thematically, they were then reread looking at the various emotions and metaphors used. These emotions were allocated specific codes, such as negative emotive language, with sentences, phrases and words being attributed to them. This allowed for further discussion within the data chapter, with each of the sentiment codes presenting all of the phrases attributed to them, allowing these to be compared with academic literature and understanding what influence these literary tools may have on public opinion.

3.8. Ethical Considerations

All field work carried out was approved on 06/04/2023 by the University of York, Department of Environment and Geography Committee on the Ethics of Research on Human Beings. The confidentiality of my research data was ensured through the use of a password protected laptop within a password protected excel file backed up on university-approved google drive cloud storage. The data does not include any data that is attributable to individuals, and all transcripts were anonymised. Prior to the interview participants were emailed an GDPR and information sheet, as well as a consent form. Then at the start of the interviews the participant was given the full explanation of confidentiality and consent, and it was made clear that they have the right to withdraw from the study or their contributions at any time, up until the transcripts are anonymised, as after this time their contributions will not be identifiable.

3.8.1. Positionality and Reflexivity

I recognise that positionality within research can influence both the research process and its outcomes, and that no research can be entirely value-free (Greenbank, 2003). As an outsider, I have conducted research into public attitudes toward a number of different renewable energy technologies, with the aim of providing a neutral and interactionist approach to representing public attitudes (Homes, 2020). However, it is important to acknowledge that my own background, values, and experiences may subtly shape the way I approach this research, particularly in terms of framing questions, interpreting responses, and selecting sources for analysis (Palagnas et al, 2017).

My positionality was disclosed to participants, presenting myself as a PhD researcher from the University of York conducting research into public attitudes to fusion energy. I also disclosed that I am from Liverpool and have no personal or professional ties to the sites where the research is conducted. It was made clear that the research is sponsored by UKAEA, but that they have no influence over the findings and final outcomes of the research, I retained complete control of this project. Despite these efforts at transparency, I recognise that my academic background and previous experiences with other energy technologies might

influence how I interact with participants, interpret data, or highlight particular aspects of the findings. In reflecting on this, I remain committed to maintaining a neutral stance and being aware of any potential biases that could arise throughout the research process (Palagnas et al, 2017).

3.9. Research Challenges and Further Reflections

One limitation of this research is that the interviews only show a snapshot of how publics close to the chosen STEP site and other proposed sites view fusion at this current moment in time where the technology is emerging. The research does not explore how attitudes change over time or give a view of how the whole country regard the technology. The research however does give a basis for future research so that attitudinal changes can be tracked and encourages the research to be replicated throughout the country to gain an in depth understanding nationwide. My contribution lies in providing an initial, context-specific analysis that can inform and guide subsequent nationwide studies, thereby setting the stage for more comprehensive longitudinal research on public opinion toward fusion energy.

This study also provides a basis for future research in terms of more interactive study of public opinion, using various other interactive methods such as focus groups. Due to the emergent nature of this technology, the use of methods that provide participants with knowledge could provide a more in depth understanding of public opinion. Again, this can be conducted throughout the country to gather a wider understanding of general public opinion.

It is also interesting to note that every participant was offered £20 in compensation for giving up their time to participate, yet out of the 23 public participants, only 3 claimed their compensation. This highlights that participants were not motivated by financial gain (as the compensation was not disclosed before they signed up, nor did most take it up), but rather were genuinely interested in discussing fusion energy, regardless of their level of knowledge. However, this self-selection bias must be acknowledged: those who chose to participate may have already had a keen interest in the topic or a predisposition towards energy technologies (Robinson 2013). As a result, the findings may not fully represent the diverse views of the

broader population, as individuals with less interest in the subject may have been less likely to volunteer (ibid.). However, the aim of this research was not statistical representativeness but theoretical generalisability, to generate insights into how and why particular views on fusion energy emerge within specific social and geographical contexts. As Butler et al. (2013) argue in their UKERC report on public engagement with energy technologies, small-scale qualitative methods such as interviews or workshops can still provide valuable insights when they are carefully contextualised and analytically rich. This suggests that while the research provides valuable insights, it may reflect the perspectives of a more engaged or motivated group, potentially skewing the overall representation of public opinion.

Chapter 4. Contextualisation of Case Study Areas

Building on the methodological framework outlined in the previous chapter, this chapter introduces the two case studies that form the core of this research: Ardeer in Scotland and West Burton in Nottinghamshire, England. Case studies are central to this project, as they provide the necessary depth and context to explore how public attitudes towards fusion energy are shaped by local histories, identities, and experiences. Understanding the specific histories of these places is crucial, the literature review highlighted how place attachment, socio-economic change, and prior experiences with energy developments can significantly influence public perceptions of new technologies. This chapter begins by explaining why exploring the historical and social context of each location is important for interpreting public attitudes. It also considers how the current perception of fusion energy, shaped by both local and national media coverage, intersects with these place-based narratives. The chapter concludes with a detailed account of the histories of West Burton and Ardeer, providing the foundation for the analysis of interview and observational data in the following chapters.

4.1. Why Understand Histories?

The aim of this section is to understand why the history of an area is important when exploring public attitudes within a specific location. There are historical factors that can influence public attitudes and therefore are vital to realise when conducting social research (see section 2.4 for an in depth look at the effect of historical factors). These aspects which will be explored within this section include economic displacement where previous industrial collapse has led to economic hardship, this can lead also to a significant mistrust of government and industry which will be understood. The history of an area can also influence public acceptance to emergent energy developments through a concern for the environment and how past industries have impacted the local area. However, has also been observed that deindustrialised areas can be more receptive to new energy investments through a desire for economic revival (Thomas et al, 2022). These aspects of local history all therefore highlight the importance of understanding the nuances within a case studies history.

The first aspect to be examined is economic displacement. This concept considers that previous industrial decline and deindustrialisation can lead to scepticism regarding new

energy developments (Sanz-Hernández, 2024). This scepticism can stem from these communities which previously relied on these industries that declined, facing job losses and economic hardship (Magidi, 2024). Publics who have faced this deindustrialisation can harbour fear that any new developments within their local area could bring similar instability or cause similar job losses in the future (Thomas et al, 2022). This can suggest that low carbon transitions are not always just, as the new low carbon technology is introduced it causes the older, less environmentally friendly technology to be retired, thus resulting in the loss of industry (Banerjee and Schuitema, 2022). In the context of fusion energy in the UK both West Burton and Ardeer are historically industrial towns that have deindustrialised. Specifically with West Burton, as fusion energy is being introduced, the coal power station is being closed. This could lead to mistrust of this new energy development, either seeing it as the cause of the loss of coal industry or fearing that the same will happen to fusion energy in years to come.

Decisions regarding energy developments and deindustrialisation are often taken by the government, therefore historical experiences with industrial decline can affect trust in government (Sampson, 2024). This can have long term impacts upon public support and acceptance of new energy developments as that mistrust continues (Thomas et al, 2022). This mistrust can lead to a scepticism of promises made by the government, doubting the number of projected jobs, environmental protections and economic growth (Arnold, 2024). The historical deindustrialisation can also lead to publics feeling unstable and uncertain regarding government decisions and developments, with the fear of history being repeated (Scheiring and King, 2023). A lack of governmental trust can therefore have an impact upon public acceptance of fusion energy, as current fusion developments within the UK are led by the government. More specifically, West Burton is a previously deindustrialised town that is now set to be redeveloped via a government led fusion energy experiment, therefore publics could harbour feelings of mistrust which may impact acceptance of this development.

Previous industries being present in an area can have an impact on public attitudes to new energy developments. The environmental impact of past industrial activities can shape public attitudes, with communities potentially associating all energy developments with disruption to the local environment (Svobodova et al, 2021). However, this can also be viewed inversely, with communities who have been exposed to fossil fuel industries now prioritising more sustainable

low carbon solutions (Golubchikov and O'Sullivan, 2020). In the context of fusion energy both the chosen case studies have been industrial areas, therefore it is interesting to observe how this can influence publics attitudes towards fusion energy.

Another aspect of deindustrialisation that can positively impact public acceptance of new developments is the ambition for economic revival. This desire can lead publics to focus on positive aspects of development such as job creation and economic growth (Stroud et al, 2018). Such communities seeking economic recovery may strongly support new energy projects if they see potential for significant job opportunities, particularly in trades that were lost due to deindustrialisation (Sen and Ganguly, 2017).

Public acceptance for new developments can also increase due to economic growth and the prospect of investment in infrastructure, such as transport and community facilities, which can lead to long term economic benefits (Cohen et al, 2014). This again in the context of fusion energy developments could influence public acceptability with these deindustrialised towns potentially being hopeful for such investment. Thus, making this study interesting in observing these impacts and showing the importance of understanding the history of the case studies being used. The following section will explore in depth the specific history of each case study, highlighting why they were chosen for this research project.

4.2. Case Study Background

This subsection outlines the rationale for selecting Ardeer and West Burton as case studies by exploring their industrial histories. Both sites have experienced significant industrial change, which may shape public perceptions of fusion energy and its potential impact on local communities, therefore justifying their choice as selected case studies.

4.2.1. West Burton History

West Burton is a small industrial area in Nottinghamshire, located within the district of Bassetlaw. The nearest local village to West Burton is Sturton le Steeple just 1 mile away, with the nearest large town being Gainsborough at just 5 miles away (University of Nottingham, 2024). Sturton le Steeple had a population of 545 in the 2021 census (City Population, 2021),

whereas Gainsborough had a population of 21,908 (City Population, 2021), therefore the majority of participants interviewed within this study live within Gainsborough.

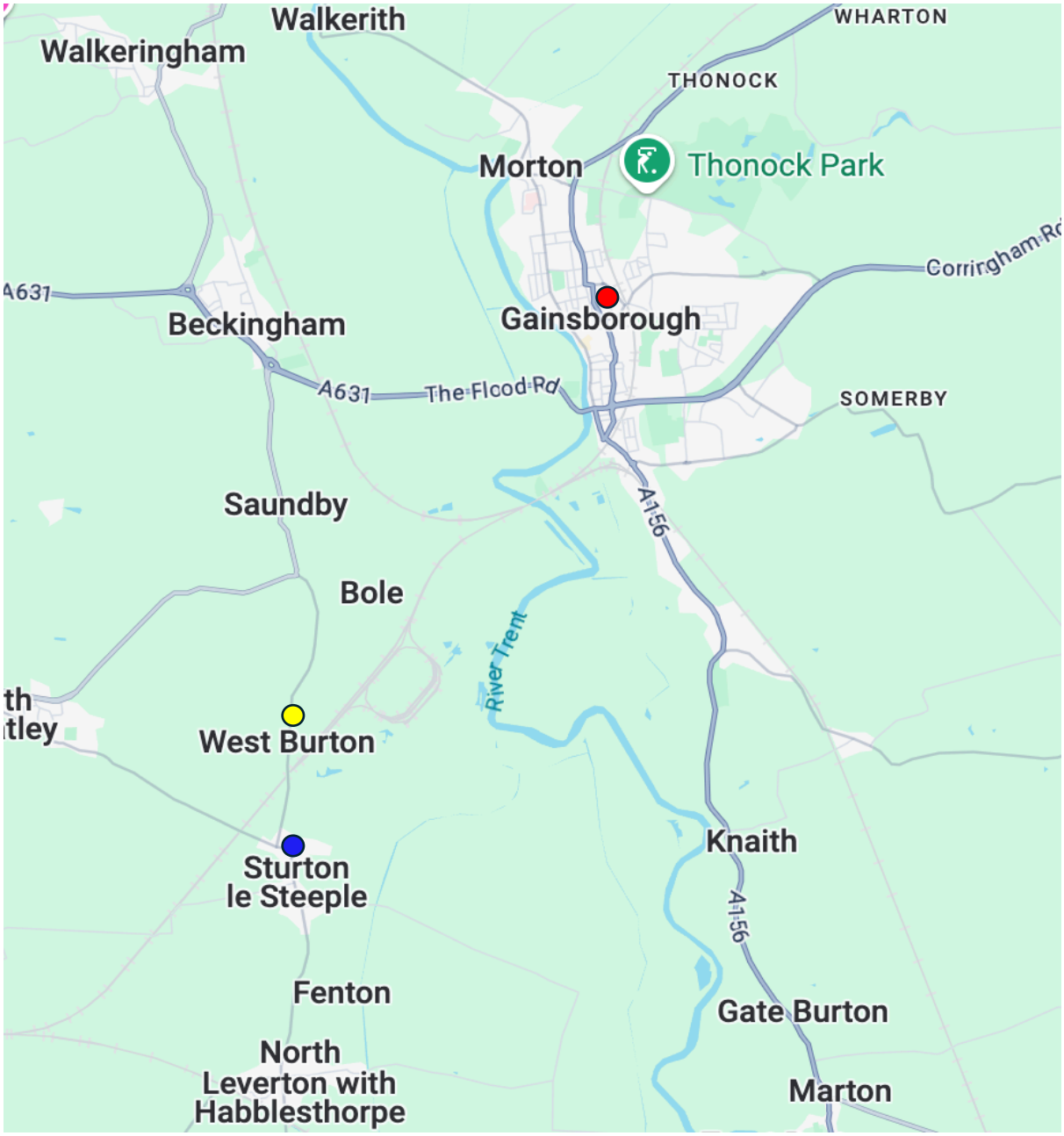

Figure 2: *A screenshot of Google Maps to highlight the STEP site (Yellow), the nearest small town Sturton le Steeple (Blue) and the nearest large town Gainsborough where the majority of participants live (Red).*

The chosen site for the STEP development project is located at the West Burton site in North Nottinghamshire (UKAEA, 2022). The site originated as a Coal-fired Power Station, opening in

1966 and running for 57 years before the power station's last generation on 7th March 2023 (EDF Energy, 2023). With the site being industrial it is vital that the landscape and communities are protected throughout the transition from coal to fusion. Csepely-Knorr (2022) explored the welfare objectives surrounding coal fired power stations and how this involved the growth of leisure and recreation activities, while helping to reduce the environmental impacts. This therefore suggests that the focus on preserving the needs of the community should remain at the forefront of the development plans in order to continue to maintain the improvement to quality of life and affluence (ibid.). The local community should also remain a key consideration in the development so that the sense of community that has been created over the past 57 years will be preserved, while also ensuring those brought to the area by fusion can be intertwined (Csepely-Knorr, 2022).

The impact of West Burton Coal-fired Power Station on publics was carefully considered during the design and construction phase, with a three-mile radius being implemented around the power station to manage the impact on what publics can see (Csepely-Knorr et al, 2020). The views were also controlled with tactical tree planting around the site to improve the appearance of the landscape surrounding the site. This means that for the past 57 years, publics has been accustomed to one specific view, with many growing up not knowing any sight other than the West Burton Power station. Thus, the same consideration must be undertaken when designing and constructing the new STEP fusion site, with the aim of minimising the visual impact upon the local population (Csepely-Knorr et al, 2020). As seen in the below figure, the surrounding area to the proposed STEP site is mostly green space, with limited dwellings within the local area.

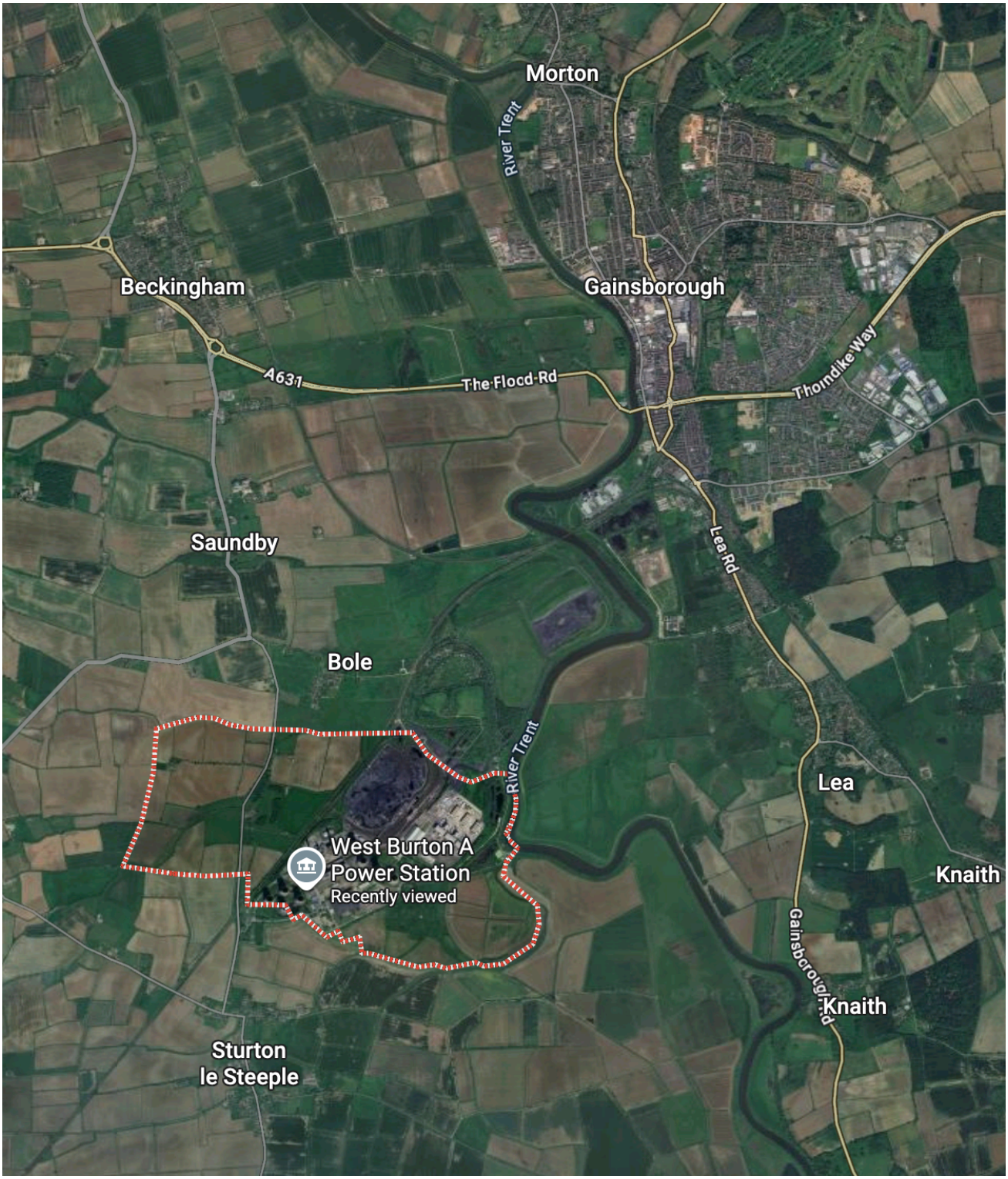

Figure 3: *A screenshot of Google Maps in satellite view to highlight the land and dwelling surrounding the STEP site shown with the red ring.*

4.2.2. Ardeer History

One of the five sites considered to host the STEP programme was Ardeer, located in North Ayrshire on the Southwest coast of Scotland. Ardeer has a population of 9000, that has declined around 6% between 2011 and 2021 (North Ayrshire Council, 2024). The nearest towns to Ardeer include Saltcoats (2 miles) and Stevenston (2.4 miles away) which has a combined population of 21,925, therefore the participants interviewed within this study live within these three very close towns (Scottish Government, 2024).

Figure 4: *A screenshot of Google Maps to highlight Ardeer (Yellow), the nearest town Stevenston (Blue) and Saltcoats (Red).*

The industrial history of the site is long with one of the main industries starting in 1849 with the construction of the Stevenson Ironworks (Clements, 1974). This industrial site had five blast furnaces and is known for creating an unusable area of the sea known as 'slag point', by dumping slag into the sea (ibid.). These works were shut down in 1931 and demolished in 1935 (Clements, 1974). Running approximately the same time as the ironworks was the Stevenson Coalfield, with ten coal pits located within the area (Clements, 1974). The pits last produced coal in 1926 (ibid.).

Another main industry along the Ardeer peninsula is Nobel's Explosives Factory, constructed in 1971, this factory was the first dynamite factory in the UK (Canmore, 2022). The site also revolutionised mining and engineering industries providing both minerals and raw materials but also helping with infrastructure (ibid.). By the 1990's the site had closed large parts of the factory due to the changing landscape of explosives, and in 2006 a significant area of the site was sold to a developer as part of brownfield regeneration (Canmore, 2022). The history of the site therefore suggests that the local population of Ardeer is familiar with existing industrial sites, however, with the recent regeneration this may have an impact on the public opinion, with publics not wanting to go back to being an industrial area.

Where STEP was to be located specifically along the Ardeer peninsular was a natural area of coastline, that has significant interest in terms of its biodiversity (South West Scotland Environmental Information Centre (SWSEIC), 2022). Along the peninsula there are both sand dunes and mudflats that are frequented by rare birds, butterflies and more species of bee and wasp have been recorded in this location compared to anywhere else in Scotland. The site is also known to be host to nationally scarce moths such as the Coastal Dart, as well as having an extensive population of nationally scarce Broom-tip moth (swseic, 2022). This abundance of rare and scarce species could contribute to public opinion of developments within this area, with construction likely to put these species at further risk. The figure below (figure 5) shows a satellite view of the proposed STEP location, showing how close to the local population this proposed site was.

Figure 5: *A screenshot of Google Maps in satellite view to highlight the land and dwellings surrounding the proposed STEP site shown with the red ring.*

Just thirteen miles away from Ardeer is Hunterston power station, a nuclear power station, which opened in 1976 and started defueling in 2022 (EDF, 2023). With the closure of this site, publics may again feel they are going backwards if they feel STEP is the opening of another nuclear power station. The Scottish Government has taken an antinuclear stance, with just one of the 5 remaining nuclear power stations in Scotland generating electricity. This power station is Torness and is estimated to stop generating electricity in 2028 (EDF, 2023). Scottish Government are committed to a decrease in nuclear power with a focus on energy generation from other renewable and low carbon sources, as stated in their energy strategy and Just Transition Plan (Scottish Government, 2023). It is important to note that the Scottish Government do not include fusion amongst these renewable energy technologies, instead

taking a neutral stance neither supporting nor disapproving of the developments but also stating that their minds should not be closed to new technologies (Wilson, 2022). This government stance can influence public opinion with no significant support for fusion developments. Zaller (1992) highlights that the role of elites, such as the government, can play a substantial role in the construction of mass public opinion on given issues, therefore with the government being anti-nuclear and neutral on fusion, this can influence publics into forming negative opinions regarding future development of fusion energy.

4.3. Case Study Rationale

Figure 4: *A screenshot of the UK from Google Maps to highlight Ardeer (Red) and West Burton (Blue)*

These two case studies were selected because they offer both important contrasts and meaningful comparisons that are central to understanding public attitudes towards fusion energy. As explored in this chapter, both Ardeer and West Burton have been shaped by histories of industrialisation and deindustrialisation, but with different outcomes: Ardeer's legacy of explosives manufacturing and long-term decline has fostered a sense of neglect and

mistrust, whereas West Burton's continued association with energy production has maintained a stronger connection to national infrastructure and future energy projects. Figures 3 and 5 both highlight the different landscapes of both case studies, with Ardeer having houses and publics significantly closer to the proposed site than West Burton. This proximity to the proposed site may also contribute to the lack of support and added scepticism. The political context also differs, with Scotland's anti-nuclear stance influencing public narratives around fusion at Ardeer in ways not mirrored at West Burton, where government backing for nuclear remains strong. If the project were to be implemented within Ardeer this would have been the development of a brownfield site, whereas in West Burton this is the development from a non-renewable power plant to a low carbon power experiment, this further shapes local perceptions of opportunity and risk. Trust in government, aspirations for economic renewal, and attachments to local identity all emerge as crucial factors for interpreting how fusion energy is received in each location. This contextual understanding provides a necessary foundation for the next chapter, which presents the findings from interviews and participant observation to explore how these histories, attachments, and perceptions are reflected in public and stakeholder attitudes towards fusion.

A comparison of the socio-economic contexts surrounding Gainsborough (the closest town to West Burton, where employees will likely originate) and Ardeer highlights important similarities and contrasts relevant to this thesis. In Gainsborough, unemployment rates in recent years have been close to or slightly above national averages, with West Lindsey recording an unemployment rate of around 4.4% in the year to late 2023, alongside persistent pockets of deprivation within the town (ONS, 2023). While not uniformly deprived, several neighbourhoods rank relatively high on income and employment deprivation indices, reflecting the long-term effects of deindustrialisation and limited economic diversification. In contrast, Ardeer is in North Ayrshire, one of the more deprived local authorities in Scotland, where unemployment has remained consistently above the Scottish average and where a substantial proportion of data zones fall within the most deprived 15% nationally according to the Scottish Index of Multiple Deprivation (SIMD, 2020). These patterns indicate a more concentrated and structural form of deprivation in Ardeer compared to the more uneven and localised deprivation evident around Gainsborough. Such differences are significant for this study, as they help explain why regeneration narratives and employment opportunities associated with

fusion resonate strongly in the West Burton context, while in Ardeer economic marginalisation intersects with environmental concerns and institutional mistrust, shaping more cautious or sceptical responses to large-scale technological development.

The following chapter is the first of three empirical chapters. Chapter 5 explores the interview data and participant observation. Chapter 6 encompasses the media analysis and the final empirical chapter, chapter 7 is a synthesis that intertwines all the methods and findings, providing unique and insightful findings. The thesis closes with chapter 8 which concludes the research and overarching findings, while also providing stakeholder recommendations.

Chapter 5. Public Perceptions and Place-Based Perspectives on Fusion Energy: Interview and Observation Data.

Fusion is a technology with extremely limited research regarding public attitudes towards it (Griffiths et al, 2022). Therefore, this project provides an understanding of attitudes towards fusion, specifically from two case studies, West Burton and Ardeer, as well as exploring how the media frame the technology and what influence this may have upon public attitudes (Chapter 6). This chapter starts by exploring the general themes that occurred within the interviews, understanding the importance of public consultation, ensuring the benefits and risks are understood by publics and ensuring that publics truly feel heard and understood. The general themes also uncovered how publics perceive climate change and energy security, with both factors contributing to public support in the development of fusion energy.

The aspect of place can play a significant role in influencing public attitudes towards fusion energy (Jones et al, 2024) and is explored after the general themes. Both West Burton and Ardeer have faced significant deindustrialisation and unemployment, however, this has resulted in different opinions regarding fusion. West Burton participants showed support and excitement that the previous coal power station is to be redeveloped into a fusion experiment. Whereas Ardeer participants showed significant concern for the impact any development would have on the local landscape. However, some participants within Ardeer indicated disappointment that the site was not selected to host the new STEP experiment.

Following place, the heuristics used by publics to understand fusion energy are discussed. As a reminder, heuristics are considered as the mental shortcuts and strategies that humans use to make decisions and understand complex phenomenon (Gigerenzer, 1999 – see section 2.5). Regarding heuristics, a significant number of participants compare fusion to fission to understand the technology, however, a number of participants showed confusion between the two. Prior opinions of the Conservative Government had a detrimental impact upon publics opinions of fusion, including mistrust of profits and the environmental benefits that the project may provide. One heuristic specific to West Burton occurred throughout the interviews in

relation to solar projects proposed in the area. Finally, the achievability of fusion was brought into question with several heuristics being used to understand this.

This chapter draws on qualitative data from semi-structured interviews and participant observations conducted as part of the case study research. These methods provide detailed insights into how individuals and communities make sense of fusion energy in relation to their everyday lives, experiences, and local contexts. While this chapter focuses on interview and observational findings, it does not encompass the full range of data gathered in this project, for instance, the media analysis discussed in Chapter 6 offers a complementary perspective on how fusion is framed in public discourse, and Chapter 7 provides a synthesis of all the primary research conducted.

Overall, the results highlight the complexities within public attitudes towards fusion energy. There appears to be consistent support for the technology, and where opposition does exist it is often due to the misconception between fusion and fission, with the risks associated with fission being transferred to this technology. This is a crucial finding, highlighting the need for clearer public communication and education to ensure that misunderstandings do not shape perceptions of this emerging energy technology.

5.1. General Themes

This sub-section will explore the general themes that occurred during the interviews conducted in West-Burton and Ardeer. These themes are associated with the general opinions of publics regarding fusion energy and are not related to the two theoretical lenses used, place theory and heuristics. Starting with climate change, which explores how publics view fusion in terms of climate change and whether this can be seen as a potential solution. Climate change is followed by energy security which examines what publics believe regarding the country's energy security and how fusion fits in with that. Then explored is how fusion is compared by publics to renewable energy. This sub-section also explored the perceived benefits and risks that publics believed having the STEP fusion development built would bring. The final two themes explore the role of public consultation, including what participants opinion on public consultation is, and government involvement, where publics expressed an opinion on the UK Government being involved within the process of building STEP. This sub-chapter reveals an understanding of what publics general attitudes towards fusion are and is followed by a sub-chapter exploring the role of place theory. Included in each of the following chapters there are a number of quotes from participants, these will be labelled anonymously, stating whether the participant was from Ardeer or West Burton, with randomly assigned numbers.

5.1.1. Climate Change

One of the major themes that appeared throughout the interviews was climate change. Participants highlighted fusion as a positive development as it could help mitigate the effects of climate change:

> "I think that anything that allows us to move away from using fossil fuels might help to address the climate emergency, which might then help us to address the sixth mass extinction event. Yeah. So, then there's major benefits, potential, or potential major benefits," (West Burton P6).

Others framed fusion as a positive step for the future as it allows the country to move away from fossil fuels:

> "I'd be happy to move away from coal. Because we need to get rid of fossil fuels. Full stop." (West Burton P3).

> "Anything that removes fossil fuels from the mix is an improvement in my opinion", (West Burton P10).

However, Čábelková et al (2021) found that fusion energy helping to mitigate the effects of climate change, through being a low carbon technology, did not directly impact public support for the technology. The interviews conducted therefore contradict the finding within the Čábelková et al study, however this may indicate how in the years since 2021 climate change and moving away from fossil fuels have come to the forefront of publics minds (Grechyna, 2025).

Not only did participants view fusion as a purely positive development accepting the technology, but others also perceived it as being the lesser of two evils, therefore reluctantly accepting the technology (Bickerstaffe et al, 2008). Reluctant acceptance means when a technology, such as fusion energy, is accepted by people due to the recognition of its potential benefits whilst said people are still hesitant and not fully supportive of the technology (Kim et al, 2014).

> "it's probably cleaner, in inverted commas for the local environment than I've ever perceived the whole production of energy to be because, you know, you do see all sorts of stuff coming out the top of the towers [West Burton Power Station Cooling Towers], and I mean, I'm led to believe it steam because it's a cooling station, but you know, so yeah, part of me thinks it's probably cleaner and better for us locally from that point of view." (West Burton P4).

Similar reluctant acceptance can also be observed when considering nuclear fission, with nuclear power only being accepted due to the potential benefits to the environment and

climate change (Bickerstaffe et al, 2008). This reluctant acceptance is particularly relevant when discussing emergent technologies such as fusion, as publics are more likely to reluctantly accept new technology with limited understanding under the perception that it will have a positive impact for the environment and climate change (Contzen et al, 2024; Nawaz et al, 2023).

5.1.2. Renewable Energy

Throughout the interviews it was clear to see that some participants automatically regard fusion energy as a renewable energy technology, whereas some other interviewees regarded it as separate. This participant framed fusion separately from renewable energy technologies, but still considers it an important aspect of the energy mix in order to eliminate fossil fuels:

> "I'm quite a supporter of renewable energy. So, I'm I think that kind of like, you know, wind, solar, and all that I've got big opinions on the way that, but I do recognise that's not the whole thing. And we need to come up with some big push generating things for other things. So, it's that kind of mix. And I think this fusion is that is the kind of probably the way to go with it" (West Burton P2).

When asked whether they regard fusion energy as separate from other renewable energy technologies mentioned such as wind and solar, this was their response:

> "In my mind, I do. Yeah. Okay. And see why you asked that question. Because that's now made me think that perhaps there is an element of it, because I don't, I don't understand. I don't know, the, the ins and outs of the process. So, I don't know what they use. But if they were using to create the, to create the fusion if they were using, I don't know, water and grass cuttings, I have no idea what they use. That I would consider that to be renewable. If they were using something and destroying. I know this goes against physics, but if they were using and destroying some kind of precious thing. Yeah, that wouldn't be renewable. My gut reaction was that you have renewable then you would have nuclear, and then you would have fossil." (West Burton P2).

Therefore, it is clear to see that not all publics regard fusion energy as renewable, but that this does not depreciate their perceived value within the energy mix. This quote raises questions around how much intervention by developers is needed to make fusion possible and how is this process utilising natural resources. Whereas the participant shows the view that wind and solar are based on natural processes, but fusion is not (Zohuri et al, 2024). However, this view might be different if the participant had a deeper understanding of the technology and how the process takes place, due to the fact fusion naturally takes place within the sun. This therefore suggests that a more in depth understanding of the technology could have an influence over how publics position fusion between renewable and non-renewable energy sources. Whereas other participants did not see the value in fusion energy and would significantly prefer investment into traditional forms or renewable energy:

> "I would rather they sought to find other alternatives. Wind farms, or like hydropower or tide, tide power as well, because we have a really, really strong tide here. And, and I think that's maybe the way forward." (Ardeer P2).

This opinion is supported by research conducted in Spain, Austria, Finland and the UK, which found that participants were more approving of investment into other renewable energy rather than fusion energy (Jones et al, 2021). This opinion was further supported by a participant interviewed in West Burton.

> "Like I see the benefits at some point in the future. Maybe if we get there, but compared to buying solar or wind now, which could actually work now, I just I feel like the benefits have been over exaggerated." (West Burton P7).

This participant acknowledges the potential benefits of fusion energy but questions their feasibility in the near term. Their scepticism presents the perception that the advantages of fusion may be overstated, particularly given the extended timeframe required for its development. Instead, they participant supports investment in established renewable technologies, such as wind and solar, which can deliver immediate benefits. This perspective aligns with discussions in the literature review, where some researchers argue that current

successful renewable energy technologies such as wind, have a higher acceptability compared to new technologies (Sovacool et al, 2021). The following section will examine the specific benefits attributed to fusion energy and how these claims are perceived by the public.

5.1.3. Energy Security

Along with climate change, some participants also considered fusion developments in the context of energy security: There are numerous dimensions of energy security such as accessibility, diversity of supply, sustainability, however this section will focus on resilience and affordability (Ang et al, 2015).

> "Well, I guess its cleaner air is now cleaner, cleaner energy. And we have to move forward with that because we can't carry on relying on gas from the you know, from Russia or fossil fuels." (West Burton P9).

This participant highlights a key driver of support for fusion energy: the perceived need to enhance energy security by reducing reliance on imported fossil fuels, particularly gas from Russia. The geopolitical instability associated with energy imports has been a significant concern amongst publics, with research showing that energy dependence can shape public attitudes towards domestic energy production (Cherp et al, 2014). The participant's statement highlights the perception that producing energy domestically, either through fusion or other renewable sources, can shield the UK from supply disruptions and volatile global markets. This is supported by Qazi et al. (2019), who identify energy security as a significant factor in public acceptance of renewable technologies. The theme of reducing reliance on imports in favour of self-sufficiency emerged repeatedly throughout the interviews, suggesting that fusion is, at least in part, viewed as a means of securing the UK's long-term energy independence.

> "Globally, it could be a game changer. And we could move from being a significantly net importer of our energy sources and start to be more resilient." (Ardeer P1).

> “I mean if, if we didn’t have to rely on other countries for energy that would, or could, make the country a bit more secure wouldn’t it” (West Burton P12).

This participant highlights the impacts regarding the wider globe, stating that reducing the importation of energy to the UK would increase the countries resilience. Around 50% of UK gas is imported from global markets and Russia provide approximately 24% of the UK’s crude oil imports (Donnarumma, 2022). Energy security in terms of nuclear fission was found to be a positive predictor of support for the technology when participants were able to also express their dislike for the technology (Corner et al, 2011). However, the participants within this study of fusion energy show that energy security is considered a major benefit, particularly in relation to recent global events.

> “We need to move away from our traditional ever ailing energy sources we've seen obviously, for many years, but particularly in light of the Russia Ukraine events, how quickly traditional forms of energy can be disrupted, can be harboured by people with more Machiavellian intent than some of the other Western powers. So yeah, it enables us to hopefully, move towards a self-sustaining energy it would be great.” (West Burton P8).

These quotes from interviewees suggest that there is a strong desire from the public to remove the reliance on other countries for our energy supply, as this can be disrupted by world events and is not reliable. New energy developments such as fusion energy can help reduce this dependence on these more politically unstable nations, therefore increasing energy security (Bradshaw, 2009). This potential reduction in unreliability can therefore increase public support for new energy developments. Often discussed alongside the reliance on other countries for energy production was the potential for reduced energy costs.

> “Yeah, I think just not being reliant on other countries for our energy so much and being bit more self-sufficient and being in a better place with energy provision and affordability.” (Ardeer P5).

Publics therefore believe that a reduction of reliance on other countries for energy can also reduce their personal energy costs, which leads to another dimension of energy security: affordability (Demski et al, 2014). This is particularly relevant in the current economic state of the UK where many people are feeling the cost-of-living crisis. Lucas et al (2021) found that this potential economic resilience can enhance public acceptability of energy developments, therefore this could be a contributing factor to the acceptance of the developments in fusion energy. However, not all participants considered fusion to be an energy worth pursuing, this will be explored in the next section examining the comparisons publics draw with renewable energy.

The UK energy crisis, which began in autumn 2021, was triggered by a combination of increasing global gas prices, reduced renewable energy output, and the collapse of numerous energy suppliers (National Audit Office, 2022). The consequences of this crisis has led to significant impacts for majority of the country, with a substantial increase in energy bills and an increase of 2.1 million households in fuel poverty, taking the total as of July 2023 to 6.6 million households (NEA, 2023). This has resulted in publics becoming more aware of where UK energy comes from and how this can affect the prices (Guan et al, 2023):

> "Well, I'm hoping for cheaper electric. I mean, I know that the energy situation in this country is always very complex, but we seem to be at the vagaries of lots of things that happen internationally." (West Burton P3).

This participant highlights that international events can impact the cost of energy, with the Russia – Ukraine war significantly impacting both the energy crisis but also the cost-of-living crisis in the UK (Mbah and Wasum, 2022). This suggests that the perceived benefit of hosting a fusion powerplant is that there will be cheaper local energy available.

5.1.4. Perceived Benefits

The perceived benefits of energy developments are a significant factor in influencing public opinion. Research regarding traditional nuclear has found that the perceived benefits of this technology are one of the biggest factors affecting public acceptance of the technology (Belmonte et al, 2023). Therefore, this can be extrapolated and viewed in terms of fusion, understanding how these benefits may affect acceptance.

Following the discussion on energy security and the different dimensions, including affordability, this is perceived as a benefit of hosting the fusion plant by the following participant who states that the UK producing their own reliable energy would benefit the cost of living and energy crisis. This participant also states that there is a hope that the plant would run affordably, in turn reducing the costs that are transferred to customers:

> "We're very reliant on other countries for our energy. So, to be able to produce our own energy would be massive, and potentially help people with the current cost of living crisis, the cost of their electric and what have you, hopefully, it might be able to be run more affordably" (West Burton P5).

Another significant perceived benefit of hosting a fusion power plant locally is the benefits to local development in terms of employment and a positive impact on education (Nguyen and Yim, 2018). The following participant highlighted the potential for local regeneration and employment opportunities, stating that without the regeneration of the current West Burton site the area would be of no use other than to cause disruption to visual amenity. This also highlights the importance of creating job opportunities as those working at the current coal power station will be in a position of losing their jobs. Therefore, the development of the fusion power plant will help to mitigate the unemployment that would be experienced within the area, thus having an influence over public support (Thomas et al, 2022).

> "It can create money, create local, local employment opportunities, create local regeneration opportunities for what would otherwise be a hell of a big, mothballed

> eyesore. And ensure that former major employment areas such as that and put to good use" (West Burton P13).

Those participants in Scotland were asked to consider the perceived benefits a fusion power plant could have brought to the area had the Ardeer site been chosen. These participants also highlighted cheaper energy costs as an important perceived benefit of hosting this power plant.

> "You know, you're looking at cheap energy costs. You're looking at jobs, you're looking at improving the economy, improving local infrastructure". (Ardeer P1).

This participant also highlights another significant perceived benefit for those surrounding the Ardeer site, employment. The creation of jobs is considered a significant driver in acceptance of renewable energy developments (Segreto et al, 2020), therefore this perceived benefit can help to encourage public acceptance of new fusion developments.

> "Obviously, employment is the backbone and as an area required to have regeneration, and as all pretty seaside towns are. And and it would probably bring about money to the area, it will probably bring jobs and employment and skills and and it would be a kind of focal point as well." (Ardeer P2).

Employment being a perceived benefit is further suggested by this participant, who also highlights the potential for this development to be a "focal point". This concept is endorsed further by another interviewee who stated "I mean, it was like experimental right. Yeah, that's completely ground-breaking technology" (West Burton P6). Therefore, highlighting the importance of the development and how influential this could be to both the area and the globe. This public opinion is significant as Turcanu et al (2020) found that public attitudes to science and technology development can be a significant predictor in attitudes regarding fusion energy. Meaning that if publics are more excited, interested and supportive of science and technology developments, then they are more likely to accept the development of fusion energy technologies. This section therefore highlights how perceived benefits of fusion energy can have a direct impact on public support for the development of this technology.

However, there is some uncertainty regarding employment, with some participants believing the potential opportunities will not be as significant as promised due to the complexity of the technology. With one West Burton (P1) participant stating "I would imagine, projects of this kind are highly technical. This probably limits opportunities, like some aspects of employment." This therefore highlights that publics may not accept the proposed benefits of fusion developments, believing that local people will not have the skills to be employed. This highlights that there are some perceived risks associated with this development, these risks are discussed within the following section.

5.1.5. Perceived Risks

Participants local to the Ardeer site in Scotland were asked to consider the perceived risks a fusion power plant could have brought to the area had the Ardeer site been chosen. One of the most occurring perceived risks amongst this public were during the construction phase highlighting the impact this would have on the local area.

> "The company would have to take care of roads and infrastructure and all those things like they are downsides to during the building phase. There's always noise and dirt and damage and stuff back there." (Ardeer P1).

This perceived risk is further supported by participants interviewed in West Burton who also highlights the impact the construction phase would have on the local infrastructure, such as roads etc. In previous years this attitude would be considered NIMBYism (Not in my backyard), however that is now considered outdated and a way for developers and governments to dismiss local opinion without addressing the underlying concerns (Foster et al, 2021). It has been argued that in order for projects to be approved by regulatory institutions, developers should not only consult with local publics but also compensate for the local costs of development (ibid.).

> "I think most of the risk come around the construction phase. The damage to roads in local infrastructure would have been probably would have been significant. And it does take time to repair stuff when you start moving heavy trucks and stuff like that through." (Ardeer P7)

One risk highlighted by the following participant is the perceived risk of the fusion experiment going wrong. With the fusion power plant development being framed as an experiment this can influence public trust of the plans (Kox et al, 2020). This participant also highlights the long-term impact of the fuels used for this plant to run. With the final fuels needed to run this powerplant not fully understood yet, hence the experimental aspect, the long-term impacts of such fuels cannot fully be identified.

> "I think there is just any risk to an experiment going wrong. I think it's just the general in the general health and safety thing. Is there you know, the immediate risk and any potential long-term risks for whatever fuels elements are being used?" (Ardeer P3).

The participants local to the West Burton site were asked to consider the potential risks hosting the site in their local area may present. A number of these perceived risks are regarding the potential danger to the local area with participants expressing they do not understand the physics of how the site works, but that this lack of understanding creates mystery around the potential danger of the site. This is supported by Ho et al (2018) in the prior knowledge section of the conceptual framework who discovered that a significant majority of the perceived risks were founded in misconceptions.

> "Yeah, the, the risks are if there isn't something if there's a danger, physical danger, a nuclear danger that they're not telling us about and I'm not savvy enough to deal with the physics to know that's going to be the case. That's the first that's the first danger. I don't believe that's the case. I'm not a conspiracy theorist." (West Burton P2).

Both the participant quotes above and below highlights the lack of information considering the risks regarding hosting a fusion power plant, however they do not seem to personally believe in these. With the following participant highlighting a perceived risk of nuclear fallout. Nuclear

fallout is traditionally associated with nuclear fission and is not a consequence of fusion energy (IAEA, 2023), therefore these risks are founded on participants prior knowledge of nuclear fission (Turcanu et al, 2020). Both participants, however, were quick to dismiss the perceived risk they described stating that they do not believe the headlines and stating that they are not conspiracy theorists. Suggesting they believe the perceived risks that they have heard of are not factually accurate.

> "Obviously there's a risk that people talk about how there's going to be a nuclear fallout, and we can all die and things like that. I don't personally buy that the big headlines when things have happened" (West Burton P14).

Another misconception that has led to a perceived risk regarding safety is the potential for the fusion plant to "blow up" or create radiation within the local area.

> "You hope it won't blow up. I mean, I don't think it will blow up I'm fairly realistic that they will make it safe and contained. I don't live right next to it. If I lived right next to it. What would I think Oh, I wonder if that radiates out or, or, you know, whatever scientific term it would be. So, a little bit wary of something like that" (West Burton P4).

Despite these concerns highlighted, the participant shows self-awareness in stating that they do not believe their perceived risks are likely to occur and state that they have confidence in developers that they will ensure the fusion plant is safe. This general theory that trust in developers can influence public support for developments is supported throughout the literature, stating that if publics have trust in those constructing the development, then they are more likely to offer support (Segreto et al, 2020). However, without true confirmation or education from developers, these worries and risks will remain amongst participants. This quote also links with publics using fission as a heuristic as this participant's concerns are based on nuclear fission, without realising that these risks, such as radiation, are not possible with fusion energy. Further to the risks posed to humans, there are also perceived risks in regard to the environment, in particular the river local to the STEP site.

> "Because I'm pretty sure that the three power stations in a row, because they use the [river] Trent as the cooling source. I'm pretty sure that raises the temperature of the Trent, and there was some concern about biodiversity and stuff." (West Burton P3).

> "Whatever form of cooling that they use, potentially is environmental pollution, particularly as it is kind of experimental. But again, given the state that the local government have allowed the rivers to get into this country, I guess there isn't much to lose on that front, because the rivers is a disgrace anyway." (West Burton P9).

Both of the above quotes discuss the potential risks in terms of the local river, due to the use of this as a way to cool the power plant. These participants highlight risks to biodiversity due to the potential raising of the river temperature. However, one participant also states how the rivers are in poor condition, believing this is due to the local government. In England no single stretch of river is considered in good overall health, with just 15% of English river stretches reaching good ecological health standards (The Rivers Trust, 2024). Concerns regarding discharge into river may have grown since this interview (June 2023), as since there has been significant news coverage of the state of UK rivers and the considerable discharge from companies. This issue of trust in developers putting the best interest of the environment and residents first was also raised in regard to the construction costs.

> "I am a little worried that we've seen this with Oil supervisor things that we are promised cheap energy and what you actually get is some fat cats lining in their pockets. So actually, we end up paying more, we end up with the development costs. When they say oh well we you know it's costly and all this we're gonna have to put it on your bills. I am taking the hit from a community point of view for somebody to line their pockets with cash." (West Burton P10).

This participant highlights how they are concerned that the promise of lower energy costs will not actually be fulfilled. In turn they show a concern that construction costs will be passed on to residents, therefore increasing their energy bills, meaning developers are able to reap the biggest profits. This indicates a need for more transparency regarding costs and how realistic the perceived benefits are, such as lower energy costs. These issues can sometimes be

avoided through effective public consultation; however, publics do not always believe this to be true. The following section discusses the varying opinions regarding public consultation.

5.1.6. Public Engagement

Public consultation is a required component of implementing new energy developments in the UK (Bale et al, 2012). However, amongst publics there are differing opinions of the effectiveness of such consultation. In regard to the type of consultation conducted within these case studies, there have been a number of information events with opportunities to ask questions to experts, conducted both in person and online. It is important to consider these methods, as it is considered that upstream engagement methods, such as workshops where publics are given the opportunity to raise their concerns and have discussions, are most effective than simple information events (Wiersma and Devine-Wright, 2014). This section will explore both attitudes towards public consultation and how the involvement of governments in developments can affect this opinion.

> "I think information and consultation can only ever be beneficial, really, because this then offsets, misinformation and misconceptions. If people know how it's progressing and things like that, then there is there won't be so much fear." (West Burton P2).

This interviewee highlights that they believe public consultation can only ever be beneficial, using it as a tool to prevent misinformation and reduce misconceptions in order to reduce potential fear amongst publics. This can be an extremely important factor in public consultation as discussed by Upreti and Van der Horst (2004), who found that lack of understanding and general knowledge of biomass due to limited public consultation led to publics having an increased risk perception. This means that publics were less supportive of this new technology. Biomass and fusion energy can be compared as they are both emergent low carbon technologies, that have low understanding by publics. Public consultation, however, is not always perceived as beneficial by publics.

> “I think I'm not naive. I work in the education sector. So quite often we get consulted on and then what was going to happen happens anyway. Consulted doesn't mean changed or listened to does it? It just means they have consulted. Yeah. That's my view.” West Burton P4).

This quote suggests that public consultation is not for the benefit of publics, it is for the developers to be able to comply with the rules that consultation has taken place. Echoing previous research regarding public engagement that state in order for consultation and engagement to actually be useful they need to involve the public as active participants in decision making and address their concerns (Pidgeon and Demski, 2012). The view of this participant is supported by results from a study regarding marine renewable energy projects, where the consultation process was viewed as a box ticking exercise (Reilly et al, 2016). Therefore, suggesting that the issues or concerns publics present will not be listened to or mitigated.

> “I haven't been involved in the public consultation processes. I'm happy to tell you why I haven't. If you want to know, that's fine. Yeah. So I haven't been involved through, I guess, political apathy. So my opinion is that the government will do what the government wants to do, regardless of what I or anybody else living locally, says. And this opinion really comes from activity by the current government around fracking.” (West Burton P6).

The suggestion here is that as UKAEA, a government funded body, are the developers of the STEP site, that they will disregard any issues that are brought forward at public consultation events. This participant believes that the government already has their ideas of what will be implemented, and they are just doing public consultation to make people think they are being listened to. This sentiment appears multiple times throughout the interviews with participants having a significant lack of trust within the UK Government, which at the time of interview was the previous Conservative government led by Rishi Sunak. This theme of government involvement appeared throughout and will be directly explored in the following section. However, some participants suggested that public consultation should not be conducted due to ill-informed publics having extreme opinions regarding technologies such as fusion energy.

> “I think that sometimes we shouldn't have consultation on certain things. Because there's just way too much that people think they know, and they don't. And very often, they can spoil a process. Yeah. With perceived ideas. Instead of like, that whole sort of like Facebook knowledge, you know, like, yeah. So, yes, while I think public consultation is fair, at times, I think that it can be very self-limiting in getting a project off the ground.” (Ardeer P5).

> “I don't think the public fully understand the implications. I think there's a lot of people who I mean, you only have to look at the comments on Facebook, to think that people people think they understand it better than they actually do. And so I think often involving members of the public who don't fully understand everything can be they can be very vocal, and you can sometimes get a really skewed vision of what the public opinion is because only the people who feel very strongly or who feel very positive for it they're the only people's voice you hear.” (Ardeer P3).

Both of the above quotes highlight that some members of the public believe that people with strong negative opinions, that they believe are not well informed, can lead to a project being stopped or the general opinion being misrepresented. The main principles of Responsible, Research and Innovation (RRI) suggest that engagement is essential to align new developments with societal needs, without however giving the public the power to be the final decision maker (Stilgoe et al, 2013). This suggests that all demographics of society are given the opportunity to have discussions regarding their views, but that the views of the few extremes will not be heard over those in the middle, ultimately coming to fair conclusions. The idea that opinion can be skewed due to only those with strong opinions both positive and negative being involved is supported by Fishkin et al (2000), who outline that the majority of people do not discuss issues in depth, and where they do it is usually to an audience who hold similar opinions. Therefore, echo chambers are created within small communities and only those with strong opinions will voice them outside of these echo chambers (ibid.). Thus, for future engagement topics should be left vague as to get a wide variety of participants and information should be fed so that there is a basic level of understanding amongst participants.

However, those conducting such public consultation can also have an influence over publics willingness to partake.

Trust in government can significantly impact public acceptability of government led energy projects (Grüdinger, 2017), this can be seen to have a clear impact on public attitudes towards the STEP development. This trust can be determined by publics perceived view on government competence and the commitment of officials (ibid.). However, given that there has been a landslide win for opposition leaders in the general election, it can be inferred that the trust publics had in the previous conservative government was limited.

> “So that I think that one of the things with with any of these big projects, if all they're looking at is the money side, and they're just going to do what they want to do, thinking we're not going to bother about you, then that's going to really annoy people. But there's got to be a level of not just consultation. But collaboration and cooperation. So they've got they've got to take on board what we say” (West Burton P2).

This participant suggests that the government will focus on making money out of the project and disregard concerns and opinions that people local to the project hold. Again, this quote suggests that there should be a deliberative process between developers and publics, and there has to be trust that publics will be listened to.

This theme of not being listened to occurred throughout the interviews. One participant raised this concern about STEP being implemented “You know, and sometimes it's decisions that are made in the offices by men that don't have a clue about the area.” (Ardeer, P2). This therefore suggests that the government make decisions on behalf of local areas without truly understanding the feelings of the local people. This sentiment was echoed by another participant stating, “I think it's kind of like we'll just try and sneak this in and we'll see we'll see what happens.” (Ardeer, P5). Suggesting that the Government are attempting to implement this technology without the knowledge of local people living there.

> “The council use media putting out there what's good about it, basically. So, looking at that probably a little bit cynically, you know, there's a bit of cherry picking so you have

> the great for jobs, etc, etc. And probably a little bit light on the technical, on the deep down really nitty gritty of the technical processes that will be involved." (West Burton P1).

Local government in terms of the council is shown not to be trusted amongst local people throughout a number of interviews, with this participant suggesting that there is not true transparency regarding the STEP development. This participant suggests that the council have "cherry picked" the benefits to share in order to gain support for the project, but have not disclosed the full potential disadvantages, including whether the benefits will be felt by local people directly.

Regarding Scottish participants, an interesting theme that occurred was Scottish independence and the involvement of the UK Government. Participants asked the question whether the development would continue if Scotland were to achieve independence as the project is funded by the UK Government. Also raised was a query over whether the site was not chosen because of this fact and whether the UK Government did not want to invest into Scotland's energy.

> "I would say, budget and costs. I mean, obviously, it's funded by the UK Government. So it's, that you know, is a thing in a sense but imagine the cost of development and project overruns and risks as I said, look back to lately the you know, especially Scotland independence, if Scotland got independence would they just stop." (Ardeer P4).

This quote suggests that Scotland's bid for independence had an influence upon the site not being selected to host STEP. Whereas, speaking with a Scottish Council official they believed that the lack of Scottish government support had a direct influence over the strength of the Ardeer bid.

> "I think we were ultimately hampered by a lack of positive support from Scottish government. There was a neutral position from Scottish Government so there was no opposition. But nor was there any strong endorsement. And that really meant that a lot of energies that were spent that should have been spent, sort of focused on the

decision makers at Westminster and UKAEA, was actually focused on trying to have a conversation with Scottish Government about their position." (Ardeer Stakeholder)

"I think that was a key factor that there was no kind of ringing endorsement from Scottish Government, saying you will welcome us with open arms, and this is the technology of the future or whatever. It was very much clearly, we're not getting involved, kind of position, which wasn't helpful, but yeah, it was it was disappointing." (Ardeer Stakeholder).

This quote highlights the struggle those in support of STEP faced within the local region, focusing more on influencing the government, rather than gathering public support. This therefore illustrates the differing opinions across the two different case studies, both case studies have a different relationship with the government, energy facilities and the proposed STEP project. These differences will be further examined within the next sub-section.

5.1.7. General Themes Summary

Taken together, the general themes emerging from the interview and observational data highlight the complex and often ambivalent ways in which publics engage with fusion energy, shaped by overlapping concerns around climate change, energy security, perceived benefits, perceived risks and public engagement. Consistent with wider literature on climate and energy attitudes, participants frequently framed fusion within the broader context of the climate emergency and the need for low-carbon energy transitions, expressing conditional support rooted in environmental concern and future-oriented responsibility (Perlaviciute and Steg, 2014; Boudet, 2019). This reflects findings that publics are more likely to support new energy technologies when they are perceived as contributing meaningfully to climate mitigation and long-term sustainability, even when uncertainties remain.

At the same time, this support was rarely unqualified. Participants articulated a tension between optimism about fusion's potential benefits – particularly energy security, economic regeneration and technological progress – and anxieties about safety, feasibility, costs and trust in political institutions. These tensions mirror the broader risk–benefit trade-offs

identified in the literature, where acceptance of emergent technologies is contingent not only on technical performance but also on perceived fairness, transparency and credibility of governance (Perlaviciute and Steg, 2014; Boudet, 2019). Importantly, participants did not passively absorb official narratives of fusion as a ‘clean’ or ‘safe’ technology; rather, they actively evaluated these claims through existing values, prior knowledge and broader scepticism about government competence and motives.

The findings also challenge simplistic assumptions embedded in the information-deficit model. While knowledge gaps were evident, particularly regarding how fusion differs from fission, increased information alone did not straightforwardly translate into acceptance. Instead, participants’ responses were filtered through wider cultural, political and emotional frames, including mistrust in government, concern about economic priorities, and scepticism towards large-scale technological promises. This aligns with critiques of deficit-based approaches to public understanding of science, which emphasise that attitudes are shaped by values, identities and power relations as much as by factual knowledge (Boudet, 2019).

Finally, the theme of public engagement revealed that participants valued early, transparent and locally sensitive consultation processes, yet often felt excluded from meaningful influence over decisions. This resonates with wider research on procedural justice, which demonstrates that perceptions of fairness, inclusion and respect are central to public acceptability of energy developments (Perlaviciute and Steg, 2014). Overall, the general themes demonstrate that attitudes towards fusion are not reducible to simple support or opposition, but instead reflect a conditional, negotiated and contextually embedded form of acceptance that is shaped by climate concerns, risk perceptions and trust in governance.

5.2. Place

As highlighted above, each case study has its own unique relationship with the proposed STEP site. This is due to a number of factors, such as the history of the case study. This subsection will explore the differing themes that occurred, specific to each case study, such as the changing of the site in West Burton from a coal power station to a fusion power station, and the specific impacts this STEP development will bring to the community. Whereas, a number of visual and landscape impacts were highlighted during the Ardeer interviews, alongside the unique theme of disappointment, where participants shared their opinions regarding not being selected to host the new STEP site. These themes will be explored using place theory (Cresswell, 2004) and how participants' unique attachments to their home can influence their opinions.

5.2.1. West Burton Specific Themes

This section aims to explore the themes that occurred within the interviews that are unique to West Burton.

5.2.1.1. Changing of the Site

One theme specific to West Burton is surrounding the changing of the site from a coal power station to a fusion experiment. This links with place literature by Devine-Wright (2009), who explored how place attachment influences public engagement, and that effective engagement must specifically address local identities, such as the changing of local infrastructure. Participants were asked specifically around their opinions regarding this change with one participant replying "Oh, hard support. I hate nimbyism" (West Burton P12). This sentiment was echoed by a number of participants stating that they would be happy to host the site providing a distaste for NIMBYism as a reason. In this case, the participant's rejection of NIMBYism aligns with the view that support for new infrastructure should be based on its broader benefits rather than resistance to change purely due to its proximity.

> "Well, it needs to go somewhere. And if I don't like it, I'll move. It would be very, very hypocritical of me to say, well, it shouldn't be in my backyard. And I'm, and I'm particularly, I guess, vocal about people that do take that approach." (West Burton P14).

This concept is known as the inverse NIMBY effect (Van der Horst, 2007), where those closest to the site feel the direct benefits such as jobs, economy boost and so forth, therefore they are more likely to support the development close to them (Gravelle and Lachapelle, 2015).

One participant who had worked at the power station in its current form expressed sadness that the power station was closing as they believed it had been rushed. This participant said "Well, with my history I'm sorry to see the coal power stations go because I think that's been a bit hurried." This sentiment was echoed by other participants.

> "it was the forefront of coal fired generation at the time. And there was room to put in more technology for pollution controls, and probably move on to carbon capture a lot of that was in the line sort of 15 years ago, and then it was decided not to go ahead with it. So I think they it was a bit premature to retire the coal stations and but to move on." (West Burton P9).

Again, this participant suggests that it was premature to close the coal power station, stating that more could have been done to extend the life by investing in carbon capture, and in turn keep a significant number of local people in employment. This sentiment reflects the deep-rooted significance of place identity in West Burton, where the coal industry was historically central to both the local economy and community identity. Milbourne et al. (2021) highlight how deindustrialisation can lead to a sense of place-based marginalisation, where communities feel abandoned by broader socio-political and economic shifts. In this context, the transition from coal to fusion energy must be approached with sensitivity, recognising the historical dependence on industry and addressing concerns that fusion may not provide the long-term stability that coal once did. To foster genuine local support, there must be clear assurances that fusion will bring sustained employment and economic regeneration, rather than repeating cycles of industrial decline.

When considering the changes to the site the visual changes should also be considered as the site will no longer look how it has for the past 57 years. The cooling towers will be demolished making way for the new STEP development. When asked about their sentiments regarding this change publics expressed a disinterest in that the site is functional, not a site of public beauty. This therefore suggests that the future design of the STEP site will not have too much of an influence over public opinion.

> “obviously, it’s not a pretty sight. It is very functional. It does what what it does, it’s not designed to be to be a site of outstanding natural beauty. And don’t feel that it would change it in a way that’s going to make it worse or better.” (West Burton P11).

> “Yeah, I guess it will look different on the environment, won't it? So I'm used to driving past the cooling towers and the big building. And that is kind of familiar. So that would look different, but I don't think difference necessarily bad.” (West Burton P4).

These participants highlight how the transformation of the site, through the removal of the familiar cooling towers and the introduction of the STEP development, will be an emotive and symbolic shift. While both participants express a pragmatic acceptance of the visual change, recognising the site's functional, rather than aesthetic role, their comments still acknowledge the significance of familiarity and attachment to the existing site. This reflects the affective dimensions of place identity, where individuals develop emotional bonds with their environment, even when that environment is industrial or utilitarian in nature (Devine-Wright, 2009).

The second quote stating that “different is not necessarily bad” suggests an openness to change, however also highlights that the change will present a disruption to the familiar. This can be seen in literature on place making, where changes to landscapes, especially those linked to a community’s industrial heritage, can influence how publics make sense of their surroundings (Lewicka, 2008). While not all publics express strong opposition to the development of the site, consideration should still be given to the affective relationship publics have with it. Managing this site change sensitively, by acknowledging the area’s history and the local connection with it, is essential in maintaining local support for the STEP development.

> “I mean, it's a site that's got something built on it. They're gonna build something else in the same place. It's not like they were going to turn it into a nice botanical garden or something and now they're going to build another sort of power station so it's much of a muchness really.” (West Burton P9).

This participant shows an indifference to the site being developed, suggesting that moving from one form of power generation to another on the same site will have no bearing on their life. Highlighting that as the site will not be something the public will be able to use or directly benefit from then it has no impact.

The changing of the site has a variety of meanings and feelings attached for different participants; a number of participants showed positive support for developing the site.

> “I think it's great that we're redeveloping a site that was backed into something more modern and more useful and I think that's the thing you have to do in areas like this is move them away from fossil fuel dependence and into the green economy so yeah, I think I think this is the right use for it.” (West Burton, P7).

This participant holds the opinion that moving away from fossil fuels, thus redeveloping the coal power station site is a significantly positive prospect. Suggesting that coal power is associated with the past and fusion is a modern form of energy generation, redeveloping the area for the future. This project will not only impact local publics in terms of the changing of the physical site, but there are also a number of community impacts, which will be explored in the following section.

5.2.1.2. Community Impacts

When asked about the overall opinion communities had shown to fusion energy, a UKAEA spokesperson stated.

> “Overwhelmingly positive in the engagements that we've had to date. There are some concerns that absolutely valid concerns and questions about waste and safety which we would entirely anticipate. Also concerns about you know, the number of lorries driving past the front door at some point in the future. Also, completely valid. But I mean, really, from my point of view, it's been incredibly positive. And everyone's pretty excited about providing a future for the West Burton site, about the skills and opportunities that might provide for young not just young people, but young people and you know, the next generations coming through. Yeah, I mean, overwhelmingly positive.” (UKAEA Stakeholder).

This suggests that from a stakeholder point of view the majority of the community are supportive of the development due to the potential opportunities it could bring. However, not all members of the community show these suggested levels of support. One community impact that emerged from the interviews was the addition of power lines to the local area. It is not known whether this is actually linked to the fusion development however the public perceive it to be. The public have highlighted that they believe that the developers are taking shortcuts and cheap alternatives in installing large overhead power lines. This suggests that there is slight distrust from the community and more open and honest discussion is required between publics and developers.

> “I will mention one thing where there’s a lot of things that at the moment with new power, like big power lines going in, right? And that we’re not as a community, massively happy about this, not because we don’t think that the power station or the or whatever it is going to be connected to the grid. Clearly, it’s going to be it’s the it’s the the routes that they’re taking, and the idea that they just want to do it as cheap as possible.” (West Burton P2).

This quote suggests that there is some resistance with further energy development, this sentiment was further expressed and explained throughout the West Burton interviews.

> “Yeah, I still live in Retford, which is just south of Cottam Power Station. And we think generally around here, there's a lot of negative attitudes to kind of environmentalism

> and green movement because people link it up with losing jobs. Because we've had a lot of coal fired power stations closed here obviously mines for that." (West Burton P10).

Due to the deindustrialisation and unemployment caused by the decline of coal power, this participant highlights how such changes have contributed to local resentment towards the transition to renewable energy. Milbourne (2010) argues that the economic decline of rural and post-industrial towns can create a lasting sense of marginalisation, where the loss of industry is felt not just economically but socially, as communities experience a breakdown in cohesion and identity. His later work (Milbourne and Kitchen, 2014) builds on this by showing how these past experiences shape contemporary responses to new developments, with communities often approaching change with caution due to previous experiences of instability.

This perspective helps explain the data in this study, where several participants associate the green transition with job losses and the erosion of their community. The historical context of economic hardship informs current attitudes towards new technologies such as fusion energy. Milbourne (2010; and 2014) therefore highlight the importance of providing targeted support and meaningful communication to address both the economic and social concerns of affected communities. Participants also highlighted the loss of community that occurred alongside the unemployment when the coal power stations were decommissioned.

> "I would hope that with the changing of the site, and if it's got that long term future, we could retain some of that, retain some of that culture and also maybe even get some of the stuff that I that I found that we lost back. I know this has nothing to do with nuclear fusion we had they had a great Cricket Club, and bowls. And there was a club with where you were put went and played snooker and they did a bonfire night. You know that it was a big community thing." (West Burton P2).

This participant speaks to a deeper sense of loss that goes beyond just jobs, reflecting on how the closure of the power station also meant the decline of the wider community. The mention of lost social spaces, like the cricket and bowls clubs, snooker hall, and community events, highlights how important the power station once was in supporting local life and fostering a

strong community spirit. This supports Milbourne's (2010) point that industrial closures often break down not just economic stability, but also the social ties and identity of a place.

This participant shows hope that the STEP project will bring some of this community spirit back, suggesting that people are looking for more than just economic investment they want social contribution from the project. This links closely to Johnstone and Hielscher's (2017) work, which argues that when coal is phased out, it is important for policy to address the social and cultural impacts, not just the economic ones. Therefore, fusion developments such as STEP must be positioned not only as technological innovations but as opportunities to rebuild social infrastructure, fostering a sense of ownership and inclusion within the host community. Ensuring publics feel listened to is vital, this can be aided by public engagement events. The concerns and questions raised at a local engagement event are explored within the following section.

5.2.1.3. Community Events

Attending a UK Atomic Energy Authority (UKAEA) council and community event in West Burton allowed the concerns by both local government and publics to be understood. Overall, at the event there was lots of engagement with good numbers of both the public and councillors in attendance. The majority of those attending visited the information room and engaged with UKAEA employees by asking questions.

The majority of questions observed during the councillor's session concerned the economic impact on the area and also the technical aspects of fusion. The impacts were assessed in terms of questions surrounding how much money the plant will bring to the area and how local businesses and industries can benefit. Technical aspects were explored though discussion on fuels, which are used and how they are acquired, but also the probability of the plant's success with the potential difficulties that will be faced.

Whereas during the general public session the main themes of questions included the potential benefits and opportunities for young people in the area and the practicalities of the

site. The practicalities were discussed in terms of how the plant will fundamentally make electricity and how long the process will take.

Key themes that came up throughout the day, regardless of demographics, were safety and infrastructure. The main concerns highlighted were whether fusion is actually safe, and whether a disaster could occur from this plant. Seeming to arise repeatedly is the question of infrastructure in terms of the railway, but the most important seemed to be the development of a bridge.

Overall, all those attending seemed extremely positive regarding the development, with most actively excited about the prospect. All questions were answered by staff and the community attendees at the event appeared satisfied with the responses given.

5.2.2. Ardeer Specific Themes

This section aims to explore the themes that occurred within the interviews that are unique to Ardeer.

5.2.2.1. Visual and Landscape Impact

The visual impacts of renewable energy technologies have been a sticking point for decades, this can significantly affect the public acceptance of technological developments (Hevia-Koch and Ladenburg, 2019). Studies regarding visual and landscape impacts have mostly centred around wind energy within the UK, highlighting that the influence aesthetics of an area can result in opposition for energy developments (Wolsink, 2007). However, it is also understood that visual impacts are not just aesthetic concerns, but that they are tied to publics emotional connection to landscapes (Devine-Wright, 2009). This emotional connection can lead to both support and opposition, depending on how the project is perceived in relation to the local identity (ibid.). A number of the Ardeer participants referenced the impact Hunterston, the nuclear power station along the coast, has had on the visual landscape.

> “I, I know, I know, there’s a lot of people around here who’d be abjectly against cause of Hunterston and because of the scarring to the landscape it’s caused and the waste material”. (Ardeer P2).

> “as an area of outstanding beauty and the concern would be that, that of the landscape, you know, it would be a dominant thing on my landscape, the way Hunterston is” (Ardeer P7).

These quotes highlight how the visible and long-lasting impact of Hunterston power station on the local landscape has shaped negative perceptions of energy infrastructure in Ardeer. The references to "scarring" and the site being a "dominant thing on my landscape" suggest a strong emotional connection to place and a concern that further developments could threaten the natural beauty and identity of the area. Parkhill et al. (2014) explores how perceptions of

energy infrastructure are shaped not only by proximity but also by the symbolic meanings people attach to landscapes. For many, landscapes are more than physical spaces, they are tied to identity, memory, and a sense of belonging.

While proximity to infrastructure can influence attitudes (Devine-Wright, 2009), it is not simply a matter of distance. Parkhill et al. (2014) argues that the meaning attributed to a landscape, particularly one designated as an area of outstanding natural beauty or locally appreciated, can amplify concerns about visual intrusion and environmental degradation, regardless of the actual distance from a site. In Ardeer, the negative perception of Hunterston has created a negative stigma regarding further industrial development, with participants expressing concern not just about practical issues like waste, but about the broader disruption to the landscape. This contrasts with sentiments in West Burton, where the existing industrial identity of the landscape appears to make residents more accepting of change. These insights highlight the importance of understanding local place attachments and the meanings attributed to landscapes when planning new developments like fusion energy sites.

Another significant concern that was raised by Ardeer interviewees was that of the perceived risk to wildlife. Ardeer is home to huge numbers of rare and endangered wildlife as highlighted in the contextualisation chapter. One participant expressed that it is people who do not understand the local area making these decisions without fully appreciating the consequences.

> “Because of this area, as an area of natural beauty and as there’s a lot of wildlife and there’s a lot and I think people were concerned that the fact that this would be disruptive. I mean, so very well was being experiments, you know. Sometimes it’s decisions that are made by people who don’t know the area. They just pick out random plant bases and think, Well, we really, really good to put it there without actually coming down and having a look at the area and you know and it just so be in this [area] we have one of the largest populations, birds. And also, as well. There can be birds coming in from, like Canadian geese and all that sort of thing. Just disrupt all that. I think, personally” (Ardeer P3).

This statement, therefore, suggests that there is distrust for the decision makers that can in turn influence the public support of a development (Shaw et al, 2015). This also suggests that impacts on wildlife and rare species can negatively affect public opinion (Conkling et al, 2021).

> "I know there was various meetings and that took place but unfortunately, I wasn't able to go and but from what I can gather, it was not very well received. Because of this area, as an area of natural beauty and as there's a lot of wildlife and there's a lot and I think people were concerned that the fact that this would be disrupt that" (Ardeer P4).

This participant suggests that this development would significantly and negatively impact the local area, due to the area being a site of natural beauty, highlighting that the sight would be a disruption to that. This was supported by a stakeholder within Ardeer:

> "I know that sort of voices from local communities were concerned about the impact on the biodiversity of the site, which is you know, as an area strong and biodiversity and attracts a lot of interest. There's also a triple si on the area so that was a big concern for people" (Ardeer Stakeholder).

This stakeholder therefore provides support to the large number of individuals opposing this project. This also highlights that the area was a sight of special scientific interest (SSSI), which not only gives publics a reason to withdraw support but also would have presented a significant challenge if this site was to be selected to host STEP. However, this sentiment was not held by all participants, with some showing disappointment over Ardeer not being chosen to host STEP. These themes of disappointment are explored within the following section.

5.2.2.2. Disappointment

Despite there being a number of the Ardeer participants against fusion and any developments in their area, when asked their opinion on Ardeer not being chosen a considerable amount of disappointment was shown. One reason given for the disappointment shown is the loss in terms of economic development with one participant stating "I think that's really sad, actually.

Probably the, the biggest [loss] is the short-term economic development. The most immediate [loss] Yeah" (Ardeer P1). This quote suggests that the area would have benefitted significantly from the influx of jobs and other economy boosts. This sentiment was explained due to the prior industries of the local area.

> "Congress X chemical exposures, folks don't know it kind of shut down in the 80s 90s. but obviously there's a lot of unemployment that came from that. North Ayrshire where we are, has kind of a significantly higher unemployment rate and kind of lower skilled jobs or obviously it would have brought the benefit of that, you know, higher skilled jobs." (Ardeer P5).

This interviewee highlights that due to the chemical works closing down in the 80s there has been significant unemployment within the area. Similar to that of West Burton, this STEP development would have brought about significant employment and regeneration to a previously deinduatrialised area.

Another participant stated "So yeah, disappointing. I think this is what the area needs, this industry that's going to push in the fringes and everything that's really unique," (Ardeer P8). This participant however suggests more than simple disappointment; it reflects a deeper sense of missed opportunity tied to pride and local identity. The use of phrases such as "what the area needs" and "something unique" suggests that this individual viewed the STEP project as a transformative opportunity, one that could have placed Ardeer on the map as a pioneering site, either globally or within the UK.

This perspective indicates that the project was seen not just as an economic boost, but as a chance to reframe Ardeer's identity from a post-industrial community to a leader in cutting-edge energy innovation. Lewicka (2011) and Devine-Wright (2009) both argue that place identity is strongly shaped by narratives of pride and recognition, where large-scale developments can offer more than jobs, they provide symbolic value and a renewed sense of belonging. The participant's disappointment, therefore, can be interpreted as a lost opportunity for Ardeer to redefine itself and strengthen collective place identity.

5.2.3. Place Summary

The place-based findings underscore the central role of local histories, identities and spatial imaginaries in shaping public responses to fusion energy. Across both case study sites, attitudes were not formed in abstraction but were deeply embedded within participants' relationships to place, reflecting emotional attachments, industrial legacies and future aspirations. This aligns closely with Devine-Wright's (2009) place attachment and place identity framework, which emphasises that responses to energy developments are shaped not only by instrumental concerns but by how projects are perceived to align with, or threaten, valued meanings of place.

In West Burton, participants' generally positive orientation towards STEP was closely tied to narratives of regeneration, continuity of industrial identity and local economic renewal. The fusion development was frequently framed as a symbolic replacement for the declining coal-fired power station, enabling participants to reconcile technological change with a sense of place-based pride and socio-economic resilience. This reflects Cresswell's (2015) argument that places are not static backdrops but dynamic, meaning-laden constructs shaped by historical and cultural processes. Fusion, in this context, became incorporated into an evolving place identity grounded in industrial heritage and aspirations for future prosperity.

By contrast, in Ardeer, participants' scepticism and disappointment were shaped by a different spatial narrative, one rooted in environmental protection, landscape value and a more ambivalent relationship to industrial development. The loss of STEP as a potential regeneration opportunity did not automatically translate into regret; instead, it revealed tensions between economic hopes and environmental priorities. This finding resonates with Norris et al. (2024), who highlight how historical experiences of industrialisation and environmental burden can generate place-protective responses to new infrastructure, particularly in communities with long-standing grievances or contested development histories.

These contrasting place responses illustrate that public attitudes towards fusion cannot be understood independently of spatial context. Rather than reflecting generic resistance, participants' views were grounded in coherent place-based logics shaped by deindustrialisation, environmental values and local identity narratives. In doing so, the findings extend Devine-Wright's (2009) framework by showing how different place identities can foster either enthusiasm or scepticism towards the same technology, depending on whether it is perceived as consonant with local meanings of place.

Overall, the place findings demonstrate that fusion is not merely a technical development but a spatially embedded social project, whose acceptability is mediated by how it intersects with local histories, identities and aspirations. This reinforces the argument that energy developments must be analysed not only through national policy and technological lenses, but through the lived geographies of the communities in which they are situated.

5.3. Heuristics

Heuristics are used by publics as mental shortcuts to understand complex phenomenon (Gigerenzer, 1999). Some common heuristics come from the comparison of fusion energy to nuclear fission or the comparing fusion to the sun. One participant states: “Nuclear fusion is basically the process that goes on in astronomical bodies, in the sun, typically.” (West Burton P1). These heuristics are discussed throughout this sub-section, alongside the common knowledge gaps that can lead to these heuristics and transfer heuristics that have been uncovered, particularly in relation to the Conservative government involvement. STEP is not the only energy project proposed within the area of West Burton, with a number of solar projects being considered, this has led to mixed opinions amongst local people, resulting in fusion being viewed as the lesser of the two evils. The final heuristic explores the achievability of this project as perceived by publics, as there are various heuristics being used to understand the attainability of this project.

5.3.1. Comparison With Fission

As outlined in Chapter 2 in section 2.5.1 the transfer heuristic is a cognitive shortcut where individuals apply knowledge or strategies from one familiar context to a new, similar situation (Todd and Gigerenzer, 2000). Transfer heuristics can play a crucial role in shaping public perception of new energy technologies (Lennon et al, 2019). A significant majority of participant when describing their knowledge of fusion, used fission as a heuristic to understand the concept. For example, one participant stated, “But it's basically the opposite of nuclear fission, isn't it?” (West Burton P15), station that fusion and fission are opposites. This aims to use one phenomenon they understand, being fission, to determine another they do not fully grasp which is fusion. This is consistent with Turcanu et al (2020) who found that nuclear fission plays a vital role in the publics understanding and making sense of fusion energy, with a key aspect of this understanding using fission as a comparison.

It was also made clear throughout the interviews that there is some confusion between the two terms. When asked to describe their understanding, a number of participants proceeded to

outline the process of fission. This common misconception was discerned by several participants for example one stated:

> “I guess I think that it's clear that there might be a misconception between fission and fusion, and that people think that they've got Chernobyl on their doorstep which might cause people to be a little bit more vocal about their opposition to things like that.” (West Burton P11).

This is further supported by one participant who admitted their own confusion between fission and fusion, stating that they had mixed the two up prior and had since researched and discovered the difference:

> “This is, was the confusion for me was actually I think I am mixing it up with fission. Yeah, yeah. So, I actually went to look at it. It's about joining stuff. To join in atoms together instead of splitting. And that's from I mean, I had heard of it before. But there was that sort of confusion with fission. So not huge amounts of understanding of fusion energy.” (Ardeer P1).

This confusion with nuclear fission can result in risks typically associated with fission; such as radioactive waste, meltdown potential, and long-term contamination, being incorrectly attributed to fusion. This misconception can significantly affect public support for fusion, particularly given the strong cultural and psychological responses that fission has historically provoked. As Slovic (1987) argues, nuclear fission is a “dread risk” for many members of the public, perceived as catastrophic, uncontrollable, and involuntary. These perceptions are deeply embedded in collective memory and cultural narratives, reinforced by historical events such as Chernobyl and Fukushima (Weart, 2012). Similarly, Parkhill et al. (2010) found that public responses to nuclear power often centre on ethical concerns, perceived injustice, and intergenerational risk. Zonabend’s (1993) ethnographic work further illustrates how the legacy of nuclear accidents continues to influence local perceptions of new technologies, often through narratives of mistrust and institutional failure. In this context, fusion energy may struggle to gain acceptance if it continues to be misunderstood and entangled with fission, despite its fundamentally different scientific and safety profile.

> “Well, the thing that comes to mind is Chernobyl. Yeah, and the, you know, big disasters like that. And the consequences of if something bad happened, if there was a nuclear explosion, because something failed, or, you know, something along those lines, I'm sure we've probably been using nuclear energy for decades. And I've not really thought about it, it's not been at the top of my mind, but then when somebody asks the questions, you know, how do I feel about it? Yeah, that's scary. Yeah.” (West Burton P9).

This participant highlights significant concerns with fusion technology, particularly STEP being built on their doorstep, however, these concerns are based on Chernobyl, which involved a nuclear fission disaster. This finding is supported by (Turcanu et al, 2020) who found when surveying the public that the most common mistake when describing fusion was confusing it with fission, with 21% of 365 respondents getting this wrong.

> “So I don't know enough about the procedure to know what the actual physical risks might be. Stuff that I've read says that it's safe. But I guess the people in the 1980s that lived in the Ukraine, so that they were living next to a safe nuclear efficient plant? So I don't know the answer to that. I'm not naive enough to think that there will be there would be no potential safety risk. But I am, I think reflective enough to understand that unless we're going to go back to heating water through burning, sustainable wood fuel. We need to do something.” (West Burton P6).

> “So the little bit that I read, its experimental right. It's experimental, it's integral. But there are always risks to new things. So, I think if those risks have been managed, yeah, sure, Then they are properly managed. I think a good example of that would be the what was it Three Mile Island? Yeah, yeah. All new nuclear thing. No one understood anything. Yeah. Yeah, things went wrong” (West Burton P10).

Both the above quotes again confuse fusion with fission, with each individual comparing fusion to a previous nuclear fission disaster. The first quote again references Chernobyl, however, suggests that living close to a potentially dangerous site is worth it in order to create more sustainable energy. This sentiment is supported through a study regarding nuclear fission,

which found that there is reluctant acceptance for nuclear where is it viewed as a solution to climate change (Pidgeon et al, 2008). The second quote highlights the experimental nature of STEP and compares this project to three-mile island, which was a nuclear fission accident in 1979 resulting in significant fear and psychological stress amongst people living locally to the plant (World Nuclear Association, 2022). These quotes therefore highlight the worries of local people, and how these are increased when fusion is confused with fission. This finding is supported through stakeholder interviews, with one stating.

> "Opposition was people heard nuclear and made assumptions about what that meant and didn't understand how fusion different from fission and that was, that was a strong voice." (West Burton Stakeholder).

This quote implies that the confusion between both power sources can lead to significant opposition through misconception. Participants, however, recognised the difficulty of understanding that fusion and fission are two separate technologies, to the point where solutions to overcome this issue were suggested. Participants suggested these changes as they initially misinterpreted the terms, proposing that public consultation should be held in order to help disperse the confusion and educate on the differing energy types.

> "I think that's the that's the thing if they did a public consultation to make people realise the difference between fusion and fission Yeah, it's got the word nuclear in it. They might misunderstand, and because I initially did". (West Burton P12).

This therefore suggests that participants believe that there should be further education and widespread information on the difference between nuclear fission and fusion energy, as there is significant confusion amongst publics. This confusion and misunderstanding can be understood by figuring out where public knowledge gaps lie, the following section will explore these knowledge gaps.

5.3.2. Knowledge Gaps

Participants were asked towards the end of the interview what aspects of fusion they did not understand, whether this is specific to STEP or in regard to fusion as a whole, in order to understand where the public knowledge gaps are.

One of the more common themes that arose within this section of the interview is the practicalities of the fusion power plant. Highlighted below are some of the questions that came up within this theme.

> "one of my questions is what kind of systems will be used to extract the energy to use it from the actual fusion process?" (West Burton P1).

> "What medium will use for the heat transfer and, for instance, like co2, as a heat transfer medium. Would you be using some of the gas would it be co2 Maybe. I'm aware, it's potentially going to be helium, right? Oh, yeah. Isn't there a shortage of helium?" (West Burton P7).

> "what drives the turbine and what makes electricity out of that? Does it produce heat?" (West Burton P10).

These technically detailed questions from West Burton participants highlight a deep curiosity and engagement with the technology itself. West Burton is a post-industrial area, therefore there is a high probability that participants have a direct or familial link to previous energy infrastructure. This industrial link generates a technical curiosity based on previous experiences or knowledge.

Another reoccurring question, shown below, was regarding the timeline for the development. Publics had little to no knowledge of what the fusion development actually involved regarding time. Also highlighted here is the question around how many people will be employed by the

development. Therefore, highlighting that publics would encourage further information on the logistics of the STEP project.

> "Yeah, so where's the timeline? How does it work? How many people are going to be employed and stuff like that" (West Burton P2).

> "just really, what's their timeframe of for development? Because obviously, the old site is still there. So, I'm guessing this isn't going to be it's not a short-term projects. A few years. I guess." (West Burton P4).

One important theme that was significant to publics is the impact on the environment. Occurring in almost every interview was a query around the environmental impact fusion can incur. Highlighted below are some of these questions that were asked, regarding environmental impact, waste and risks to environmental pollution. This suggests that publics would appreciate clear, honest information about how this technology can influence their surrounding area.

> "So I guess the key the key question I would ask about fusion would be, what exactly are the risks to environmental pollution? Would be one of the one of the questions. The the other one would be around how feasible it is to roll this out on a larger scale, so do the costs involved." (West Burton P8).

> "what about waste is there waste? Sort of like with fission, there's waste and started to be stored for hundreds of years. Is that what about fusion? Like, how does that work?" (Ardeer P2).

> "I think just what the by-products are and what sort of environmental damage would it be? I think that's a bad thing, because obviously it's not the same as Hunterston and I don't know whether it would be on a scale to that. And also, just how do you get rid of the waste?" (Ardeer P6).

It was highlighted by publics that they would like clear information on the pros and cons of this development and fusion in general. Suggesting that information regarding this is not reaching these publics, therefore wider discussion, education and clear communication is required.

> "probably be information about getting like pros and cons, you know, is are there any health risks and long term risks, you know, would there be anything that would, I suppose, you know, affect the local, I say the local area, kind of like wildlife, nature, water sources, all those kinds of good things that we see" (West Burton P15).

Overall, there was the continuous sentiment that all participants would appreciate more information regarding fusion generally, but also the process itself in terms of how fusion works, but also how the development will evolve. One stakeholder expressed surprise at how little knowledge existed regarding the technology.

> "It was surprising to me that there were people or organisations or bodies that I would have felt should have had more of a knowledge than they did. So. I think there is a huge requirement for education and information dissemination, about what fusion is and what it can do, and all the various kind of safety considerations and all these kind of things." (West Burton Stakeholder).

With this quote suggesting that there is also a lack of understanding of the technology amongst organisations as well as lay persons. It is therefore suggested that there is a significant need for education and information regarding fusion. This sentiment is echoed amongst a number of case study participants.

> "generally, more information and a little bit more detail about the process. Stop people getting wrong information. We've got all the emotion about wind turbines, which we've had locally, actually, in the past have been campaigns against wind turbines. Very emotional. We've got campaigns starting now about solar panels in the area. Not much time before somebody gets the wrong idea, and this could go political. Yeah. But I think there's a big it's a big job to get the message out and get it right." (West Burton P1).

This participant highlights how there has been previous controversy regarding wind turbines, it can be inferred from this quote that the participant believes this could have been avoided through thorough public consultation giving publics all the information they require. Also mentioned within this statement is the issue of solar panels. This will be explored further in the following section.

5.3.3. Lesser of Two Evils

Within West Burton there are a total of five solar farm projects, all at various stages of development. These solar farms propose to occupy a significant area of farmland within West Burton, if the four projects that have been fully proposed were to be approved, they would span 4142 hectares of farmland, which is the equivalent of 7700 football pitches (West Lindsey District Council, 2024). A number of interviewees highlighted the on-going local debate regarding solar farms. This issue was brought up multiple times throughout the interviews conducted stating that the local community are not happy about the prospect of these solar farms encroaching on the greenspace and taking land away from local farmers. Therefore, West Burton publics are more likely to support the fusion developments as this is the regeneration of an already industrial site, and in the hopes that this reduces the need for the solar farms locally. The comparison of fusion to solar farms uses the heuristic lesser of two evils, and comparative reasoning for publics to explain their knowledge and justify their support or opposition for particular energy developments.

> “So there’s a lot of controversy over Lincolnshire, in how much of our land is actually used for farmland. And I suppose having a nuclear plant would reduce the need for farmers to feel like they need to get their land up for solar plants and be able to continue farming their land, which would be great, especially around here, because it’s we are in the middle of the countryside here and to have a solar farm on your door step isn’t as nice as seeing a field full of crops or animals.” (West Burton P1).

This participant also describes the STEP fusion energy development as a nuclear plant, indicating that attempts by authorities to disassociate fusion from nuclear fission have not

succeeded. It was the view of some participants that fusion is being introduced now while others are preoccupied with the controversy regarding solar panels.

> “That there's been lots of discussion about whether the new solar panel farm that's supposed to be going around the West Burton site has been kind of wedged like the thin end of the wedge so that they can get the fusion in without having too much of the kind of logistics around it. And so we're in the middle of farm land here, and there's quite a lot of vocal opposition particularly to the solar farms. So the news media I've seen it's kind of been linked to to that kind of element of it.” (West Burton P3).

This participant highlights the distaste for the solar farm proposals, implying that it has been dominating both news and community conversations. Meaning those opposing the solar farms are more willing to accept fusion as the lesser of two evils, believing that if fusion is introduced then there is not the need for the solar farms. However, this is not the opinion held by all local people.

> “I haven't heard a lot of negative opinion about it. And I am about so I'm in the pub so I do hear what people are saying about things. I'm a bit I'm a bit sad that there's a lot of negative opinion about solar panels and stuff like that.” (West Burton P2).

This participant suggests that they have not heard any negativity towards the STEP development when in the community, but they have heard significant opposition to the proposed solar developments. This again suggests that the community is preoccupied opposing these solar farms to have an opinion over the redevelopment of the West Burton site. However, this interviewee proposes his upset regarding these opinions, suggesting that there is some support for the development of solar in the area.

5.3.4. Government Influence

One main transfer heuristic theme that occurred throughout the interviews is the communities' opinions regarding the Conservative government and their role in the proposal and approval of the STEP project.

> "One of the risks that I'd be interested in knowing more about is who's going to finance this? And where are the profits gonna go? Because linked to my political apathy, are my feelings that the current government basically allow themselves to, and other people that are linked to them to make large profits from effectively from the electorate, and both from people locally, and not locally. So so my thoughts would be that the government might well fund this from from Central taxation, and then take the profits or not put them into central taxation. So I would be, I would be against taking that risk. If that was going to be the case." (West Burton P6).

This participant highlights their mistrust for the government, leading them to believe that due to the government's involvement, the project will not benefit the local people. Suggesting that the government are only out to benefit themselves, profiting off this small community. This shows that the beliefs regarding the previous Conservative government have significantly impacted their trust in the project. The opinions of this current government appeared to have an impact over a number of participants opinions.

> "My opinion is like government carry out public consultation in order to make the public think that they've had a say. And I don't necessarily think that that opinion, holds true through all periods of time, but I just think that of the of the current government who appear to think that they can do what they want, when they want, and there are few, if any consequences to their actions." (West Burton P11).

Not only do participants show a lack of trust in government decision making, but it was also suggested that the government's stance on fossil fuels has had an impact.

> “The first time I heard about that reactor, it was our local MP Brendan Clarke - Smith, and obviously it was touted by Jacob Reese Mogg State Energy Secretary at the time. And they're both you know, very backwards people very focused on fossil fuels.” (West Burton P7).

This participant highlights that the involvement of both Sir Jacob Reese Mogg and Brendan Clarke-Smith has had an impact on their opinion. Suggesting that these two members of parliament have given support for fossil fuels, and therefore that casts uncertainty amongst local publics, particularly those who do not have extensive knowledge regarding fusion energy. Those who have limited knowledge of fusion may associate this technology with fossil fuels, due to the stances of those government officials involved, therefore decreasing support for the project.

When speaking with a council official in Scotland they highlighted that there is a mistrust of Westminster within Scotland, stating that “I'm thinking about Scotland in particular. People think if it's coming from Westminster, it's a bad idea automatically.” Suggesting that Scottish participants automatically disregard or avoid supporting any developments that are proposed by Westminster.

> “There’s a few people saying it's government funded and that's different. But there's been a nice legacy of EDF doing things in our community, like I say, with children at school and with community projects.” (West Burton P14).

The prior coal power station at West Burton was operated by EDF energy, a private company. This participant suggests that this organisation created community projects and involved local schools, providing a positive experience from the previous site. The participant emphasising that the Government is funding STEP and therefore it will be different, highlights that the participant does not have the same faith that the Government will continue benefitting the community in the same way EDF did. These opportunities, however, can only be provided if the project is achievable, this theme was considered by a number of interviewees and is discussed within the following section.

5.3.5. Achievability

The theme of achievability was considered by a number of participants, using a number of heuristics to understand how and if this project is attainable. One aspect of this is in relation to the emergent and revolutionary nature of this project.

> “You know, you're pushing the boundaries of engineering and everything so, so think locally. In terms of working in the UK or globally, it's obviously you know, it's just like trying to get this captured, this unicorn that is fusion power.” (Ardeer P4).

This participant illustrates the difficulty of harnessing fusion power, by comparing the technology to a unicorn. This highlights that publics believe the technology may be beyond the reach of modern science and may not actually be possible. If fusion is to be successful it will take a considerable number of years to conquer the technology and design, with STEP not estimated to be producing net electricity until after 2040.

> “I just I don't want to focus on that much too much because I feel like it's a distraction from getting what we need to get done. Done. We need we need green energy now. Not in potentially maybe 40 years time if it happens, and if it works.” (West Burton P13).

With fusion being at least 20 years from producing net electricity, some publics believe putting time and resources into this technology is a waste. The quote above suggests that green energy is required immediately, not relying on a technology to bring green energy in ’40 years’ with no guarantee that fusion will ever be possible. This therefore suggests that some publics would support more resources being given to implementing more green energy that is proven to work. One stakeholder in Scotland highlighted that the risk of investing in STEP is if this technology proves not viable then the money would go to waste, which could have been used elsewhere.

> “It’s a new technology, people don't really understand it. And the there'll be the, you know, there would be a risk that maybe it wouldn't work, and it wouldn't come to fruition, or the investment doesn't come through to enable the realisation of the overall project.” (Ardeer Stakeholder)

One participant highlighted that if it takes 20 years to understand whether fusion is a viable power source in the UK then discover that it is not viable, the energy and climate issues will be too far advanced with the efforts focused in the wrong area.

> "The other danger, I think it is that we put our eggs in the wrong basket. So, we rely on this in 20 years' time as an answer to solve our energy problems. And it doesn't work. And then we're stuffed." (West Burton P2).

This is supported by a different participant who echoed similar sentiments stating "what If they can't create net energy? Because otherwise they'll be burning fossil fuels and energy that could be utilised" (West Burton P5). Highlighting that if the experiment does not result in net energy being produced, then the years it had been running and testing for would have been wasting energy resources that could have been utilised elsewhere.

Some participants however did see the potential benefits, but were left unconvinced as to whether the project is to be successful. One participant stated "I see the benefits at some point in the future. Maybe if we get there" (West Burton P13). This highlights a distrust in the achievability of the projects with a number of comparisons and heuristics being used to generate these opinions.

5.3.6. Heuristics Summary

The heuristic-based findings reveal how participants relied on cognitive shortcuts to make sense of fusion energy as a complex, unfamiliar and technically opaque technology. In line with classic work on heuristics and bounded rationality, participants frequently drew upon readily available reference points – most notably nuclear fission – to interpret fusion's risks, safety and feasibility (Tversky and Kahneman, 1974). This resulted in the transfer of negative associations from nuclear accidents and radioactive waste to fusion, despite its fundamentally different physical and safety characteristics.

This fusion–fission comparison heuristic strongly echoes Pidgeon et al.'s (2008) work on nuclear risk perception, which demonstrates how public attitudes towards nuclear technologies are shaped less by technical detail and more by affective responses, symbolic meanings and historical memory. In this study, participants' difficulty in disentangling fusion from fission functioned as a powerful cognitive frame through which risk was socially constructed, reinforcing safety anxieties even in the absence of specific technical knowledge.

Beyond nuclear analogies, participants also employed heuristics of achievability, governmental competence and political trust to evaluate fusion's plausibility. Fusion was frequently framed as either an over-promised technological fantasy or a long-term gamble that would divert resources from proven renewables. These judgements align with Corner et al.'s (2010) concept of reluctant acceptance, in which publics express conditional support for low-carbon technologies while remaining sceptical about political delivery, institutional credibility and opportunity costs.

Importantly, these heuristics did not operate in isolation but interacted with place-based identities and broader political mistrust. For example, scepticism about government competence amplified doubts about fusion's achievability, while place-protective identities intensified safety concerns. This demonstrates that heuristics function not simply as individual cognitive shortcuts, but as socially embedded interpretive devices shaped by history, media framings and local experience.

Overall, the heuristic findings underscore that public attitudes towards fusion are not primarily the product of rational risk calculation, but of meaning-making processes that draw upon analogy, trust and symbolic association. By foregrounding these cognitive and social dynamics, the findings extend existing work on nuclear heuristics (Pidgeon et al., 2008) and reluctant acceptance (Corner et al., 2010), demonstrating how emergent technologies become cognitively 'anchored' to familiar risks and political narratives. This reinforces the need for engagement strategies that address not only information deficits but also the deeper symbolic and affective frames through which fusion is understood.

5.4. Chapter Summary

Overall, Chapter 5 outlines the key insights gathered from the fieldwork, which included public and stakeholder interviews, complemented by observations from community engagement events. This chapter is the first in-depth, qualitative exploration of UK publics and stakeholders' views on fusion energy, addressing a gap in the literature, which has previously relied on survey and European research. Thematic analysis of the interviews highlights several core issues, including the importance of meaningful public consultation (Devine-Wright, 2009), how publics perceive both the risks and benefits of fusion, and how broader concerns such as climate change and energy security influence levels of support (Qazi et al., 2019; Pidgeon et al., 2008).

The geographical and historical contexts of each case study played a notable role in shaping attitudes. In West Burton, a community with a long industrial history, participants expressed optimism towards repurposing the coal power station site, reflecting themes of place identity and industrial resilience (Milbourne, 2010; Lewicka, 2011). In contrast, participants in Ardeer, where the site was not selected, voiced concerns regarding potential environmental degradation and landscape change (Parkhill et al. 2014) alongside disappointment over the perceived loss of a unique economic and cultural opportunity for the region (Johnstone & Hielscher, 2017).

The findings also demonstrate how heuristics influence public attitudes, particularly the widespread confusion between fusion and nuclear fission. This confusion often reinforces negative associations with nuclear risks (Warren et al., 2005; Pidgeon et al., 2008). Additionally, the data reveal how local perceptions of fusion are shaped by wider distrust in government (Burningham et al., 2015), where scepticism towards national decision-making processes transfers into scepticism towards the STEP project itself.

While there is a general recognition of the potential benefits of fusion energy, particularly in contributing to climate change mitigation and energy security (Sovacool & Geels, 2021), these are often tempered by localised concerns and misunderstandings. Ultimately, these insights highlight the importance of addressing both place-based identities and public trust in future energy transitions, as well as the need for targeted, transparent communication to clarify the distinctions between fusion and fission technologies.

Chapter 6. Media Framing

The previous chapter explored the findings of the fieldwork section of this project, analysing the outputs of the interviews and community events. The aim of this chapter is to examine how nuclear fusion is currently being framed and narrated within UK national and local media, and what these representations reveal about how fusion is being contextualised, characterised and given meaning in wider public discourse. Rather than treating media coverage primarily as a mechanism that influences public opinion, the chapter approaches media as a cultural site of meaning-making in which dominant narratives, metaphors and imaginaries surrounding fusion are constructed, circulated and normalised. In doing so, it aligns with scholarship on mediatised science and sociotechnical imaginaries, which emphasises the role of media in shaping how emerging technologies are symbolically framed as objects of hope, progress, risk or uncertainty (Jasanoff and Kim, 2009; Bauer and Bucchi, 2017).

The analysis focuses on identifying the dominant discursive patterns through which fusion is represented in both national and local UK media, including recurring themes of safety, futurity, technological optimism and economic regeneration. Particular attention is paid to how these narratives construct fusion as a social, political and technological object, and how they position it as a seemingly unproblematic or inevitable solution to climate change and energy insecurity. This framing foregrounds the cultural work performed by media representations, rather than making strong causal claims about their direct effects on public attitudes.

By examining what meanings are made available, repeated and reinforced through media coverage, this chapter provides insight into the discursive environment in which publics encounter fusion for the first time. It therefore offers contextual understanding, rather than causal explanation, for the qualitative findings presented in later chapters, illuminating the symbolic resources that participants may draw upon, contest or reinterpret in forming their own views.

6.1. Key Findings

This section outlines the dominant themes highlighted throughout all the articles identified for the analysis, including both national media and local media, the process for which is outlined in Chapter 3, section 3.5. One of the interesting findings of this media analysis is the overwhelmingly positive and celebratory tone of fusion coverage across both national and local outlets. Fusion is consistently framed as a breakthrough technology, a climate solution and a symbol of scientific progress, with limited critical interrogation of risks, regulatory uncertainties or socio-environmental trade-offs. Unlike media debates surrounding other emerging technologies, where controversies, ethical concerns and political contestation are often foregrounded, fusion is presented in largely unproblematic and depoliticised terms. This lack of deeper critical debate is particularly notable given the first-of-a-kind nature of STEP and the unresolved questions surrounding waste management, regulation and long-term governance. The dominance of positive framings therefore constitutes an important empirical finding in its own right, revealing how fusion is currently being normalised as a desirable and inevitable future technology within UK public discourse.

6.1.1. Low Carbon Alternative

This theme was framed as when fission energy plants are referred to as having lower carbon emissions when compared to other energy production methods.

A number of articles just state that fusion is a low carbon form of energy production when introducing what fusion is. For Example, the South Wales Echo introduce fusion as a "Futuristic low carbon technology" (Seabrook, 2021. Pg.5). Therefore, the technology if unknown by the public is automatically associated by them as being low carbon, thus it is considered better for the environment than traditional fossil fuel technology.

Fusion is described as a future technology, with the UK Government (2021) stating that "UKAEA is the UK's national fusion energy laboratory – aiming to realise the huge potential of fusion as a way of generating carbon-free electricity in the future." This suggests that fusion is a technology

of the future as it is completely carbon free, helping to achieve net zero targets. It could therefore be inferred that without fusion a carbon free future may be more unattainable.

The claims of low power energy production are quantified to increase their impact on the reader, with the Mail Online stating that “Scientists estimate that one kilogram of fusion fuel can provide the same amount of energy as 10 million kilograms of fossil fuel” (Zolfagharifard, 2013). This helps publics reading to understand the scale of the lesser unknown energy source in comparison to more widely known and currently used fossil fuels. However, there is some discrepancy with the facts that are reported in the media with the Express Online stating that “Fusion power creates nearly four million times more energy for every kilogram of fuel than burning coal, oil or gas.” (Randall, 2022. P.1). This could cause confusion among publics with an uncertainty over which publications are printing correct facts, and which are taken out of context. However, they both highlight that the energy output of fusion energy is significantly more than fossil fuels, which ultimately should be the take away by publics.

6.1.2. Sustainability and Climate Change

This code was classified as when the sustainability of fusion is discussed in comparison to other energy production methods, for example the energy efficiency or environmental impact. In the context of this framework, sustainability is understood as the ability to meet present and future needs without depleting resources or causing long-term harm to the environment (Sutton, 2004), this is linked closely with mitigating climate change. Fusion is frequently framed as both a sustainable long term solution and as a technology with the potential to replace fossil fuels in the global energy mix.

George Freeman, Minister for Science, Research and Innovation, said:

> "Fusion energy has the potential to be a truly revolutionary and inexhaustible energy source that can help us reduce our dependence on unreliable fossil fuels and tackle climate change” (Cuff, 2021).

This frames fusion as a solution to the issues the world is facing with climate change, suggesting that fusion is the answer to replacing fossil fuels in the current energy mix. With the use of “inexhaustible” this suggests that the energy source will be viable indefinitely. This therefore links entirely with the definition of sustainability which states that the needs for the current generation should be met without compromising the ability of future generations to meet their own needs (UN, 2023).

Fusion is also framed as sustainable due to the nature of the fuels sources that are used to create energy. Again, the UK Government (2019) states that:

> “Nuclear fusion has huge potential as a long-term energy source that is environmentally responsible (with no carbon emissions) and inherently safe, with abundant and widespread fuel resources (the raw materials are found in seawater and the Earth's crust).”

Therefore, highlighting that all of the fuel needed for energy to be created via fusion can be found in abundance naturally, therefore they will not run out for future generations meaning they will be able to continue to generate energy from this source.

Further writing suggests the importance of fusion within the future energy mix, for example “With no greenhouse gas emissions and abundant fuels, fusion can be a safe and sustainable part of the world's future energy supply” (Gov, 2021). Thus, suggesting to publics that if achieved fusion could again form a solution to the current environmental challenges. This is further supported in other articles stating,

> “Successful fusion would provide humankind with a sustainable, carbon-free source of energy, helping the UK to meet its long-term climate change targets and reducing our dependence on unsustainable, polluting fossil fuels” (Greenwood, 2022).

This frames fusion in an immensely positive way, highlighting the technology as resolution to the issues facing the world, such as climate change, but while also stating that this could be a long-term solution beneficial for future generations to come.

Fusions sustainability is also highlighted by outlining the differences in pollution between fossil fuels and fusion energy. The i-Independent reports that “Unlike burning fossil fuels or the fission process of existing nuclear power plants, fusion offers the prospect of abundant energy without pollution, radioactive waste or greenhouse gases.” (Dunham, 2022. P. 43). This framing positions fusion as a clean and sustainable energy source, directly contrasting it with both fossil fuels and conventional nuclear fission. By highlighting the absence of harmful emissions, radioactive waste, and greenhouse gases, the article not only promotes fusion as a low-carbon technology but also as a solution to two of the most pressing concerns for publics: pollution and climate change (Nisbet, 2009). Such positive framing can play a role in shaping public perceptions, reinforcing the narrative that fusion is a progressive and environmentally responsible technology.

6.1.3. Fission Contrast and Heuristics

Both the fission contrast and fission heuristics codes explored the relationship between fission and fusion within the media. Fission contrast was referred to 57 times and was classified as when the differences between fission and fusion are outlined. Whereas fission heuristics was referenced 21 times and was classified as when fusion is compared to fission in a way that allows publics to understand fusion in terms of an idea that they already understand.

The majority of fission contrast references are in regard to fusion being described as safer than fission. For example, the Oxford Mail state that “Unlike nuclear fission reactors, fusion reactors also cannot have 'meltdowns' so are potentially safer.” (Oliver, 2017). This suggests to publics that fusion power stations are more reliable than fission reactors and therefore are safer to live around. This could cause publics to favour the development of fusion over fission.

Fusion is also compared to fission in reference to the waste generated from the plants. With the Express Online stating that:

> “Unlike nuclear fission, which is the method by which energy is generated by conventional nuclear power stations, fusion produces little nuclear waste, and releases three to four times more energy.” (McGrath, 2018).

This therefore suggests that not only is fusion safer than fission as there is less nuclear waste to manage, but also that fusion is better for the environment as there is less waste produced that cannot be disposed of.

The final themes amongst the contrast code is the involvement with the military. It is known that the UK nuclear industry has links with the military, with the development of civilian nuclear helping to fund the military nuclear programmes (Johnstone and Stirling, 2021). Therefore, the Telegraph states that “Unlike nuclear fission energy, fusion has not received military support because it could not obviously be used in a weapon.” (Bernal, 2019). This could cause division amongst publics depending on their personal position on the military. Those who are staunch supporters of the military may see the development of fusion as the military losing support and resources, thus being against fusion. Whereas those who are not supportive of the military may see the development of fusion as a welcome diversion of resources, helping to disentangle the military from the energy sector and thus would be more inclined to support the development of fusion.

The heuristics code, however, frames fusion alongside fission, as a way to help publics understand a concept that they may not be entirely familiar with by using a process such as fission that they understand. Again, however this can be phrased framing fusion as a positive such as the South Wales Echo stating that “Fusion technology is the opposite of how nuclear power plants currently work, with 'fission', where atoms are broken apart. Fusion is considered safer and cleaner than fission” (Seabrook, 2021). Whereas the Mail Online frame fission as the negative and insinuates danger with the association of weapons stating:

> “It merges atomic nuclei to create massive amounts of energy - the opposite of the fission process used in atomic weapons and nuclear power plants, which splits them into fragments.” (Tonkin, 2022).

This can therefore allow publics to understand fusion with it being the opposite of a process they may already be familiar with, but also introduces the fact that fusion is, according to these sources, a safer alternative to fission.

6.1.4. Technical Pessimism VS Optimism

Technical pessimism and optimism refer to contrasting framings of technological feasibility and progress in media and public discourse. Technical pessimism typically reflects doubt or scepticism about whether a technology can work as intended, often highlighting uncertainties, delays, or previous failures (Anderson, 2007). In contrast, technical optimism emphasises confidence in technological advancement, feasibility, and innovation as solutions to societal challenges (Bauer, 2002; Jasanoff, 2005). These framings have been widely explored in studies of public communication around emerging technologies, such as nuclear power, carbon capture, and artificial intelligence (Nisbet & Scheufele, 2009; Nerlich & McLeod, 2016). In energy contexts specifically, technical pessimism often aligns with narratives of risk, failure, or overpromising, whereas technical optimism tends to reinforce narratives of progress, solutionism, and inevitability (Anderson, 2007). These discourses shape public expectations and levels of trust in science and technology. In the context of fusion energy, where timelines and feasibility have historically been contested, the balance between technical pessimism and optimism is particularly significant.

Technical pessimism was significantly more common among the sample articles with 59 references compared to just 8 for technical optimism. Technical pessimism was classified as when the description of technical feasibility is framed pessimistically. Whereas technical optimism is when the description of technical feasibility is framed optimistically.

With significantly more technical pessimism references there is a variety of different aspects focused on by journalists. However, they all revolve around the fact that fusion has not been achieved. With Express Online stating that “Scientists have been toying with fusion energy since the Fifties and though many breakthroughs have been made, star power is still out of reach.” (Kettley, 2021). This suggests to publics that despite making advances over the past 70 years scientists are still far off from achieving fusion, which could encourage a lack of support

for developments. This is further supported by similar sentiments in the Huffington Post "Although the dream of fusion power has been pursued for decades, it has so far failed to live up to its promise" (Radowitz, 2014).

The Financial Times outlines the issues in achieving fusion and highlights the long running joke within the industry:

> "To this day, it has not been possible to produce more energy than the machine uses, and sceptics joke that commercial power will always be 20 years away. But some say this breakthrough - known as net positive energy - is much closer." (Wilson, 2021).

However, this also suggests that despite the issues in the past, that the science is. Much closer than it has been and therefore could encourage both excitement and intrigue among the publics.

The other area of technical pessimism is the justification for continuing with the science despite the difficulty that fusion has faced. With The Times stating:

> "However, critics have said there are still huge hurdles to overcome, and some experts believe that existing, proven renewable technologies offer a more economical and timely way of tackling climate change." (Horne, 2021).

This could influence publics suggesting that fusion is not necessary to address the issues of climate change and therefore money and time should not be put into this, with more resources being focused on other renewable energy. However, this article fails to mention that issue of energy security and demand and how fusion could be beneficial towards this.

Despite the lack of technical optimism throughout articles, there are still some significant claims made by the media that could influence the public. The Mail Online (Tonkin, 2021) states that:

> “Even though no such facility has yet been able to generate more energy than it takes to run, governments around the world are racing to build a commercial reactor in a bid to capitalise on what has been dubbed the 'holy grail' of green power.”

This suggests that despite the technology not reaching its target yet there is still significant optimism that it will. With it being described as the ‘holy grail’ of sustainable energy, it is suggesting to the publics that if successful this technology could be the answer to all issues facing the environment such as climate change.

The Herald states that “Using the same reactions that power the sun, fusing hydrogen atoms into helium promises an almost limitless supply of clean energy - if scientists can finally figure out a way to harness it.” (Simpson, 2021. P. 11). This suggest to publics that if the technology is successful and the science is figured out then this energy source would be both good for the environment and meet the increasing energy demands. This can therefore encourage support among publics through framing the potential of this technology optimistically.

6.1.5. Safe and Reliable

The code safe and reliable was classified as when fusion is discussed in terms of its safety and reliability. Fusion is often described in terms of its process and how this is the same reaction that occurs in the sun, with also including that the fuel sources are natural. For example, the financial times describes fusion as the:

> “[the] promise of an almost inexhaustible source of clean energy akin to natural processes occurring in the sun. Fusion fuel - produced from water and lithium - is in principle so abundant that fusion energy would be inexhaustible…” (Wilson, 2022).

This insinuates to publics that fusion is a natural process and with the use of the adjective ‘inexhaustible’, it suggests that the technology will be a reliable source of energy generation.

The majority of articles when describing the safety of fusion use adjectives such as inherent and intrinsically, suggesting to the public that the process if completely safe and reliable and to be supported:

> “an intrinsically safe technology and has the potential to provide a near-limitless source of secure, low carbon energy by copying the processes that power the sun and stars” (Hall, 2022).

Such framing not only emphasises the technological promise of fusion but also reassures the public by implying a level of reliability and stability that requires little scrutiny. This portrayal is further reinforced through the strategic inclusion of expert voices, which lend authority and credibility to safety claims. For instance, the Independent cites Iter's deputy director for safety, who states:

"A Fukushima-like accident is impossible at Iter because the fusion reaction is fundamentally safe. Any disturbance from ideal conditions and the reaction will stop. A runaway nuclear reaction and a core meltdown are simply not possible," (Connor, 2013).

This highlights to publics that there is no potential danger with living in a close proximity to a fusion site, like there is with fission. It also suggests that there is no possibility of a nuclear disaster with fission. These framings effectively minimise perceived proximity risks and make nearby communities more open to development (Slovic, 1987; Pidgeon et al., 2008 – as explored in Chapter 2, section 2.2.6).

6.1.6. Socio-Economic Positive

The final code that was popular among all the articles regardless of date or location of publication was ‘socio-economic positive’. This code was classified as when the national socio-economic benefits of fusion energy developments is discussed. The main benefits focused on by the majority of people when considering new energy technology are the environment, society and the economy. But when it comes to actually implementing

something, the economic benefit is the most important factor. The evening standard has a direct quote from Sir Jacob Rees-Mogg stating:

> “the fusion energy industry could be worth billions of pounds to the UK economy with the plant leading the way for the country to design, manufacture and export the first fleet of fusion plants around the world” (Lynch, 2022).

Perceived economic benefits are a powerful driver of public support for energy projects, particularly during times of financial strain. In the context of the 2023 cost-of-living crisis, framing fusion as a source of high-value jobs, skills development, and local investment can significantly bolster community buy-in (Cowell et al., 2011; Perlaviciute & Steg, 2014). Moreover, positioning the UK as an exporter of fusion technology and expertise not only underlines national economic opportunity but also taps into broader notions of technological leadership and soft power in global markets (Bergquist et al., 2020). It was also observed that articles state there would be significant benefits to society, specifically with the development of the STEP programme. Earl (2021) reports that:

> “The government believes that STEP can boost the country's science and technology capabilities, by creating thousands of highly skilled jobs during construction and operations, while also attracting other high-tech industries to its host region.”

This highlights to the public the benefits that could be seen and therefore encourages public support of the development by framing it in a positive light.

6.2. National media

This section explores the most prominent themes throughout the national media articles, and how this may influence publics views. The national media was analysed across 3 different timeframes: 01/01/2010 - 31/12/2014, 01/01/2015 – 31/12/2019 and 01/01/2020 – present (01/08/2022), as explained in Chapter 3, Section 3.5. It was observed that each of these timeframes had a dominant topic among the articles; 2010-2014 focused mainly on global experiments primarily in the US and China. Whereas 2015-2019 focused on Culham gaining investment from the government in 2019 to aid development, as well as the loss of funds from the European Union due to the UK leaving. Finally, the main theme observed from 2020-2022 is surrounding the breakthrough at the JET facility in the beginning of February 2022. Also mentioned is a breakthrough in a the less popular projectile method by First Light Fusion.

6.2.1. Scientific Language

A number of outlets use scientific language to increase the impact of their articles by explaining processes for the public. This code is classified as when procedural and technical aspects of fusion are documented.

Most of the national newspapers have described the fusion process in depth using scientific language. For example, the Mail Online states:

> “Nuclear fusion power works by colliding heavy hydrogen atoms to form helium, releasing vast amounts of energy, mimicking the process that occurs naturally in the centre of stars like our sun.” (Tonkin, 2022).

This describes the process and elements involved while relating it to a process that may be easier understood by publics reading the article. Whereas the Financial times extends this by discussing both the different methods of fusion that can be used as well as the fuel that is uses:

> “Although laser fusion is expensive "big science", it is vying for public investment with an even more expensive approach: magnetic fusion. This heats up the fusion fuel - two heavy isotopes of hydrogen: deuterium and tritium - inside a large doughnut-shaped reactor.” (Cookson, 2014).

By providing clear explanations of the fusion process, these media articles contribute to making a complex and highly technical subject more accessible to the general public. Relating fusion to familiar concepts, such as the sun's energy production, as seen in the Mail Online, simplifies the science and makes it more relatable to non-expert audiences. The Financial Times goes a step further by introducing distinctions between different fusion methods and fuel types, offering readers a broader understanding of the technological landscape. This use of scientific language can play a crucial role in shaping public engagement, as greater scientific literacy is linked to more informed and considered attitudes toward emerging technologies (Sturgis & Allum, 2004). By explaining fusion energy, these articles may help reduce misconceptions and create a more receptive public climate for fusion’s future development, contributing to more meaningful discussions about its place in the wider energy transition.

6.2.2. Global Impacts

This code refers to when fusion is linked with other global projects or has wider global interest in the development and was referenced 29 times among the sample.

There is global interest in developing fusion with the potential benefits that it could bring. However, those countries that achieve fusion first are able to distribute this globally with benefits. Brenan (2021) reports that “We are positioning the UK as a global leader in this power source." Therefore, suggesting to the public that the UK is closer to achieving fusion than other countries. The i-Independent also suggests that “It could also bring thousands of highly skilled jobs to the chosen area, with the UK's Atomic Energy Agency (AEA) touting it as a chance to build a "global hub" for fusion energy.” (Cuff, 2021. P. 21). Finally, Earl (2021) reports that “If successful, STEP could kickstart the commercialisation of fusion and the potential

development of a fleet of future plants around the world." This highlights that the STEP programme in the UK could be the start to fusion development and rollout globally.

This global framing positions fusion as more than just a scientific breakthrough; it is presented as an opportunity for the UK to lead within the emerging low-carbon energy sector. This idea of technological nationalism is consistent with literature on science, technology, and place identity, where nations frame themselves as leaders in major scientific projects to foster domestic pride and international prestige (Jasanoff & Kim, 2009). Additionally, Devine-Wright (2013) highlights how public support for energy infrastructure can be influenced by narratives that link local projects to broader national and global benefits. By connecting STEP to global ambitions and portraying the UK as a future hub for fusion, the media frames fusion as not only a solution to domestic energy and climate challenges, but as a pathway to international economic and scientific influence. This reinforces public perceptions of fusion as a forward-looking, globally relevant technology.

6.2.3. Energy Security

One Key theme introduced within chapter 5 (5.1.3) is energy security, it was clear to see that this theme was perceived as a significant positive impact of fusion. Energy security is referenced a total of 20 times throughout the articles and is classified as when it is described that fusion power can produce energy domestically that is easily accessible and does not need transportation.

Hodgson (2016. P. 50) reports that "Fusion could supersede both nuclear fission and coal, to provide the base load of electricity demand." This suggests that fusion could provide the basis of the energy mix with other renewables able to top up where needed. Meaning that there is always a constant supply of energy available. This is further supported by the Express Online which states:

> "Nuclear fusion, which experts say could generate almost "limitless clean energy", could play a huge role in helping Britain race to net zero, and could slash its reliance on foreign suppliers, which we have seen has caused bills to shoot up" (Paul, 2022).

Again, this shows the benefits of having fusion as a component in the countries energy supply as it would drastically reduce the need for importation of energy from across the globe.

The Mail Online further supports this reporting that “In a world with an ever-increasing demand for electricity and a deteriorating environment, fusion is considered the holy grail of energy and is what powers our sun, which burns at roughly 27million°F (15million°C).” (Tonkin, 2022). This describes fusion as the holy grail, suggesting that it is eagerly sought after as if achieved it could be an almost miraculous solution to the issues facing the planet in terms of both climate change and energy security.

This emphasis on fusion’s role in securing a stable, domestic energy supply reflects wider academic discussions on the intersection of energy security and public acceptance. As Sovacool (2013) argues, energy security is a core driver of public and political support for new energy technologies, particularly when it is linked to reducing reliance on volatile international energy markets. The media’s framing of fusion as a solution to both climate change and supply instability positions it as a crucial part of the UK's future energy mix. By presenting fusion as a dependable "base load" technology, complementing intermittent renewables, these narratives contribute to building a sense of fusion as not only technologically advanced but also vital for national resilience and long-term energy independence (Qazi et al., 2019).

6.2.4. Urgency Climate and Energy Security

Both energy security and climate change are becoming more prevalent therefore increasing the urgency around finding a solution, these codes refer to instances in which this is highlighted. Urgency around climate refers to when the urgency of investing and developing fusion in order to deal with the climate crisis is discussed, with this code being referenced 35 times. The energy security code follows the same classification, but developing fusion to help achieve energy security, and was referenced 5 times throughout the sample.

Urgency in regard to climate is stated in many articles with reference to the climate crisis and fusion being a solution. McConnell (2022) reports that “The proposed plant would be a world

leader, according to experts and would produce safe, clean energy to help fight climate change with thousands of jobs being created." Suggesting that fusion could be a solution to help in the climate crisis. This is further supported by Rice (2022) who reports "clear we must make significant changes to address the effects of climate change, and fusion offers so much potential." (Rice, 2022). This again highlights to publics that the climate crisis is at the forefront of scientific developments and that fusion would provide benefits in helping to combat this.

Urgency is also used within the sample articles in regard to energy security as this is another significant issue facing the planet that requires innovative solutions. The Express Online reports that "Scientists are currently trying to develop the world's first nuclear fusion reactor to create a clean and renewable power source to solve the world's energy crisis." (Austin, 2018). This suggests that fusion is being developed for the sole purpose of solving the energy crisis. This highlights to publics that there are significant benefits to the planet and the country economically if a development is successful.

The framing of fusion as a response to both the climate crisis and global energy insecurity reflects what Sovacool and Geels (2021) describe as the growing use of crisis narratives in shaping public and policy agendas for energy transitions. By linking fusion to urgent global challenges, such as climate change and energy shortages, the media amplifies the perceived necessity and legitimacy of investing in fusion technology. This urgency frame not only positions fusion as a solution to environmental and geopolitical risks but also contributes to building public support by framing fusion as a technology that is both timely and essential in the face of increasing global pressures (Devine-Wright, 2013).

6.3. Local Media Pre STEP Site Being Chosen

This section explores the most prominent themes throughout the local media articles before the STEP location site was chosen, and how these themes may influence publics views.

6.3.1. Positive Local Impacts

The most popular code throughout the local media sample was positive local impacts. This code is classified as when the positive local impacts fusion will bring to an area is discussed such as jobs. This code was referenced a total of 116 times throughout the sample.

One of the most repeated positive local impacts of fusion energy coming to an area among the articles is the addition of jobs to the local economy. Hamilton (2021) reports for the Ardrossan Herald that "The Three Towns could potentially be set for a STEP fusion power plant which could bring over 500 new jobs to the area.". Beyond just jobs, this development would have indirect economic benefits as increased local employment drives up local spending benefitting local businesses and potentially causing a ripple effect stimulating the entire economy (Jacobs et al, 2010).

However, Steele (2022) reports for the Greenock Telegraph that "The proposed development, on a former industrial site, could deliver around 3,500 skilled jobs during the construction phase and up to 1,000 engineers, technicians and support staff once the plant is operational." This is reporting on the same potential development of STEP in Ardeer, with drastically different statistics on potential jobs. This can therefore cause distrust among readers of what impact the development will actually have within the area. This article also highlights the need for skilled and engineer jobs, this could indicate that qualified workers may be moved into the area rather than local people being given the opportunity. Therefore, potentially causing local people to not support the development.

Kay Cutts MBE leader of the Nottingham County council said for the Gainsborough Standard:

> "Generations to come would benefit from new skills, training and thousands of highly skilled jobs, attracting investment and bringing massive benefits to our regional economy, not to mention lucrative opportunities for the local supply chain to help construct the plant." (Marriott, 2021).

This therefore suggests that the development will bring with it training programmes so that local people within the area can get qualifications to become skilled workers within the

development. This can encourage support within the local community by highlighting the potential opportunities this would bring.

This focus on local economic benefits reflects wider research on public attitudes towards energy infrastructure, where job creation and economic regeneration are key drivers of community support (Cowell et al., 2011; Gross, 2007). While estimates for local jobs vary across media outlets, potentially fuelling scepticism and mistrust, the broader narrative of economic opportunity is used to frame fusion as a catalyst for local development. As Devine-Wright (2013) highlights, local support is often contingent on whether communities feel that they will directly benefit from large-scale projects. The inclusion of training and skills development in this frame strengthens the idea of fusion as a long-term investment in the local community, helping to alleviate some of the negative associations linked to previous periods of industrial decline.

6.3.2. Negative Local Impacts

However, the opposite of the previous code was referenced significantly less at just 3 across the whole sample. This code was classified as when the negative impacts fusion would bring to a local community are discussed.

An Ayrshire CND spokesperson for the daily record said, “People who don't want to live near a nuclear power station or want to be able to continue using Ardeer for leisure oppose it” (McConnell, 2022). This suggests to publics reading the article that if the development is to go ahead then there will be no provisions made for those who use the area recreationally. Thus, encouraging those in the local area to not give their support for the plans. This article also references nuclear, which is traditionally not supported in Scotland, not providing any distinction between fusion energy and nuclear fission.

McGowan (2021) for the daily records reports that “Historic Ayr hotel to be demolished and turned into flats if plans are approved”. Therefore, suggesting to publics that the local area will be altered losing local amenities such as hotels if the development is to go ahead. The use of

the word historic also suggests that the local site is being altered with local important buildings being demolished. However, this could be observed by some in the local area as positive with the current housing crisis.

The limited coverage of negative local impacts reflects a wider trend identified by Batel and Devine-Wright (2015), who argue that opposition to energy developments is often underrepresented or simplified in media narratives. When negative impacts are mentioned, they focus on disruptions to local amenities, recreational spaces, or place identity, as observed within the local media analysis. The lack of clear distinction between fusion and fission in some reporting also risks reinforcing public misconceptions and amplifying opposition based on historical anti-nuclear sentiment, particularly in contexts like Scotland where nuclear power has faced stronger resistance (Cotton, 2017). This suggests that while positive economic narratives dominate, underlying local concerns around identity, land use, and misinformation remain important.

6.3.3. Opposition Justification

With the number of negative responses to the proposed STEP site the opposition justification code refers to when publics give their justifications for opposing fusion developments and was referenced 11 times throughout the sample.

Grayston (2022) reports for the Herald:

> "The respected nuclear free local authority's organisation which includes Scottish councils such as Glasgow, Edinburgh, Dundee and East Ayrshire are opposed to nuclear fusion, labelling it a distraction from the need to continue developing renewable energy sources."

This generates mistrust and lack of support among the public by highlighting that their government will not support the development, therefore suggesting that if they support the government, then they should not provide their support too. This also suggests that more focus

should be placed on renewable energy sources, differentiating this from fusion. This suggests to publics that fusion is not a renewable energy source. The Sunday Herald is another outlet stating that the focus should be solely on fusion and that there should be “no diversion via nuclear” (Lucas, 2010. P.5), again suggesting that fusion energy is a distraction from renewable energy developments and therefore should not be supported.

Further reference to fusion in comparison with other renewable energy sources comes from The National, stating that fusion “is an expensive form of energy compared to many renewable resources and, increasingly, wind energy and nobody’s ever yet worked out what to do with the waste from nuclear energy” (Morrison, 2022). This also makes reference to an environmental and safety point of view stating that the issue of nuclear waste has not been solved and therefore suggests that fusion is not as good environmentally as other renewable sources. This can cause a lack of support among publics.

Further reference to safety is by The Scottish Campaign for Nuclear Disarmament (CND) who has been quoted by The National stating that fusion is the “latest effort to extol the virtues of nuclear fusion as a "low carbon" source of energy is to keep the industry "alive" due to the UK being a "nuclear weapon state" (Mason, 2021). This links fusion with nuclear weapons, suggesting that the technology will help in the weapon production. This can lead to both fear and mistrust among publics and thus decrease support for new developments.

One of the final themes of opposition justification is outlined in The National, with further links with technical pessimism stating:

> “Fusion, which creates energy by forcing atoms together, is considered to be both cleaner and safer but has so far proved extremely difficult to harness. Even a prototype is expected to involve high construction and operational costs.” (Spowart, 2021).

This highlights the difficulty of generating energy via fusion, this can cause scepticism among the public. This also highlights the high costs of fusion energy, this combined with the framing of fusion as being hard to achieve can cause publics to reduce their support for new fusion developments.

This pattern of opposition reflects what Wolsink (2007) describes as the intersection of technological scepticism and perceived procedural injustice, where publics are more likely to resist developments, they feel are imposed without alignment to local or national priorities, such as a preference for renewables. The association of fusion with nuclear weapons or traditional nuclear waste issues, as highlighted in these articles, also demonstrates the persistence of negative nuclear heuristics, where publics conflate fusion with the risks historically linked to fission. Additionally, these narratives contribute to what Batel and Devine-Wright (2015) term discourses of resistance, where concerns around safety, cost, and energy policy priorities shape public opposition. Together, these framings reveal that opposition is not purely based on a rejection of fusion's technical aspects, but also on wider socio-political and environmental concerns.

6.3.4. Future Generations

Fusion is referenced to largely as an energy source of the future therefore the future generations code refers to when fusion is framed as a way to protect the planet and produce energy for generations to come. This code was referenced 46 times throughout the sample.

Cavanagh (2020) reports for the News and Star that "Nuclear fusion is believed to be the next generation of clean energy production." This suggests to publics that fusion is the energy of the future being able to address the current dilemmas of climate change. This therefore encourages support among publics. This is further supported by an article in The National that states "researchers say it is a power worth striving for, with one expert saying it is a source of energy that "helps protect the planet for future generations". (Massey, 2022. P.5). This therefore suggests that fusion will help to preserve the planet, through its low carbon energy source. This fosters acceptance among publics as most wish to protect the planet.

"If successful, a prototype of the fusion reactor, which Professor Stephen Hawking has called "the key to the future" could be housed at Moorside; along with the Small Modular Reactors

that are already in the works. "This is right at the cutting edge of green energy" said deputy chairman of Copeland Borough Council David Moore." (Cavanagh, 2021).

This not only quotes an incredibly well-respected physicist, Stephen Hawking, it presents fusion as being a vital development. "Key to the future" implies that fusion is crucial for future success, pairing this with "cutting edge of green technology" therefore insinuating that fusion is essential for success in creating efficient green energy generation. This implies to readers that fusion is therefore needed to improve the lives of future generations. This development for future generations is currently in the hands of the government as they are developing the first fusion prototype in the UK. How the involvement of the government is framed within the media will be explored in the following section.

The framing of fusion as a technology for future generations reflects what Jasanoff and Kim (2009) describe as sociotechnical imaginaries, where visions of national progress and environmental stewardship are tied to the development of cutting-edge technologies. These frames help to foster legitimacy and support by including fusion within a broader moral discourse of protecting future generations, a theme frequently associated with public acceptance of low-carbon technologies (Devine-Wright, 2013).

6.3.5. Government Influence

With the biggest fusion development in the UK being STEP, there is a huge influence from the government as they are the main funders. Therefore, the government influence code refers to when the involvement of the government influences the publics opinions of fusion, with this being referenced a total of 35 times.

Richards (2022) reports in The National:

> "The UK Government is eager to promote nuclear fusion as a new form of nuclear energy, but the Scottish Government has previously confirmed that it does not support the building of any new nuclear power stations in Scotland." (Richards, 2022).

This highlights the arguments between Westminster and the Scottish Government. This can therefore influence publics as if they have a strong affiliation to one of the political parties then they can be influenced to adopt the same stance on fusion energy. This is further supported by Declan Driver a professor in plasma physics at Glasgow University who stated in the Scotsman that “the Scottish Government's antinuclear stance could accidentally jeopardise the proposals.” (Grant, 2022).

The government can also impact public opinion more indirectly. McConnell (2022) reports in the Daily Record that “People who don't want to live near a nuclear power station ... oppose it along with those who don't want Westminster to decide what happens.” This highlights the hostility among the Scottish public regarding the influence Westminster can have over their local area.

This connection between government influence and public attitudes reflects Devine-Wright’s (2011) argument that energy developments are often politicised, with local acceptance shaped by wider political identities and relationships with governance structures. In this case, the tension between Westminster and the Scottish Government introduces a layer of political contestation, where public attitudes towards fusion may be filtered through broader views on national autonomy and trust in central government (Bomberg & McEwen, 2012). Such dynamics highlight that perceptions of energy infrastructure are not solely driven by technological or environmental concerns but are also influenced by issues of governance.

6.3.6. Safety Risks

Referenced a total of 9 times the safety risk code is classified as where the safety of fusion is discussed in terms of the potential risks a plant may cause.

Safety is one of the most relevant issues when talking about traditional nuclear energy, this translates over to fusion energy while comparing and contrasting. Spowart (2021) reports in The National:

> "It is an entirely untested process and will not, even with the best of outcomes, be able to contribute to emission reduction before it is too late. There remain huge worries around safety, the production of nuclear waste and the potential link to nuclear weapon production." (Spowart, 2021).

This suggests fusion is dangerous in multiple ways, from damaging the atmosphere to injuring humans. Highlighting the uncertainty around fusion fuels the thoughts of fusion not being possible, this also highlights whether fusion is worth the time over traditional renewable energy.

This is further supported by Day-Parker (2021) in the Gazette Standard reporting that "fusion produces radioactive waste which must be managed for the long term, and claims fusion is still at the experimental stage, as a complex technology that carries dangers of radioactive emissions, accidents and proliferation" (Day-Parker, 2021). Again, this portrays fusion as a dangerous energy source and therefore influence publics not to support any future developments citing safety concerns.

These narratives also reflect Parkhill et al.'s (2013) work, which highlights how public perceptions of emerging energy technologies are deeply influenced by social, cultural, and emotional responses to risk, particularly in relation to nuclear technologies. By framing fusion alongside traditional nuclear concerns, such as radioactive waste, accidents, and proliferation, these articles reinforce existing fears and uncertainties, shaping scepticism towards fusion. This is supported by Pidgeon et al. (2008) who states publics tend to focus on worst-case scenarios when technologies are associated with high-stakes, unfamiliar risks. Without clear communication to separate fusion from fission in the public discourse, these safety concerns could continue to undermine support for fusion developments.

6.3.7. Environmental Risks

Alongside the perceived safety risks, a number of environmental concerns were raised. Of the media that was analysed, these environmental concerns were raised exclusively within the Scottish media. One of the major environmental impacts raised was in relation to the proposed location of the STEP project, with one article highlighting “Ardeer borders on the Bogside Flats site of special scientific interest (SSSI), a part of which is also an RSPB reserve.” (Richards, 2022). The proposed building within this location could present significant disruption to these otherwise peaceful and protected areas. Despite this the local government stated that he had assurances that there would be no disruption to these sites being quoted saying “I also welcomed the assurance that there would be no compromise to the Environmental Sites nearby.” (Hamilton, 2021). Therefore, those proposing and approving the development suggest they do not believe that any significant disruption will be inflicted upon the local protected sites.

However, there are concerns not just with the disruption to local sites, but also in the process of producing energy from the fusion site:

> “It may be low carbon at the point of generation but not in terms of uranium mining or all the efforts that go into producing these plants and then you have this terrible legacy of waste.” (Mason, 2021)

This suggests that the construction of this plant will have significant environmental impacts, and that the process of gaining the fuel needed to run will also have similar impacts. Therefore, framing fusion negatively in terms of waste, suggesting this will have significant negative impacts. This article also contains quotes from an independent consultation regarding fusion:

> “Dr Ian Fairlie, an independent consultant with experience in radiation and radioactivity dating back until at least the Chernobyl accident in 1986, has written about the waste issues around nuclear fusion with particular reference to the Step reactor. Dr Fairlie states that - if they are ever introduced - fusion reactors would routinely release radiation into the atmosphere via cooling water for the reactor which would "contaminate all areas downwind and downstream."." (Mason, 2021)

This consultant raises concerns regarding radiation contamination, suggesting that fusion can release radiation into the atmosphere and also into the water systems. This idea is not suggested within any other articles, with the majority framing fusion as safe with very little waste. The suggestion of radiation being released into the atmosphere can raise significant concerns amongst publics, viewing this project as having significant environmental impacts.

These concerns reflect what Parkhill et al. (2013) describe as place-based risk perceptions, where environmental objections are often shaped by the specific ecological and cultural significance of the local landscape. The focus on disruption to protected areas, such as the SSSI and RSPB reserve, aligns with Devine-Wright's (2009) notion of place attachment, where developments are resisted due to perceived threats to valued local environments. The fact that such environmental concerns are raised predominantly in Scottish media also points to a regional sensitivity around land use and conservation, particularly in areas where landscapes are highly valued and protected.

6.4. Local Media Post the STEP Site Being Chosen

This section explores the most prominent themes throughout the local media articles after the STEP location site was chosen, and how these themes may influence publics views.

6.4.1. Chosen Site

Logically the chosen STEP site is referenced a significant number of times throughout the sample, with 36 references. This code is classified as where the chosen site of Nottingham is discussed.

Where the chosen site was referenced throughout the sample it was always framed positively. Ben Bradley of Nottingham County Council said for the Newark Advertiser (2021):

> "This is a huge opportunity for us, not least in terms of the narrative of North Nottinghamshire powering the country with our coal mines in the past and being able to do that in the future with this carbon-free source."

This suggests to local readers that fusion is a way to modernise the power generation in the area in a positive way for the environment. This fosters acceptance among publics by highlighting the importance of Nottingham in the UK energy mix suggesting the country is reliant on the power created.

Also highlighted within this code is the benefits to Nottingham that will be brought through the development. Tom Greatrex of the Nuclear Industry Association trade body said for the West Bridgford Wire (2022):

> "This is a huge moment for fusion energy in the UK. The STEP project will bring real benefits, including good jobs, opportunities for local companies and an ambition to drive skills and investment in the community."

This highlights to local publics that the development will bring direct benefits to the local community, implying that further opportunities for jobs and career development will be a positive by product. This can therefore foster importance among publics as they are able to observe the direct impacts that may be beneficial to their family.

6.4.2. Unsuccessful Site – Disappointment

As the local sites put a significant amount of time, effort and resources into their bids, there is understandably a level despondency among the other sites. This code is referenced as when an associate or resident of a site shows disappointment that they were not chosen to host the new STEP site. With a total of 20 references throughout the sample.

This code was diverse through the sample and requires deduction to understand the disappointment among the local site. The chairman of the Cumbria Local Enterprise Partnership states for the News and Star (2022) that "He added that hosting the experimental technology in West Cumbria would have brought long term transformation to the area as well as an economic boost." This highlights what the area has lost out on with the site not being chosen as the host, showing the loss of economic development, the areas could have experienced. This also outlines that the areas will be losing out on transformation to the area suggesting that they will require this from somewhere else now.

This is further supported by The Herald (2022) reporting:

> "STEP was predicted to directly attract more than 4,500 jobs to Ardeer and hundreds of millions of pounds of investment, and the bid drew widespread support from across Scottish businesses, as well as local communities."

Therefore, highlighting what the local area is losing out on by losing the bid. It also highlights that the thousands of jobs will no longer be brought to the area and therefore other new developments will have to be considered to provide employment opportunities for future generations.

This sense of disappointment reflects broader themes found in place-based research, where communities see large infrastructure projects not just as economic drivers but as opportunities for regeneration (Lewicka, 2011). The language around transformation and job creation underscores the deep connection between local aspirations and major developments like STEP. The loss of such projects can contribute to what Milbourne (2010) describes as continued feelings of marginalisation and being left behind, particularly in regions that have already experienced economic decline. This disappointment is therefore more than just economic, it is tied to hopes of long-term regeneration.

6.4.3. Unsuccessful Site – Positive

The final code in relation to the post STEP site decision sample is classified as where there is mention of residents or associates at unsuccessful STEP sites being happy that they were not chosen. This code was referenced 7 times within the sample.

Mark Ruskell the party energy spokesperson for Scottish greens said for The National (2022) that “The climate emergency is happening all around us, we don't have time to waste by pouring billions of pounds of public money into unproven technology.” Suggesting that the focus should be on renewable energy and that the development of fusion energy is a waste of money. This also suggests that huge amounts of public money is being used and “wasted” in the development of fusion, this fosters unacceptance and potentially anger among publics and therefore limits support for future fusion developments.

Russell (2022) also states:

> “Fusion may have a role in the future, but there is a long way to go before we will know if it is safe or viable. We cannot pin our hopes for decarbonising our economy on technology that is still years away.”

This again suggests that fusion is a “waste” of resources, inferring that fusion is potentially years away it is not worth investing in now. This can encourage publics to believe investment belongs elsewhere in other renewable energy sources and therefore can reduce support for fusion energy.

This theme reflects broader scepticism found in the literature regarding technological deferral, where critics argue that focusing on future or uncertain technologies can delay immediate action on urgent issues such as climate change (Sovacool & Geels, 2021). The framing of fusion as a "distraction" or misuse of public funds reinforces the idea proven renewable technologies should be prioritised, aligning with wider debates on how public trust and acceptance are shaped by perceptions of technological readiness and policy priorities (Wolsink, 2007). This frame highlights the idea that investment in fusion is seen as coming at the expense of more immediate solutions, outlining how this can influence public acceptability.

6.5. Sentiment Analysis

This section is a sentiment analysis exploring the emotions in the language used by the media and how this could affect publics views of fusion energy technology.

6.5.1. Positive Emotive Language

The code of positive emotive language is defined as when adjectives and metaphors are used to describe fusion positively and appeared 37 times throughout the articles. The use of emotive language is a known media technique and is regarded as necessary in order to influence readers perception of news stories (Ouayed, 1990). This therefore suggests that the use of emotive language can have a significant influence over public opinion of fusion energy. Within the media there is significant use of emotive language when discussing fusion.

> "Nuclear fusion is the process that powers the stars in our universe. If scientists are able to re-create this process on Earth, it would be game-changing for sustainability and might even make net zero look like a walk in the park." (Paul, 2022).

This quote describes fusion as game changing, suggesting that it could be the answer to reducing the countries emissions by making net zero "look like a walk in the park" (Paul, 2022). Net zero is known amongst publics as being an extremely difficult task to achieve, therefore framing fusion as a technology to make this easy, could significantly impact public opinion of the technology.

> "A fuel with no greenhouse emissions or radioactive waste that is almost unlimited, sounds too good to be true. But scientists have taken one more step to make fusion power useful and affordable." (Mail Online, 2014).

This quote frames fusion as being too good to be true but then follows this up by suggesting that developments are moving in the right direction. This suggests to publics that the benefits of this technology are beyond belief; however, they may be achievable now. Therefore,

expressing forcefully to readers just how good this technology could be. This sentiment was reiterated through numerous articles:

> “Fusion is a potentially world changing energy source that could help sustain the low carbon economies of the future.” (Hawley, 2021).

Using language such as world changing suggests that fusion energy could change the energy sector globally, highlighting also that this could have significant impacts on the future. This could increase public support for fusion energy and encourage publics to feel strongly about the potential benefits it could bring. Fusion is framed within the media as being a solution to climate change and sustainability issues, which encourages publics from all generations to put their support within this project.

The use of positive emotive language in media coverage of fusion energy serves to amplify its perceived value and potential, shaping public perceptions through compelling and optimistic narratives. As highlighted by Ouayed (1990), emotive language is a deliberate media strategy used to influence reader engagement and opinion. By describing fusion as "game-changing" or "world changing," and by framing its benefits as almost "too good to be true," the media constructs a powerful aspirational image of fusion that appeals to hope, progress, and global impact. This kind of sentiment framing aligns with Gamson and Modigliani’s (1989) concept of media framing, where language choices guide audiences on how to interpret and emotionally respond to an issue. Through this language, fusion is not only positioned as a scientific achievement but also as a transformative solution to climate and energy challenges, encouraging stronger public support by appealing to both logic and emotion.

6.5.2. Negative Emotive Language

The code of negative emotive language is defined as when adjectives and metaphors are used to describe fusion negatively and appeared 28 times throughout the articles. The use of negative language within the media can result in publics having strong negative emotions towards the

described technologies. These negative emotions held by publics can significantly influence the support given to fusion energy projects (Cass and Walker, 2009).

> "Conceivably nuclear fusion or some other futuristic energy-providing technology might someday save humankind, but relying on nuclear fusion coming to the rescue is a dangerously absurd way of thinking." (Walker, 2016).

Describing the investment and focus on fusion energy as dangerous and absurd can evoke distinct emotional responses within readers. This is encouraging publics not to give their support for the technology and could result in publics having a preference for other energy technologies.

> "UK ministers have been criticised for pouring billions of pounds of public money into unproven technology but pressed ahead with nuclear fusion investment." (Bol, 2022).

This quote pairs the fact that fusion is an 'unproven' technology with government spending, therefore makes the government look incompetent and brings fusion down into this debate. Highlighting the cost of the technology can evoke strong opinions amongst publics and therefore result in a lack of trust with government involvement and of the technology itself (Van der Horst, 2007).

> "The same process enables stars to shine and in a less controlled way provides the destructive force of H-bombs." (Belfast Telegraph, 2017)

Comparing fusion energy to hydrogen bombs, despite the suggestion it is a more controlled version, can instil fear and distrust amongst readers. This relates to the risks associated with fusion and can be compared with the interviews where some participants had concerns about the STEP project 'blowing up'. This means that some publics fears can be reinforced by the media, which can result in those individuals with slight concerns becoming an opposition to the technology (Happer and Philo, 2013).

The use of negative emotive language reinforces narratives of fear, uncertainty, and distrust, which can heavily influence public opposition to fusion energy. Such language evokes strong affective responses that may shape perceptions of risk and scepticism, particularly when linked to broader concerns such as public spending or associations with nuclear weapons. This aligns with research by Cass and Walker (2009), who highlight how emotional narratives in the media can foster opposition to energy developments, while Happer and Philo (2013) emphasise that repeated exposure to negative framings can solidify fears within public consciousness. As Van der Horst (2007) also suggests, when technological uncertainty is paired with wider mistrust in decision-makers, it can deepen public resistance. Ultimately, this demonstrates how negative media portrayals can act as a barrier to public acceptance by framing fusion as risky, wasteful, or even dangerous.

6.6. Fusion, Media and Sociotechnical Imaginaries

The representational patterns identified in this chapter can be productively interpreted through the lens of sociotechnical imaginaries, understood as collectively held visions of desirable futures that are animated by, and in turn shape, technological development (Jasanoff and Kim, 2009). UK media coverage of fusion consistently constructs it as a future solution to climate change and energy insecurity, embedding it within a broader narrative of technological progress, national scientific leadership and economic regeneration. These framings support what Felt and Wynne (2007) describe as visions of scientific futures, in which emerging technologies are symbolically positioned as instruments of societal salvation, while uncertainties, risks and socio-political complexities are rendered peripheral.

Drawing on Gamson and Modigliani's (1989) concept of media packages, fusion is assembled through recurring cultural resonances, metaphors and interpretive frames that collectively stabilise its meaning as safe, clean and forward-looking. These packages do not simply describe fusion but actively constitute it as a particular kind of object within public discourse: one that appears technologically inevitable, politically uncontroversial and morally aligned with climate action (ibid.). In doing so, they contribute to a techno-optimistic imaginary in

which fusion is normalised as a solution rather than interrogated as a contested sociotechnical project.

This representational configuration contrasts sharply with media coverage of other emerging technologies, such as genetically modified crops, artificial intelligence and nanotechnology, which has often been characterised by polarisation, ethical debate and heightened attention to uncertainty and risk (Anderson et al., 2005; Nerlich and Halliday, 2007; Cave et al., 2019; Jones, 2023). The relative absence of such contestation in fusion coverage is therefore significant, suggesting that fusion currently occupies a privileged symbolic position within UK media imaginaries of progress and sustainability.

6.7. Chapter 6 Summary

Chapter 6 explores how fusion energy is framed within UK media, both at the national level and within local media surrounding the proposed STEP sites. Rather than seeking to determine how media coverage influences public opinion directly, the chapter examines media as a cultural and discursive space in which fusion is narrated, contextualised and given meaning at this moment in time. The analysis reveals that, similarly to the interviews in Chapter 5, key media narratives frequently emphasise fusion's potential contribution to energy security and climate change mitigation. National media commonly frame fusion as an inexhaustible and innovative energy source, positioning it as a key solution for a sustainable future and reinforcing its perceived role in meeting long-term energy and environmental goals (Sovacool & Geels, 2021). This repeated emphasis on fusion as "clean", "limitless" and future-oriented contributes to an overwhelmingly positive and techno-optimistic discourse, within which uncertainty and socio-political complexity are largely marginalised.

A key finding was the frequent reliance on publics' pre-existing knowledge of nuclear fission as a way to explain fusion energy, simplifying complex scientific processes by using familiar nuclear references. While this representational strategy renders fusion more intelligible within media narratives, this approach risks reinforcing confusion between fusion and fission, which

aligns with the confusion observed in interview data presented in Chapter 5. This supports previous research by Pidgeon et al. (2008), who suggest that public perceptions of nuclear-related technologies are often shaped by conflated risk narratives due to a lack of clear distinction between different forms of nuclear energy. In this context, media coverage plays a role in stabilising particular interpretive frames through which fusion is understood, rather than resolving ambiguity.

At the local level, media narratives largely focus on the economic benefits of hosting the STEP project, particularly in terms of job creation and economic regeneration, echoing themes of place-based opportunity (Devine-Wright, 2013; Gross, 2007). These narratives construct fusion as a mechanism for local renewal and progress, while local media also presented concerns around potential negative impacts, such as disruption to valued landscapes and local infrastructure. However, such concerns were typically less sustained and less prominent than celebratory narratives, contrasting the more accepting views reported by publics at the selected West Burton site in Chapter 5. These findings highlight how place-based meanings are selectively mobilised within media discourse, as discussed by Parkhill et al. (2010; Parkhill et al. 2013), where landscape change and local identity can influence how new developments are received.

Sentiment analysis further demonstrates the affective dimensions through which fusion is represented, with both positive and negative emotional framing were present, with positive terms such as "game-changing" promoting enthusiasm and technological optimism, while negative terms such as "dangerous" and "unproven" evoked scepticism and fear. Notably, positive emotive language dominated coverage overall, reinforing findings from Happer and Philo (2013), who argue that the media's emotive language plays a key role in influencing public attitudes toward energy developments, particularly when complex technologies such as fusion are involved.

Overall, this chapter highlights how media framings of fusion are predominantly positive and future-oriented shaping public narratives around its environmental, economic, and technological potential, while offering limited space for sustained critical debate around risk, regulation or governance. By mapping these circulating narratives, the chapter provides insight

into the discursive environment in which fusion is currently being normalised and made sense of within UK public discourse. The following chapter builds on this by synthesising these findings with the theoretical and conceptual frameworks outlined earlier in the thesis, drawing out the study's overall contributions and positioning them within the wider academic and policy context.

Chapter 7. Synthesis Chapter

7.1. Introduction

This synthesis chapter provides an integrated analysis of findings from public and stakeholder interviews, local and national media analyses, and participant observations at community events. It uniquely compares insights from these data sources and related them back to the theoretical and conceptual framework, uncovering broader patterns and tensions surrounding fusion energy that extend beyond the individual methods used. The chapter begins by exploring misconceptions and opposition, particularly highlighting confusion between fusion energy and nuclear fission, environmental concerns, and the influence of government involvement. It then examines the dynamics of reluctant acceptance, where fusion is supported not through enthusiasm but due to perceived necessity or lesser evil scenarios. The influence of geographical context and place identity is subsequently discussed, contrasting attitudes between the West Burton and Ardeer case studies. Next, the chapter analyses media influence on public perceptions, focusing on how different framings affect community expectations and support. Following this, the chapter explores optimism surrounding fusion technology, specifically relating to energy security and climate change. The chapter then closes by addressing the complexity of public engagement, emphasising the need for more empowering consultation methods.

7.2. Fears, Misconceptions and Opposition

Emergent technologies such as fusion energy are often highly misconceived, which can lead to fear and opposition (Turcanu et al, 2020). When speaking with UKAEA I asked what opposition they had faced so far within communities, they stated:

> "So I wouldn't even say we've had opposition. Really, I think there's been a need for clarification about fusion and fission. And being sort of, you know, open and honest about what what it is and isn't."

This does somewhat reflect the findings within both the interviews and media analysis as it is clear to see there is significant confusion between the two technologies, with people wanting clarifications (see section 5.1.6.). However, I have found there to be further significant opposition to fusion energy, amongst different communities, a finding which contrasts with their perception and therefore adds a novel dimension to the literature. This section aims to explore the misconceptions including the confusion with fission, the opposition rooted in environmental impacts, the perceived risks in terms of wasting money and finally the known knowledge gaps and how these can be filled.

In regard to nuclear fission and fusion energy, there is significant comparison between the two energy sources. The media did not display any confusion; however, fission was used repeatedly to explain fusion, with the media suggesting fusion is the opposite of fission or the 'clean' version of fission (see section 6.1.3). This opinion can then be seen reflected throughout the interviews (see section 5.3). This constant coupling of the two technologies results in publics viewing them under the same common theme, which can lead to confusion between the two. This confusion was highlighted throughout the interviews, where publics concerns regarding fusion were actually rooted in their perceived risks of fission, with some participants showing concern for a Chernobyl type disaster (section 5.3.1). This finding is consistent with previous studies (Semadeni et al., 2004; Slovic, 1987) which identify the 'dread risk' associated with nuclear technologies, but it extends this work by documenting the transfer of these risks from fission to fusion in a UK context, something not previously examined in depth.

Rather than reflecting a simple lack of knowledge, the comparisons between fission and fusion point to broader scepticism towards unfamiliar and experimental technologies, including the potential benefits and risks given public admission of lack of information and understanding within the interviews, combined with the clear misconceptions outlined. Publics have an existing prejudice over nuclear fission (Semadeni et al, 2004), and due to the coupling of fusion with fission, this prejudice is influencing public learning and understanding of fusion. As Slovic (1987) argues, nuclear fission is a "dread risk" for many members of the public, perceived as catastrophic, uncontrollable, and involuntary. Therefore, fusion may struggle to gain acceptance amongst publics due to the entanglement with nuclear fission.

One common theme that occurred throughout the media analysis is the view that fusion is an inherently safe technology. However, this sentiment was not observed during the interviews, with a number of the participants feeling uneasy about the experimental nature of the technology. Due to the confusion with fission throughout the interviews, people also associated their perceived fission safety risks with fusion, resulting in further fear around the technology.

This misunderstanding of fusion can also be attributed to the knowledge gaps that have been discovered throughout the interviews. No knowledge gaps were identified within the media, with a significant majority of media articles containing a large proportion of scientific information. This therefore suggests that traditional media in terms of newspapers and online news articles are not effectively disseminating information to publics. This supports Boudet's (2019) argument that information provision alone is insufficient but adds the new insight that even technically detailed information can fail to address fundamental public misconceptions if it is not contextually accessible or linked to everyday understandings.

The knowledge gaps include understanding regarding the process, the fuels and also potential benefits and risks, amongst other themes. These knowledge gaps can be improved via public consultation and engagement with local publics (Boudet, 2019). This was observed within the interviews that participants were enthusiastic about the idea of future public engagement. This engagement will allow developers to dispel any misconceptions and also understand the concerns that are held by local publics.

A number of concerns where highlighted both within the media and throughout the interviews, the majority of these being environmental and landscape impacts. These concerns were exclusively raised in Ardeer, Scotland. Both the interviews and media analysis raise concerns regarding the nearby Site of Special Scientific Interest (SSSI), suggesting that the proposed STEP development would cause significant disruption to this site, with this causing a lack of support for the STEP project, but specifically being built in this location. While environmental opposition has been documented in previous energy siting literature (Devine-Wright, 2005; Wolsink, 2007; Ellis et al., 2009), this finding is novel in linking opposition to fusion with a highly localised conservation identity (see section 7.4), which has not been addressed in earlier fusion perception studies.

A concern raised more specifically in the interview but also cropped up within the analysis of local media, was the government involvement with this project. The publics interviewed showed significant mistrust of the previous conservative government who approved the STEP project, more specifically the involvement of Sir Jacob Reese-Mogg and the local MP Brendan Clarke – Smith. This mistrust of the government has led these participants to have a lack of trust and in turn support for the STEP development. This sentiment was echoed within the media analysis but focused mainly on the Scotland England divide. This divide raises the question of whether such differences in government might influence the selection of the Scottish site, and, if Scotland were to gain independence, whether the project's progression would be affected. The lack of Scottish government support for fusion (Grant, 2022) energy generation is said to have significantly impacted public attitudes towards the technology according to a Scottish stakeholder. Previous literature has examined mistrust in nuclear governance (e.g., Pidgeon et al., 2008), but this study offers new empirical evidence of how partisan politics intersect with technological acceptance in the UK fusion context.

These findings therefore highlight that the government being intertwined within this development has impacted public support and trust within the project. Regarding government involvement there was also the opinion that the government will do what they want to do regardless of what concerns the public raise. This opinion again feeds into the fact the publics local to the STEP development do not trust the government to act in accordance with their best

interests. However, as of July 2024, there is a new Labour government, therefore these sentiments regarding the previous conservative government may not still stand, providing a basis for future research.

Another theme observed in both the interviews and the media analysis was the sentiment that fusion was ultimately a waste of resources. It was observed throughout the analysis that publics would prefer investment in energy to be focused on renewable sources such as solar and wind, rather than low carbon sources such as fusion. Fusion is framed by some media articles as a distraction. This idea that publics have a preference for investment in renewable energy sources over fission was also found by Jones et al (2012), however they also found that fusion was preferred over traditional energy sources such as coal, gas and nuclear fission. This study confirms the broader trend identified by Jones et al (2012) but contributes a novel case of how such preferences occur in real-world siting contexts, influencing acceptance dynamics at the local level. This preference of fusion over fission and other non-renewable energy sources is deemed reluctant acceptance and will be explored fully within the next section.

7.3. Reluctant Acceptance

Reluctant acceptance is a concept that is most commonly attributed to nuclear fission, where publics accept fission due to a mitigating factor e.g. helping with climate change or reducing the reliance on coal (Dehner et al, 2023; Kim et al, 2014). Rather than reflecting outright support, this form of acceptance is conditional and often framed as the "least worst" option (Simmons and Walker, 1999). This concept was similarly observed in both the media analysis and interview data within this study, where participants expressed tentative support for fusion energy, not because they were unreservedly positive about it, but because they saw it as a means to accelerate the decline of fossil fuels (see section 5.1.1). This mirrors findings from previous research on public attitudes to energy system change, which showed that people are often willing to accept contested technologies such as nuclear or bioenergy if they are seen as transitional tools to move the UK closer to a renewable future (Butler et al., 2013; Parkhill et al., 2013). This study, however, adds novelty by extending the concept to a technology still in its pre-commercial phase, such as fusion, which has not yet been deployed at scale.

One heuristic used by publics in the media and throughout the interviews was the comparison to fission. This comparison to fission resulted in fusion being framed as the ‘cleaner’ or ‘safer’ version of nuclear fission. Comparing fusion to fission can therefore lead publics to reluctantly accept fusion in order to reduce the reliance on nuclear fission. This interpreted framing from the interviews is directly linked to the media. News articles use fission to explain fusion, using the idea that fusion is the clean version of fission. This suggests that some more basic information from the media is potentially being retained by the public. Previous studies (Pidgeon et al., 2008; Bickerstaff et al., 2008) have documented how such comparative framings shape public attitudes to nuclear technologies, but the finding that these framings foster reluctant acceptance rather than enthusiastic support is a contribution of this research.

Specifically, within the West Burton case study there is reluctant acceptance when it comes to the STEP development, with the view that it is the lesser of two evils. Within West Burton there are a number of proposed solar farms that a majority of interviewees were abjectly against, viewing fusion as the lesser of two evils. These participants reluctantly accept fusion, in the hopes that it means the solar farms will not be needed, meaning that they will not be approved,

and the local farmers will not have to ‘give up’ their land. This objection of solar farms did not occur within the local media analysis, therefore suggesting it is a concern that can only be extracted via public consultation. This supports Wolsink’s (2007) argument that local opposition is often place-specific and cannot always be anticipated from media coverage but is new in showing how opposition to one low-carbon technology can indirectly encourage acceptance of another.

Reluctant acceptance also relates to perceptions of the energy transition itself. Interviewees expressed scepticism about the urgency and cost of fusion relative to more established renewables like wind and solar. This aligns with Sovacool and Geels (2021), who argue that publics often prefer mature technologies over speculative solutions.

Notably, some interviewees linked their reluctant acceptance to feelings of powerlessness. Several expressed doubts about whether public consultations genuinely influenced decision-making. A West Burton resident stated that " consulted doesn't mean changed or listened to does it?”, illustrating how disengagement and procedural scepticism shaped their resigned support. This reflects Wolsink’s (2007) notion that procedural justice is critical in shaping community acceptance; when communities perceive decision-making as top-down or symbolic, reluctant acceptance becomes more common. Van de Grift and Cuppen (2022) add that opposition is not simply a matter of misunderstanding or resistance but often arises from inadequate recognition of diverse actor roles and a lack of responsiveness in decision-making processes. The link between procedural scepticism and reluctant acceptance is an underexplored aspect in the literature, and this study’s findings offer new empirical evidence connecting these concepts.

7.4. Geographical Context and Place Identity

The comparison between West Burton and Ardeer revealed how deeply geographical context and place identity shape responses to fusion. West Burton, with its industrial heritage and recent experience of deindustrialisation, welcomed the STEP project as a symbol of economic revitalisation. Interviewees frequently cited the potential for job creation and local regeneration. This aligns with Lewicka's (2011) work on place attachment, which highlights how positive associations with industrial heritage can foster support for energy infrastructure when framed as part of economic regeneration narratives. It also builds on Devine-Wright's (2009) place identity model by applying it to a technology (fusion) that has not yet been the subject of such empirical research.

In contrast, the Ardeer case revealed a far stronger connection to environmental values and conservation identity. Ardeer interviewees consistently framed their opposition around landscape preservation, voicing concerns that STEP would disrupt the ecologically sensitive coastal environment. Local media reinforced this narrative, publishing articles focused on the proximity of the Bogside Flats SSSI and the potential destruction of wildlife habitats. This reflects Parkhill et al.'s (2013) argument that place-based values and environmental attachments are central to shaping risk perceptions of new energy technologies. While environmental opposition has been documented in previous energy siting literature (Devine-Wright, 2005; Wolsink, 2007; Ellis et al., 2009), this case study adds originality by demonstrating how a distinct conservation identity can mobilise against a technology that is otherwise framed nationally as environmentally beneficial.

While West Burton interviewees framed the STEP project as a positive change from their declining coal history, Ardeer residents were concerned that STEP would erode their landscape's recreational and cultural value. These contrasting responses are highlighted in Devine-Wright's (2009) place identity model, where developments perceived as congruent with local values, such as economic regeneration in post-industrial regions, are more likely to be supported. In contrast, projects that threaten valued environmental or cultural landscapes provoke resistance. The Ardeer case also highlights how conservation narratives can become a rallying point for opposition, with ecological identity reinforcing public scepticism, reflecting the literature explored in section 2.4.3.

7.5. Complexities of Public Engagement

In both West Burton and Ardeer, publics expressed frustration that engagement felt more like a formal requirement than a process designed to genuinely integrate their views into the decision-making process. This aligns with Wolsink's (2007) argument that when engagement is perceived as symbolic rather than substantive, it can exacerbate scepticism towards the project itself. For some participants, engagement appeared more performative, serving to legitimise predetermined outcomes rather than fostering open dialogue. This reflects earlier findings in renewable energy engagement research (Aitken, 2010; Cotton and Devine-Wright, 2012), but extends them to fusion, providing evidence that similar procedural justice concerns apply to emergent technologies.

Interestingly, while there was criticism of the process, many interviewees across both sites expressed a willingness to participate more actively if given the opportunity. There was a clear call for models of engagement that go beyond consultation and move towards genuine collaboration. Some participants proposed more interactive forums where local communities could be actively involved in shaping the project's benefits, including local employment opportunities and environmental protections. This reflects findings from Boudet (2019) that publics are more likely to accept and trust projects where they see clear opportunities for local influence and agency.

Media narratives also touched on the engagement issue. Local media, particularly in Ardeer, highlighted the perception of imbalanced power between local communities and national decision-makers, reinforcing interviewee sentiments that STEP was being imposed from government without sufficient local input.

Overall, this section demonstrates that dissatisfaction with public engagement is not rooted in opposition to participation in consultation itself but in a desire for more meaningful, two-way processes. Publics are seeking involvement that extends beyond passive feedback to active influence, underscoring the importance of participatory approaches that address procedural justice concerns. For fusion projects like STEP, failing to address this engagement gap risks

eroding public trust further, while genuine engagement could foster both stronger support and greater local ownership of the technology's rollout.

7.6. Support and Optimism

Throughout the analysis it was also clear to see that there is some significant support and optimism for this emergent technology. The media and global leaders portray optimism for fusion energy in terms of energy security dubbing the technology the 'holy grail' of energy, suggesting it could provide limitless energy supplies. This leads to increased support amongst publics, with interview participants highlighting energy security as one of the major reasons to support the technology. Interviewees suggest that their major support comes from the hope that this new technology will reduce the reliance on other countries such as Russia, in turn increasing the robustness of the country's energy security. This is consistent with previous studies linking energy security narratives to increased acceptance of energy projects (Winfield et al., 2010; Demski et al., 2015), but original in showing that such narratives resonate strongly even for emergent technologies such as fusion.

Not only was energy security suggested as a reason why participants actively support the development of fusion energy, but also the technologies contributions towards a low carbon future. A number of interview participants highlighted how the low carbon nature of the technology was a huge advantage, suggesting this is a vital technology to develop as it can run regardless of outside influences, unlike solar and wind energy. This sentiment is also reflected within the media, where there is a matter of urgency when discussing the development of fusion, framing the technology as the solution to climate change and a low carbon future. These findings echo previous research on public support for low-carbon technologies (Corner et al., 2011; Pidgeon et al., 2014), but this study adds a unique contribution by revealing how such optimism can coexist with localised scepticism, depending on place identity.

Interestingly, optimism was often paired with a strong sense of local pride, especially in West Burton. Several interviewees mentioned that hosting a globally significant project like STEP could "put the area on the map" (West Burton, P6) and provide opportunities for future generations (West Burton, P11). The media analysis also revealed similar sentiments

particularly in section 6.4.1, describing STEP as a huge opportunity for the future of the area (Newark Advertiser, 2021). This aligns with Lewicka's (2011) findings that place identity, and pride can play a role in shaping support for infrastructure perceived as innovative and prestigious.

While optimism was more pronounced in West Burton, it was not absent in Ardeer. Some participants acknowledged the global benefits fusion could offer but felt conflicted due to concerns about local environmental impacts. This points to the complexity of local-global trade-offs within energy transitions, where communities may simultaneously recognise broader benefits while opposing developments perceived as harmful to local landscapes.

Overall, fusion was framed by both media and interview participants as a key solution to climate change and energy insecurity. However, the degree of optimism expressed varied based on local context and the framing of risks versus benefits in both media and lived experiences. By documenting this nuanced interplay between global narratives and local place-based concerns, this research adds an empirical and theoretical contribution to the literature on public perceptions of energy technologies (Devine-Wright et al., 2015).

7.7. Chapter 7 Summary

This chapter has demonstrated the value of bringing together findings from interviews, participant observation, and media analysis to generate a deeper, more layered understanding of public attitudes towards fusion energy. Unlike Chapters 5 and 6, which presented these data sources separately, this synthesis reveals how local experiences, media framings, and institutional trust interact in shaping public perceptions. This synthesis allowed for insights that would not have emerged from looking at each dataset in isolation, particularly how public concerns are often rooted in place-specific histories and experiences that are not always recognised in national policy or media coverage. Another important contribution of this chapter is the identification of how safety framings and economic promises can build support, but only when accompanied by credible, transparent engagement. By mapping how different forms of information are interpreted through localised heuristics and past experiences, this chapter contributes to broader debates on energy justice and public acceptability. These findings provide a crucial bridge into the final chapter, which outlines the wider implications for policy, communication, and future fusion development.

Chapter 8. Conclusion

This chapter draws together the key findings from this research, offering a critical reflection on how the project contributes to existing scholarship on public perceptions of emergent energy technologies, particularly fusion energy. It synthesises the project's theoretical, empirical, and methodological contributions, before providing stakeholder recommendations and identifying avenues for future research.

8.1. General Attitudes Towards Fusion

The findings highlight a complex and multifaceted set of public attitudes towards fusion energy. On one hand, there is widespread optimism regarding fusion's potential contributions to energy security and climate change mitigation. Many interview participants noted that fusion offers an appealing alternative to fossil fuels and traditional nuclear fission, with the promise of low-carbon, domestic energy generation. Media framings reinforced this, particularly in national publications, where fusion was frequently described as "limitless," "clean," and "game-changing" (Tonkin, 2022). This aligns with broader literature on technological optimism within public perceptions of new energy technologies (Scheer, 2012; Corner et al., 2011).

On the other hand, this research also revealed persistent risks and concerns reflect broader unease with novel technologies, uncertainty about long-term consequences, and mistrust in institutional decision-making, with fusion–fission comparisons operating as a heuristic shorthand for these concerns. Drawing on Turcanu et al. (2020), who note that emerging technologies are frequently misunderstood by publics, this research confirms that the conflation of fusion with historical nuclear disasters (e.g., Chernobyl) is a significant barrier to public acceptance. Safety concerns, fears around radioactive waste, and broader scepticism about experimental technologies were widespread. Additionally, the perceived dominance of government influence on STEP's development eroded trust in public engagement processes. Participants frequently expressed the belief that public consultation was tokenistic and that governmental decisions would be imposed regardless of local sentiment, echoing insights from Wynne's (1992) work on public trust and technocratic decision-making.

Empirically, this project contributes by identifying how these attitudes are shaped through both local contexts and national discourses, reinforcing the need to consider public perceptions not as static, but as deeply intertwined with socio-political and historical factors.

8.2. The Influence of Place and Heuristics Used by Publics

The influence of place attachment and identity emerged as a key factor in shaping public responses to fusion. In West Burton, fusion was largely viewed as a positive force capable of reinvigorating a deindustrialised community. Participants expressed support for the redevelopment of the old coal power station, hoping it would generate new employment opportunities and restore a lost sense of community. This supports Devine-Wright's (2009) argument that place identity plays a crucial role in public engagement with energy infrastructure. Additionally, Milbourne's (2010, 2014) work on rural restructuring and community memory is relevant here, as West Burton publics framed the fusion project as a means to reverse the socio-economic decline triggered by coal plant closures.

In contrast, Ardeer participants voiced more caution, with anxieties focused on landscape changes and the ecological impacts of fusion infrastructure. Several residents referred to their negative associations with the nearby Hunterston fission power station, demonstrating how proximity to past energy developments and environmental experiences inform present-day perceptions (Parkhill et al., 2010). Furthermore, participants in both case studies displayed reliance on heuristics such as conflating fusion with fission and aligning attitudes with broader political sentiments, particularly anti-government mistrust towards the Conservative-led STEP decision process. One heuristic specific to West Burton occurred throughout the interviews in relation to solar projects proposed in the area. Publics appear to reluctantly accept fusion as the lesser of two evils, in the hopes that the solar farms will not be approved or needed. Finally, the achievability of fusion was brought into question with a number of heuristics being used to understand this, most notably the comparison of attaining fusion power with catching a unicorn.

Methodologically, this research contributes by triangulating media analysis, interviews, and participant observation to reveal how spatial contexts and political identities mediate public heuristics.

8.3. Media Framings and Their Influence

The media analysis illustrates the influential role of media framing in shaping how publics understand fusion energy. National media predominantly framed fusion in a positive light, presenting it as a key solution to global crises. This echoes Gamson and Modigliani's (1989) framing theory, which suggests that media frames provide interpretive packages that shape public understanding and discourse. Describing fusion as the "holy grail" of energy production positioned the technology as both futuristic and essential.

However, local media narratives diverged from national framings, focusing instead on site-specific impacts. In Ardeer, media emphasised ecological concerns, such as the potential disruption to nearby protected areas like the Bogside Flats SSSI. In West Burton, local media highlighted the project's potential to boost employment and regional pride. These localised narratives shaped community attitudes by reinforcing immediate concerns or benefits (Happer and Philo, 2013). Interestingly, this project found that while national media was influential in shaping general awareness, local media played a more significant role in framing site-specific acceptance or opposition to STEP.

Theoretically, this research contributes to media and communication studies by evidencing how competing media frames interact with local geographies and histories to produce divergent public attitudes towards fusion energy.

8.4. Contributions to Theory, Methods and Empirical Knowledge

This research makes a substantial theoretical contribution by applying and extending theories of place attachment, media framing, and heuristics within the context of emerging energy technologies. The findings reinforce Devine-Wright's (2009) place attachment theory, demonstrating how differing attachments to place influence local acceptance or opposition to infrastructure projects like the STEP fusion development. In West Burton, place identity rooted in industrial heritage and aspirations for economic regeneration contributed to more positive attitudes towards STEP. In contrast, Ardeer's place identity was grounded in environmental protection and a deep connection to the landscape, leading to more sceptical views. These two case studies show how place- attachment and values differ and how they can shape attitudes.

This research also builds on Gamson and Modigliani's (1989) media framing theory by showing how national and local media use distinct frames when reporting on fusion. The national media's focus on global benefits and technological optimism was contrasted by local media's concern with site-specific risks and opportunities. This contributes to a more nuanced understanding of how media frames operate in energy debates and how publics integrate these narratives into their own attitudes.

The project advances understanding of public heuristics in relation to emergent technologies, building on Pidgeon et al. (2008). Participants consistently relied on cognitive shortcuts, drawing comparisons between fusion and the more familiar technology of nuclear fission, despite technical differences. This heuristic mechanism was found to be central to public risk perception, with participants transferring perceived dangers of fission (e.g., radioactive waste, nuclear meltdowns) onto fusion. This dynamic exemplifies transfer heuristics, where publics apply familiar knowledge from related technologies, in this case, fission, when evaluating the risks and benefits of an emergent technology like fusion. The heuristic linking governmental mistrust, particularly towards the Conservative Party or Westminster decision-making, also contributed to scepticism about the motives behind STEP. Together, these findings expand the use of transfer heuristics within energy infrastructure research, showing how historical

experiences with other technologies can influence attitudes towards emergent energy technologies.

Empirically, this research provides novel insights into public perceptions of fusion energy, an underexplored topic in the UK context. It highlights the co-existence of optimism (focused on energy security and climate change mitigation) and scepticism (grounded in environmental concerns and political mistrust) within local communities. By analysing attitudes across two contrasting case studies, West Burton and Ardeer, the research demonstrates how histories of deindustrialisation, prior exposure to nuclear infrastructure, and local environmental priorities shape divergent public views.

The research also adds depth to the concept of reluctant acceptance (Corner et al, 2010), illustrating how publics in West Burton accepted STEP not because of complete support for fusion, but to avoid alternative developments such as solar farms. This finding extends existing research on public trade-offs between energy technologies and infrastructure siting.

This project contributes methodologically by combining three distinct qualitative methods: interviews, media analysis (both frame and sentiment analysis), and participant observation. This triangulated approach enabled a more comprehensive exploration of the interplay between media narratives, public discourse, and lived experience. By comparing media outputs with public interviews, the research demonstrates how media frames are selectively integrated by publics.

Additionally, by integrating frame and sentiment analysis in the media component, this research moves beyond basic content analysis and captures both the thematic and emotional tone of media coverage. The use of participant observation at public engagement events further enriched the data by providing insights into how engagement spaces mediate trust-building, scepticism, and participation.

Overall, this project offers a robust interdisciplinary mixed-methods model for investigating public attitudes to emerging technologies, bridging environmental psychology, media studies, and energy social science.

8.5. Stakeholder Recommendations

The following recommendations are grounded in the findings of this research, which examined public attitudes towards fusion energy through interviews, media analysis, and participant observations. These insights highlight the critical factors influencing public perceptions, including mistrust of institutions, confusion between fusion and fission, place attachment, and the role of media framings. Based on this, several recommendations are made for stakeholders involved in fusion energy developments such as STEP.

1. *Improve Transparency and Communication:*

- The analysis identified a widespread mistrust of government and private organisations, particularly in relation to top-down decision-making and opaque project processes. This was especially pronounced in Ardeer, where participants expressed frustration over a perceived lack of transparency about decision-making between UK and Scottish governments.
- Therefore, stakeholders should be open with publics regarding how the project is developing, potential timelines and transparency on what organisations are involved as this can improve trust amongst publics. This communication then needs to be widespread, going to communities with information, not expecting communities to find it for themselves.

2. *Improve Public Consultation:*

- Publics across both case studies expressed scepticism towards consultation processes, describing them as tokenistic or performative. Many interviewees felt their concerns were ignored, echoing wider procedural justice literature (Gross, 2007).
- Therefore, stakeholders should give publics the opportunity to be heard, not just for them to be informed. Ensure publics feel listened to and respected, and ensure they are allowed a safe space to voice their opinions, both positive and negative. Where negative opinions and worries are shared, make public any

mitigations that will be implemented. If publics feel heard, this is more likely to improve trust and ultimately reduce opposition.

3. *Emphasise Local Benefits*

- Interviewees, particularly in West Burton, were receptive to the economic opportunities that fusion could bring, viewing it as a potential catalyst for regenerating post-industrial communities. However, there was also scepticism, especially in Ardeer, about whether these benefits would materialise or whether jobs would go to non-local workers.
- Therefore, stakeholders should clearly communicate the economic and social benefits fusion developments can have, this can be specifically aimed to the needs of local publics discovered within the public consultation. Being honest and realistic with figures, ensuring to dispel any rumours that can falsely inflate any benefits, so that trust is not broken in the future.

4. *Showcase Fusion as Part of a Sustainable Energy Mix*

- Stakeholders should showcase how fusion will make up a part of a comprehensive approach to a sustainable, low carbon energy mix. The research found that publics generally favour renewables such as wind and solar but see fusion as an unfamiliar and sometimes competing technology. By framing fusion as complementary to renewables, stakeholders can mitigate public fears of an either-or scenario and demonstrate how fusion fits within a broader, balanced approach to achieving net zero. This also addresses concerns voiced by interviewees and seen in local media (particularly in Scotland), where fusion was sometimes positioned as a "distraction" from developing renewables.

5. Invest in Public Education and Awareness

- Both the interview and media analysis revealed confusion between fusion and fission, with publics often drawing on heuristics based on nuclear accidents or weapons. Misconceptions surrounding safety were also common.
- Therefore, it is vital for stakeholders to invest in educational campaigns that explains how fusion works, outlines the potential risks but also dispels known misconceptions such as radiation and explosions. This education should be aimed at all ages, aiming the risks and misconception particularly at adults, as this will reduce rumours and aim to reduce misguided opposition.

8.6. Opportunities for Further Research

Future research could include a more national overview of fusion energy combining both a widespread survey to gather quantitative data but also interviews within a number of major cities. This could be conducted to understand and map how attitudes towards fusion energy varies throughout the country and could further be used to understand where would be most accepting for any future fusion developments.

This project could also be continued forming the basis for a longitudinal study to understand how public attitudes to fusion grow and change within West Burton. This research can be conducted as the STEP project grows from the planning to the construction and then the operational phase.

8.7. Final Conclusions

Overall, the results indicate the complexities within public attitudes towards fusion energy. There appears to be consistent support for the technology, and where opposition does exist it is often due to the misconception between fusion and fission, and a broader unease surrounding novel technologies and the associated risks. Concern for current fusion developments are exaggerated by the involvement of the UK government and the historic mistrust that publics hold. These concerns and tensions held by publics can be eased and potentially even mitigated by successful and meaningful public engagement with those locally to the site. Wider understanding of the technology, engagement and education is needed, particularly for school age children so that the next generation are fully aware of this potentially revolutionary technology that may play a major role within their future.

References

Abelson, J., Forest, P.G., Casebeer, A., Mackean, G., Maloff, B., Musto, R., Kouri, D., Sutherland, D., Eyles, J., Emo, M. and Gold, M. (2004). *Towards more meaningful, informed, and effective public consultation*. Ottawa: Canadian Health Services Research Foundation.

Adams, J., Keane, W. and Dutton, M. (2005). *The politics of method in the human sciences: Positivism and its epistemological others*. Duke University Press.

Adams, W.C. (2015). Conducting semi-structured interviews. *Handbook of practical program evaluation*, pp.492-505.

Agenda. (2022). Agenda: Bringing the benefits of fusion power to Scotland. *The Herald*. [Online] 20 January 2022. Available at: https://www.heraldscotland.com/opinion/19854237.agenda-bringing-benefits-fusion-power-scotland/ [Accessed: 17/02/2023].

Agius, C. (2013). Social constructivism. *Contemporary security studies*, *3*, pp.87-103.

Agnew, J.A. (2014). *Place and politics: The geographical mediation of state and society*. Routledge.

Ahlin, E.M. (2019). Semi-structured interviews with expert practitioners: Their validity and significant contribution to translational research.

Aitken, M. (2010). Wind power and community benefits: Challenges and opportunities. *Energy policy*, *38*(10), pp.6066-6075.

Alexandre, B., Reynaud, E., Osiurak, F. and Navarro, J. (2018). Acceptance and acceptability criteria: a literature review. *Cognition, Technology & Work*, *20*, pp.165-177.

Alhojailan, M.I. (2012). Thematic analysis: A critical review of its process and evaluation. *West east journal of social sciences*, *1*(1), pp.39-47.

Ali, M., Irfan, M., Ozturk, I. and Rauf, A. (2023). Modelling public acceptance of renewable energy deployment: a pathway towards green revolution. *Economic research-Ekonomska istraživanja*, *36*(3).

Alkon, A.H. and Traugot, M. (2008). Place matters, but how? Rural identity, environmental decision making, and the social construction of place. *City & Community*, *7*(2), pp.97-112.

Allen, B.J. (2005). Social constructionism. *Engaging organizational communication theory and research: Multiple perspectives*, pp.35-53.

Almond, L., Alison, L., Eyre, M., Crego, J. and Goodwill, A. (2012). Heuristics and biases in decision-making. In *Policing Critical Incidents* (pp. 151-180). Willan.

Alozie, E. (2005). Sudan and South Africa – a framing analysis of Mail & Guardian Online's coverage of Darfur. *Ecquid Novi*, vol. 26 (1): 63-84.

Alzahrani, S.M., Alwafi, A.M. and Alshehri, S.M. (2023). A framework of examining the factors affecting public acceptance of nuclear power plant: case study in Saudi Arabia. *Nuclear Engineering and Technology*, *55*(3), pp.908-918.

Anderson, B. (2007). Hope for nanotechnology: anticipatory knowledge and the governance of affect. *Area*, *39*(2), pp.156-165.

Amineh, R.J. and Asl, H.D. (2015). Review of constructivism and social constructivism. *Journal of social sciences, literature and languages*, *1*(1), pp.9-16.

Ang, B.W., Choong, W.L. and Ng, T.S. (2015). Energy security: Definitions, dimensions and indexes. *Renewable and sustainable energy reviews*, *42*, pp.1077-1093.

Arnold, J. (2024). *The British Miner in the Age of De-industrialization: A Political and Cultural History*. Oxford University Press.

Ashraf, P., Ayad, H. and Saadallah, D. (2017). Sense of community and built environment: how can built environment, social economic conditions and history of place shape our sense of community. *Int J Eng Adv Technol*, *6*(3), pp.2249-8958.

Asif, M. and Muneer, T. (2007). Energy supply, its demand and security issues for developed and emerging economies. *Renewable and sustainable energy reviews*, *11*(7), pp.1388-1413.

Asif, M.H., Zhongfu, T., Dilanchiev, A., Irfan, M., Eyvazov, E. and Ahmad, B. (2023). Determining the influencing factors of consumers' attitude toward renewable energy adoption in developing countries: A roadmap toward environmental sustainability and green energy technologies. *Environmental Science and Pollution Research*, *30*(16), pp.47861-47872.

Atkins, P., Blumenthal, P., Edisis, A., Friedhoff, A., Curran, L., Lowry, L., St Clair, T., Wial, H. and Wolman, H. (2011). Responding to manufacturing job loss: What can economic development policy do?. *Available at SSRN 3799721*.

Auer, J. (2012). Academia. The Role of Media in Public Opinion Formation. [Online] Available at: https://www.academia.edu/7024865/The_Role_of_Media_in_Public_Opinion_Formation [Accessed: 20/02/22].

Austin, J. (2018). Mission to Mars: Is nuclear fusion key to rocket fast enough to land humans on Red Planet? *Express Online*. [Online] 29 January 2018. Available at: https://www.express.co.uk/news/science/911462/Mars-nuclear-fusion-rockets-fast-enough-reach-Red-Planet [Accessed: 16/02/2023].

Austin, Z. and Sutton, J. (2014). Qualitative research: Getting started. *The Canadian journal of hospital pharmacy*, *67*(6), p.436.

Bailey, I. and Darkal, H. (2018). (Not) talking about justice: justice self-recognition and the integration of energy and environmental-social justice into renewable energy siting. *Local Environment*, *23*(3), pp.335-351.

Bahgat, G. ed. (2011). *Energy security: an interdisciplinary approach*. John Wiley & Sons.

Bale, C.S., Foxon, T.J., Hannon, M.J. and Gale, W.F. (2012). Strategic energy planning within local authorities in the UK: A study of the city of Leeds. *Energy policy*, *48*, pp.242-251.

Bamberger, M. (2012). Introduction to mixed methods in impact evaluation. *Impact evaluation notes*, *3*(3), pp.1-38.

Bandura, A. (1999). Social cognitive theory of personality. *Handbook of personality*, *2*, pp.154-96.

Banerjee, A. and Schuitema, G. (2022). How just are just transition plans? Perceptions of decarbonisation and low-carbon energy transitions among peat workers in Ireland. *Energy Research & Social Science*, *88*, p.102616.

Barnett, J., Burningham, K., Walker, G. and Cass, N. (2012). Imagined publics and engagement around renewable energy technologies in the UK. *Public Understanding of Science*, *21*(1), pp.36-50.

Basel, J.S. and Brühl, R. (2013). Rationality and dual process models of reasoning in managerial cognition and decision making. *European Management Journal*, *31*(6), pp.745-754.

Batel, S. and Devine-Wright, P. (2015). Towards a better understanding of people's responses to renewable energy technologies: Insights from Social Representations Theory. *Public Understanding of Science*, *24*(3), pp.311-325.

Batel, S. (2020). Research on the social acceptance of renewable energy technologies: Past, present and future. *Energy Research & Social Science*, *68*, p.101544.

Bauer, M.W. (2002). Controversial medical and agri-food biotechnology: a cultivation analysis. *Public understanding of science*, *11*(2), p.93.

Bayulgen, O. and Benegal, S. (2019). Green Priorities: How economic frames affect perceptions of renewable energy in the United States. *Energy Research & Social Science*, *47*, pp.28-36.

BBC. (2016). Protest over Cumbria's Moorside nuclear plant consultation. [Online] Available at: https://www.bbc.co.uk/news/uk-england-cumbria-32764176. [Accessed: 26/10/24].

BBC News. [Online] Available at: https://www.bbc.co.uk/news/uk-england-nottinghamshire-63119465 [Accessed: 11/09/2024].

Beatley, T. and Manning, K. (2013). *The ecology of place: Planning for environment, economy, and community*. Island Press.

Beer, M., Rybár, R. and Gabániová, Ľ. (2023). Visual impact of renewable energy infrastructure: Implications for deployment and public perception. *Processes*, *11*(8), p.2252.

Belfast Telegraph. (2017). Reactor takes next step towards generating clean electricity from fusion. Belfast Telegraph Online. [Online] 28 April 2017. Available at: https://www.belfasttelegraph.co.uk/business/reactor-takes-next-step-towards-generating-clean-electricity-from-fusion/35661950.html [Accessed 16/07/2024].

Belmonte, Z.J.A., Prasetyo, Y.T., Benito, O.P., Liao, J.H., Susanto, K.C., Young, M.N., Persada, S.F. and Nadlifatin, R. (2023). The acceptance of nuclear energy as an alternative source of energy among Generation Z in the Philippines: An extended theory of planned behaviour approach. Nuclear Engineering and Technology.

Benedict, M.A. and McMahon, E.T. (2012). *Green infrastructure: linking landscapes and communities*. Island press.

Bennett, W.L. and Pfetsch, B. (2018). Rethinking political communication in a time of disrupted public spheres. *Journal of communication*, *68*(2), pp.243-253.

Berger, P.L. and Luckmann, T. (1966). *The social construction of reality: A treatise in the sociology of knowledge*. Anchor.

Bergquist, P., Ansolabehere, S., Carley, S. and Konisky, D. (2020). Backyard voices: how sense of place shapes views of large-scale energy transmission infrastructure. *Energy research & social science*, *63*, p.101396.

Bergquist, P., Konisky, D.M. and Kotcher, J. (2020). Energy policy and public opinion: patterns, trends and future directions. *Progress in Energy*, *2*(3), p.032003.

Berka, A.L. and Creamer, E. (2018). Taking stock of the local impacts of community owned renewable energy: A review and research agenda. *Renewable and Sustainable Energy Reviews*, *82*, pp.3400-3419.

Berkes, F. (2004). Rethinking community-based conservation. *Conservation biology*, *18*(3), pp.621-630.

Bernal, N. (2019). Sci-fi fantasy or source of boundless clean energy? Inside Britain's quest to harness nuclear fusion. *The Telegraph*. [Online] 26 July 2019. Available at: https://www.telegraph.co.uk/technology/2019/07/26/sci-fi-fantasy-source-boundless-clean-energy-inside-britains/ [Accessed: 15/02/2023].

Bessette, D.L. (2022). Heuristics and bias in assessing the social impacts of energy projects. In *Handbook of Environmental Impact Assessment* (pp. 258-269). Edward Elgar Publishing.

Beveridge, R. and Kern, K. (2013). The Energiewende in Germany: background, developments and future challenges. *Renewable Energy Law & Policy Review.*, *4*, p.3.

Beyers, J. and Arras, S. (2021). Stakeholder consultations and the legitimacy of regulatory decision-making: A survey experiment in Belgium. *Regulation & Governance*, *15*(3), pp.877-893.

Bickerstaff, K. and Walker, G. (2001). Public understandings of air pollution: the 'localisation 'of environmental risk. *Global environmental change*, *11*(2), pp.133-145.

Bickerstaff, K., Lorenzoni, I., Pidgeon, N.F., Poortinga, W. and Simmons, P. (2008). Reframing nuclear power in the UK energy debate: nuclear power, climate change mitigation and radioactive waste. Public understanding of science, 17(2), pp.145-169.

Bidwell, D. (2016). The effects of information on public attitudes toward renewable energy. *Environment and Behaviour*, *48*(6), pp.743-768.

Bies, A.L., Lee, D.G., Lindsey, C., Stoutenborough, J.W. and Vedlitz, A. (2013). Citizens, nonprofits and climate change policy. In *Nonprofit Policy Forum* (Vol. 4, No. 1, pp. 5-28). De Gruyter.

Bird, D.K., Haynes, K., van den Honert, R., McAneney, J. and Poortinga, W. (2014). Nuclear power in Australia: A comparative analysis of public opinion regarding climate change and the Fukushima disaster. Energy Policy, 65, pp.644-653.

Bird, D.K., Haynes, K., van den Honert, R., McAneney, J. and Poortinga, W. (2014). Nuclear power in Australia: A comparative analysis of public opinion regarding climate change and the Fukushima disaster. Energy Policy, 65, pp.644-653.

Birkland, T.A. (2017). Agenda setting in public policy. In *Handbook of public policy analysis* (pp. 89-104). Routledge.

Blumer, H. (1986). *Symbolic interactionism: Perspective and method*. University of California Press.

Bol, D. (2022). UK ministers under fire for 'wasting public money on unproven technology' on nuclear plan. The Herald. [Online] 4 October 2022. Available at: https://www.heraldscotland.com/politics/23019671.uk-government-fire-wasting-public-money-unproven-technology-nuclear-plan/ [Accessed: 16/07/2024].

Bollino, C.A. and Galkin, P. (2021). Energy security and portfolio diversification: Conventional and novel perspectives. *Energies*, *14*(14), p.4257.

Bolton, P. (2023). Imports of fossil fuels from Russia. *House of Commons Library.* UK Parliament.

Bomberg, E. and McEwen, N. (2012). Mobilizing community energy. *Energy policy*, *51*, pp.435-444.

Bond, S., Sims, S. and Dent, P. (2013). *Towers, turbines and transmission lines: Impacts on property value*. John Wiley & Sons.

Bondarouk, T. and Ruel, H. (2004). Discourse analysis: making complex methodology simple. *ECIS 2004 Proceedings*, p.1

Borah, P. (2011). Conceptual issues in framing theory: A systematic examination of a decade's literature. *Journal of communication*, *61*(2), pp.246-263.

Boso, A., Garrido, J., Alvarez, B., Oltra, C., Hofflinger, A. and Galvez, G. (2020). Narratives of resistance to technological change: Drawing lessons for urban energy transitions in southern Chile. *Energy Research & Social Science*, *65*, p.101473.

Bostan, I., Gheorghe, A.V., Dulgheru, V., Sobor, I., Bostan, V. and Sochirean, A. (2012). *Resilient energy systems: renewables: wind, solar, hydro* (Vol. 19). Springer Science & Business Media.

Boudet, H.S. (2019). Public perceptions of and responses to new energy technologies. *nature energy*, *4*(6), pp.446-455

Bourdin, S. and Nadou, F. (2020). The role of a local authority as a stakeholder encouraging the development of biogas: a study on territorial intermediation. *Journal of Environmental Management*, *258*, p.110009.

Boyatzis, R.E. (1998). *Transforming qualitative information: Thematic analysis and code development*. Sage.

Boydstun, A.E. (2013). *Making the news: Politics, the media & agenda setting*. University of Chicago Press.

Bradley, B. (2022). Fusion energy power plant plans for West Burton are welcomed. *Newark Advertiser*. [Online] Available at: https://www.newarkadvertiser.co.uk/news/fusion-energy-power-plant-plans-welcomed-9277817/ [Accessed: 14/03/2023].

Bradshaw, M.J. (2009). The geopolitics of global energy security. *Geography Compass*, *3*(5), pp.1920-1937

Brasier, K.J., Filteau, M.R., McLaughlin, D.K., Jacquet, J., Stedman, R.C., Kelsey, T.W. and Goetz, S.J. (2011). Residents' perceptions of community and environmental impacts from development of natural gas in the Marcellus Shale: a comparison of Pennsylvania and New York cases. *Journal of Rural Social Sciences*, *26*(1), p.3.

Brenan, V. (2021). Ardeer in final five for prototype fusion plant. *The Herald*. [Online] 16 October 2021. Available at: https://www.ardrossanherald.com/news/19647404.ardeer-shortlist-prototype-fusion-energy-plant/ [Accessed: 16/02/2023].

Brewer, P.R. (2002). Framing, value words, and citizens' explanations of their issue opinions. *Political Communication*, *19*(3), pp.303-316.

Bridge, G. and Gailing, L. (2020). New energy spaces: Towards a geographical political economy of energy transition. *Environment and Planning A: Economy and Space*, *52*(6), pp.1037-1050.

Brüggemann, M. (2014). Between frame setting and frame sending: How journalists contribute to news frames. *Communication Theory*, *24*(1), pp.61-82.

Brundtland, G.H. (1987). Our Common Future World Commission On Environment And Development.

Burchardt, T. (2014). Deliberative research as a tool to make value judgements. Qualitative Research, 14(3), pp.353-370.

Burnett, N., Hinson, s., and Stewart, I. (2024). The UK's plans and progress to reach net zero by 2050. *House of Commons Library.* [Online] Available at: https://researchbriefings.files.parliament.uk/documents/CBP-9888/CBP-9888.pdf [Accessed: 28/07/2025].

Burr, V. (2015). *Social constructionism*. Routledge.

Burstein, P. (2003). The impact of public opinion on public policy: A review and an agenda. *Political research quarterly*, *56*(1), pp.29-40.

Busse, M. and Siebert, R. (2018). Acceptance studies in the field of land use—A critical and systematic review to advance the conceptualization of acceptance and acceptability. *Land use policy*, *76*, pp.235-245.

Bustamante, M., Robledo-Abad, C., Harper, R., Mbow, C., Ravindranat, N.H., Sperling, F., Haberl, H., de Siqueira Pinto, A. and Smith, P. (2014). Co-benefits, trade-offs, barriers, and policies for greenhouse gas mitigation in the agriculture, forestry and other land use (AFOLU) sector. *Global change biology*, *20*(10), pp.3270-3290.

Butler, C., Parkhill, K. and Pidgeon, N.F. (2013). Transforming the UK energy system: public values, attitudes and acceptability-deliberating energy system transitions in the UK.

Butler-Warke, A. (2021). There'sa time and a place: temporal aspects of place-based stigma. *Community Development Journal*, *56*(2), pp.203-219.

Čábelková, I., Strielkowski, W., Streimikiene, D., Cavallaro, F. and Streimikis, J. (2021). The social acceptance of nuclear fusion for decision making towards carbon free circular

economy: Evidence from Czech Republic. Technological Forecasting and Social Change, 163, p.120477.

Cacciatore, M.A., Scheufele, D.A. and Shaw, B.R. (2012). Labelling renewable energies: How the language surrounding biofuels can influence its public acceptance. *Energy Policy*, *51*, pp.673-682.

Canmore. (2022). Ardeer, Ici Works, Nobel's Explosives Factory. [Online] Available at: https://canmore.org.uk/site/79607/ardeer-ici-works-nobels-explosives-factory. [Accessed: 18/08/2023].

Canmore. (2022). Ardeer, Ici Works, Nobel's Explosives Factory. [Online] Available at: https://canmore.org.uk/site/79607/ardeer-ici-works-nobels-explosives-factory. [Accessed: 18/08/2023].

Canmore. (2022). Ardeer, Ici Works, Nobel's Explosives Factory. [Online] Available at: https://canmore.org.uk/site/79607/ardeer-ici-works-nobels-explosives-factory. [Accessed: 18/08/2023].

Cantarero, M.M.V. (2020). Of renewable energy, energy democracy, and sustainable development: A roadmap to accelerate the energy transition in developing countries. *Energy Research & Social Science*, *70*, p.101716.

Capozza, C., Divella, M. and Rubino, A. (2021). Exploring energy transition in European firms: The role of policy instruments, demand-pull factors and cost-saving needs in driving energy-efficient and renewable energy innovations. *Energy Sources, Part B: Economics, Planning, and Policy*, *16*(11-12), pp.1094-1109.

Carley, S. and Konisky, D.M. (2020). The justice and equity implications of the clean energy transition. *Nature Energy*, *5*(8), pp.569-577.

Carnahan, D., Hao, Q. and Yan, X. (2019). Framing methodology: a critical review. *Oxford Research Encyclopedia of Politics*.

Cass, N. and Walker, G. (2009). Emotion and rationality: The characterisation and evaluation of opposition to renewable energy projects. *Emotion, Space and Society*, *2*(1), pp.62-69.

Cavanagh, G. (2020). Cumbria could be home to UK's first prototype nuclear fusion power plant - new plans reveal. *News and Star*. [Online] 14 December 2020. Available at: https://www.newsandstar.co.uk/news/18940283.cumbria-home-nuclear-fusion-plant/ [Accessed: 17/02/2023].

Cavanagh, G. (2021). Copeland is a step closer to nuclear fusion. *News and Star*. [Online] 10 February 2021. Available at: https://www.newsandstar.co.uk/news/19077273.moorside-clean-energy-hub-selected-bidding-location-nuclear-fusion/ [Accessed: 01/08/2024].

Cavanagh, G. (2022). Cumbrian peer 'disappointed' as Copeland's fusion reactor bid unsuccessful. *News and Star*. [Online] 06 October 2022. Available at: https://www.newsandstar.co.uk/news/23022980.cumbria-lep-chairman-disappointed-moorside-unsuccessful-reactor-bid/ [Accessed: 15/03/2023].

CCFE. (2024). Fusion in Brief. [Online] Available at: https://ccfe.ukaea.uk/fusion-energy/fusion-in-brief/#:~:text=The%20only%20by%2Dproducts%20of,released%20without%20harming%20the%20environment. [Accessed: 03/05/2024].

Chandra, Y., Shang, L., Chandra, Y. and Shang, L. (2019). Inductive coding. *Qualitative research using R: A systematic approach*, pp.91-106.

Charmaz, K. (2017). The power of constructivist grounded theory for critical inquiry. *Qualitative inquiry*, *23*(1), pp.34-45.

Chase, V.M., Hertwig, R. and Gigerenzer, G. (1998). Visions of rationality. *Trends in cognitive sciences*, *2*(6), pp.206-214.

Checkel, J.T. (1999). Social construction and integration. *Journal of European public policy*, *6*(4), pp.545-560.

Chen, J. (2016). Regulatory challenges for fusion energy: Safety, licensing and governance. Energy Policy, 98, 529–537.

Chen, S. and Chaiken, S. (1999). The heuristic-systematic model in its broader context.

Cherp, A., Adenikinju, A., Goldthau, A., Hernandez, F., Hughes, L., Jewell, J., Olshanskaya, M., Jansen, J., Soares, R. and Vakulenko, S. (2012). Energy and security. In *Global energy assessment: Toward a sustainable future* (pp. 325-383). Cambridge University Press.

Childs, H.L. (1965). Public Opinion: Nature. *Formation and Role*.

Chong, D. and Druckman, J.N. (2007). A theory of framing and opinion formation in competitive elite environments. *Journal of communication*, *57*(1), pp.99-118.

Christensen, T. and Lægreid, P. (2005). Trust in government: The relative importance of service satisfaction, political factors, and demography. *Public performance & management review*, *28*(4), pp.487-511.

Churcher, K., Downs, E. and Tewksbury, D. (2014). " Friending" Vygotsky: A Social Constructivist Pedagogy of Knowledge Building through Classroom Social Media Use. *Journal of Effective Teaching*, *14*(1), pp.33-50.

CIEEM. (2024). Labour lifts ban on onshore windfarms. [Online] Available at: https://cieem.net/labour-lifts-ban-on-onshore-windfarms/ [Accessed: 26/10/2024].

City population. (2021) Sturton le Steeple. [Online] Available at: https://citypopulation.de/en/uk/eastmidlands/nottinghamshire/E63001449__sturton_le_steeple/ [Accessed: 17/07/2024].

Clements, J. (1974). The Kernel of Cunninghame. Glasgow: Gilmour and Lawrence.
Cohen, A., Fischhendler, I. and Katz, D. (2023). Institutional acceptance of wildlife mitigation technologies for wind energy: The case of Israel. *Energy Policy*, *173*, p.113359.

Cohen, J.J., Reichl, J. and Schmidthaler, M. (2014). Re-focussing research efforts on the public acceptance of energy infrastructure: A critical review. *Energy*, *76*, pp.4-9.

Conkling, T.J., Loss, S.R., Diffendorfer, J.E., Duerr, A.E. and Katzner, T.E. (2021). Limitations, lack of standardization, and recommended best practices in studies of renewable energy effects on birds and bats. *Conservation Biology*, *35*(1), pp.64-76.

Conlisk, J. (1996). Why bounded rationality?. *Journal of economic literature*, *34*(2), pp.669-700.

Connor, S. (2013). One giant leap for mankind: £13bn Iter project makes breakthrough in the quest for nuclear fusion, a solution to climate change and an age of clean, cheap energy. *The Independent*. [Online] 27 April 2013. Available at: https://www.independent.co.uk/news/science/one-giant-leap-for-mankind-ps13bn-iter-project-makes-breakthrough-in-the-quest-for-nuclear-fusion-a-solution-to-climate-change-and-an-age-of-clean-cheap-energy-8590480.html [Accessed: 16/02/2023].

Conover, P.J. (1988). The role of social groups in political thinking. *British Journal of Political Science*, *18*(1), pp.51-76.

Contzen, N., Perlaviciute, G., Steg, L., Reckels, S.C., Alves, S., Bidwell, D., Böhm, G., Bonaiuto, M., Chou, L.F., Corral-Verdugo, V. and Dessi, F. (2024). Public opinion about solar radiation

management: A cross-cultural study in 20 countries around the world. *Climatic Change*, *177*(4), p.65.

Cookson, C. (2014). Lasers blast a way forward for nuclear fusion power. *Financial Times*. [Online] 12 February 2014. Available at: https://www.ft.com/content/71e73124-9347-11e3-8ea7-00144feab7de [Accessed: 16/02/2023].

Corner, A. and Clarke, J. (2016). *Talking climate: From research to practice in public engagement*. Springer.

Corner, A., Venables, D., Spence, A., Poortinga, W., Demski, C. and Pidgeon, N. (2011). Nuclear power, climate change and energy security: Exploring British public attitudes. *Energy Policy*, *39*(9), pp.4823-4833.

Corner, A., Whitmarsh, L. and Xenias, D. (2012). Uncertainty, scepticism and attitudes towards climate change: biased assimilation and attitude polarisation. *Climatic change*, *114*, pp.463-478.

Cotton, M. (2017). Fair fracking? Ethics and environmental justice in United Kingdom shale gas policy and planning. *Local Environment*, *22*(2), pp.185-202.

Cowell, R., Bristow, G. and Munday, M. (2011). Acceptance, acceptability and environmental justice: the role of community benefits in wind energy development. *Journal of Environmental Planning and Management*, *54*(4), pp.539-557.

Cox, J.R. (2010). Beyond frames: Recovering the strategic in climate communication. *Environmental Communication*, *4*(1), pp.122-133.

Crabtree, B.F. and Miller, W.F. (1992). A template approach to text analysis: developing and using codebooks.

Cracknell, R., Baker, C., and Pollock, L. (2024). General Election 2024 Results. House of Commons Library. [Online] Available at: https://commonslibrary.parliament.uk/research-briefings/cbp-10009/ [Accessed: 10/09/2024].

Cresswell, T.J. (1996). *In place/out of place: Geography, ideology, and transgression*. The University of Wisconsin-Madison.

Cresswell, T. (2015). Place: An Introduction (2nd ed.). Wiley-Blackwell.

Csepely-Knorr, L. (2022). 'Conditions in landscape which the public as a whole wishes to see and enjoy'–electricity generation, amenity and welfare in post-war Britain. Geografiska Annaler: Series B, Human Geography, 104(3), pp.192-208.

Cuff, M. (2021). Five sites in the running for nuclear fusion plant. *I-Independent Print Ltd*. [Online] 15 October 2021. Available at: https://inews.co.uk/news/nuclear-fusion-plant-uk-cumbria-nottinghamshire-yorkshire-ayrshire-gloucestershire-energy-1248302 [Accessed: 03/02/2023].

Cukier, W., Ngwenyama, O., Bauer, R. and Middleton, C. (2009). A critical analysis of media discourse on information technology: preliminary results of a proposed method for critical discourse analysis. *Information systems journal*, *19*(2), pp.175-196.

Culley, M.R., Ogley-Oliver, E., Carton, A.D. and Street, J.C. (2010). Media framing of proposed nuclear reactors: An analysis of print media. Journal of Community & Applied Social Psychology, 20(6), pp.497-512.

Cunliffe, A.L. (2011). Crafting qualitative research: Morgan and Smircich 30 years on. *Organizational research methods*, *14*(4), pp.647-673.

D'Angelo, P. (2017). Framing: media frames. *The international encyclopaedia of media effects*, pp.1-10.

Dampier, J.E.E., Lemelin, R.H., Shahi, C. and Luckai, N., 2014. Small town identity and history's contribution to a response in policy change: a case study of transition from coal to biomass energy conversion. *Energy, Sustainability and Society*, *4*, pp.1-14.

Darke, P., Shanks, G. and Broadbent, M. (1998). Successfully completing case study research: combining rigour, relevance and pragmatism. *Information systems journal*, *8*(4), pp.273-289

David, C.C., Atun, J.M., Fille, E. and Monterola, C. (2011). Finding frames: Comparing two methods of frame analysis. Communication Methods and Measures, 5(4), pp.329-351.

Davison, W. P. (1968). Public Opinion. Introduction. In D.L. Sills (Ed.), *International Encyclopaedia of the Social Sciences*. (Vol. 13, pp. 188-197). New York: Macmillan & Free Press.

Dawadi, S., Shrestha, S. and Giri, R.A. (2021). Mixed-methods research: A discussion on its types, challenges, and criticisms. *Journal of Practical Studies in Education*, *2*(2), pp.25-36.

Day-Parker, J. (2021). Essex village dropped as potential site for nuclear fusion plant. *Gazette Standard*. [Online] 25 October 2021. Available at: https://www.gazette-

news.co.uk/news/19670127.bradwell-dropped-list-sites-nuclear-fusion-plant/ [Accessed: 17/02/2023].

Dehner, G., McBeth, M.K., Moss, R. and van Woerden, I. (2023). A zero-carbon nuclear energy future? Lessons learned from perceptions of climate change and nuclear waste. *Energies*, *16*(4), p.2025.

Del Campo, C., Pauser, S., Steiner, E. and Vetschera, R. (2016). Decision making styles and the use of heuristics in decision making. *Journal of Business Economics*, *86*, pp.389-412.

Delicado, A., Figueiredo, E. and Silva, L. (2016). Community perceptions of renewable energies in Portugal: Impacts on environment, landscape, and local development. *Energy Research & Social Science*, *13*, pp.84-93.

Demski, C., Poortinga, W. and Pidgeon, N. (2014). Exploring public perceptions of energy security risks in the UK. *Energy Policy*, *66*, pp.369-378.

Denicolo, P., Bradley-Cole, K. and Long, T. (2016). Constructivist approaches and research methods: A practical guide to exploring personal meanings.

Department for Business, Energy and Industrial Strategy (BEIS). (2020). The impact of the UK's public investments in UKAEA fusion research. [Online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/937633/impact-uk-investment-fusion-research.pdf [Accessed: 10/12/2021].

Department for Business, Energy and Industrial Strategy (DBEIS). (2020). The impact of the UK's public investments in UKAEA fusion research. [Online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file /937633/impact-uk-investment-fusion-research.pdf [Accessed: 10/12/2021].

Department for Business, Energy and Industrial Strategy (DBEIS). (2020). The Ten Point Plan for a Green Industrial Revolution. [Online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/936567/10_POINT_PLAN_BOOKLET.pdf [Accessed: 10/12/21].

Department for Business, Energy and Industrial Strategy (DBEIS). (2021). Net Zero Strategy: Build Back Greener. [Online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf [Accessed: 01/09/2023].

Department for Business, Energy and Industrial Strategy (DBEIS). (2020). The impact of the UK's public investments in UKAEA fusion research. [Online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file /937633/impact-uk-investment-fusion-research.pdf [Accessed: 10/12/2021].

Department for Business, Energy and Industrial Strategy; BEIS. (2020). UK sets ambitious new climate target ahead of UN Summit. [Online] Available at: https://www.gov.uk/government/news/uk-sets-ambitious-new-climate-target-ahead-of-un-summit#:~:text=A%20new%20plan%20aims%20for,decade%2C%20compared%20to%201990%20levels.&text=The%20Prime%20Minister%20has%20today,2030%2C%20compared%20to%201990%20levels. [Accessed: 10/12/21].

Department for Business, Energy and Industrial Strategy; DBEIS. (2020). UK sets ambitious new climate target ahead of UN Summit. [Online] Available at: https://www.gov.uk/government/news/uk-sets-ambitious-new-climate-target-ahead-of-un-summit. [Accessed: 10/12/2021].

Department for Business, Energy and Industrial Strategy; DBEIS. (2020). UK sets ambitious new climate target ahead of UN Summit. [Online] Available at: https://www.gov.uk/government/news/uk-sets-ambitious-new-climate-target-ahead-of-un-summit. [Accessed: 10/12/2021].

Dermont, C., Ingold, K., Kammermann, L. and Stadelmann-Steffen, I. (2017). Bringing the policy making perspective in: A political science approach to social acceptance. *Energy policy*, *108*, pp.359-368.

Devine-Wright, P. (2005) Local aspects of renewable energy development in the UK: public beliefs and policy implications. *Local Environment,* 10(1), 57-69.

Devine-Wright, P. (2007). Reconsidering public attitudes and public acceptance of renewable energy technologies: a critical review. *Beyond Nimbyism: a multidisciplinary investigation of public engagement with renewable energy technologies*, *15*.

Devine-Wright, P. (2008). Reconsidering public acceptance of renewable energy technologies: a critical review. *Delivering a low carbon electricity system: technologies, economics and policy*, pp.1-15.

Devine-Wright, P. and Batel, S. (2017). My neighbourhood, my country or my planet? The influence of multiple place attachments and climate change concern on social acceptance of energy infrastructure. *Global environmental change*, *47*, pp.110-120.

Devine-Wright, P. and Howes, Y. (2010). Disruption to place attachment and the protection of restorative environments: A wind energy case study. *Journal of environmental psychology*, *30*(3), pp.271-280.

Devine-Wright, P. and Peacock, A. (2024). Putting energy infrastructure into place: A systematic review. *Renewable and Sustainable Energy Reviews*, *197*, p.114272.

Devine-Wright, P. (2005). Beyond NIMBYism: towards an integrated framework for understanding public perceptions of wind energy. *Wind Energy: An International Journal for Progress and Applications in Wind Power Conversion Technology*, *8*(2), pp.125-139.

Devine-Wright, P. (2009). Rethinking NIMBYism: The role of place attachment and place identity in explaining place-protective action. *Journal of community & applied social psychology*, *19*(6), pp.426-441.

Devine-Wright, P. (2011). Public engagement with large-scale renewable energy technologies: breaking the cycle of NIMBYism. *Wiley Interdisciplinary Reviews: Climate Change*, *2*(1), pp.19-26.

Devitt, C., Brereton, F., Mooney, S., Conway, D. and O'Neill, E. (2019). Nuclear frames in the Irish media: Implications for conversations on nuclear power generation in the age of climate change. Progress in Nuclear Energy, 110, pp.260-273.

Dewulf, A. (2013). Contrasting frames in policy debates on climate change adaptation. *Wiley Interdisciplinary Reviews: Climate Change*, *4*(4), pp.321-330.

Dijink, G. (2002). *National identity and geopolitical visions: Maps of pride and pain*. Routledge.

Donnarumma, H. (2022). Office for National Statistics. Trends in UK imports and exports of fuels.

Donnarumma, H. (2022). Office for National Statistics. Trends in UK imports and exports of fuels.

Droste-Franke, B., Carrier, M., Kaiser, M., Schreurs, M., Weber, C., Ziesemer, T. and Policy, T.B.S. (2015). Improving energy decisions. *Towards better scientific policy advice for a safe and secure future energy system. Cham: Springer*.

Druckman, J.N. and Bolsen, T. (2011). Framing, motivated reasoning, and opinions about emergent technologies. Journal of communication, 61(4), pp.659-688.

Druckman, J.N. and Bolsen, T. (2011). Framing, motivated reasoning, and opinions about emergent technologies. Journal of communication, 61(4), pp.659-688.

Dunham, W. (2022). Scientists closer to using nuclear fusion as viable fuel source. *I-Independent*. 27 January 2022. Pp 43.

Dunne, C. (2011). The place of the literature review in grounded theory research. *International journal of social research methodology*, *14*(2), pp.111-124.

Dunwoody, S. (1999). Scientists, journalists, and the meaning of uncertainty. *Communicating uncertainty: Media coverage of new and controversial science*, pp.59-79.

Earl, N. (2021). Five sites shortlisted for UK fusion energy plant. *City.A.M.* [Online] 14 October 2021. Available at: https://www.cityam.com/five-sites-shortlisted-for-uk-fusion-energy-plant/ [Accessed: 16/02/2023].

Eaton, W.M., Gasteyer, S.P. and Busch, L. (2014). Bioenergy futures: framing sociotechnical imaginaries in local places. *Rural sociology*, *79*(2), pp.227-256.

EDF Energy. (2023). End of generation at West Burton A. EDF Energy. [Online] Available at: https://www.edfenergy.com/media-centre/news-releases/end-generation-west-burton [Accessed: 08/08/2023].

EDF Energy. (2023). Hunterston B power station. [Online] Available at: https://www.edfenergy.com/energy/power-stations/hunterston-b [Accessed: 18/08/2023].

Egbue, O. and Long, S. (2012). Barriers to widespread adoption of electric vehicles: An analysis of consumer attitudes and perceptions. *Energy policy*, *48*, pp.717-729.

Ejnavarzala, H. (2019). Epistemology–ontology relations in social research: A review. *Sociological Bulletin*, *68*(1), pp.94-104.

Ekins, P. and Zenghelis, D. (2021). The costs and benefits of environmental sustainability. *Sustainability Science*, *16*, pp.949-965.

Emmerich, P., Hülemeier, A.G., Jendryczko, D., Baumann, M.J., Weil, M. and Baur, D., 2020. Public acceptance of emerging energy technologies in context of the German energy transition. *Energy Policy*, *142*, p.111516.

Entman, R.M. (1993). Framing: Toward clarification of a fractured paradigm. *Journal of communication*, *43*(4), pp.51-58.

Epley, N. and Gilovich, T. (2006). The anchoring-and-adjustment heuristic: Why the adjustments are insufficient. *Psychological science*, *17*(4), pp.311-318.
Escobar, O. (2011). Public dialogue and deliberation: A communication perspective for public engagement practitioners.

Escobar, O. (2014). Upstream public engagement, downstream policy-making? The Brain Imaging Dialogue as a community of inquiry. *Science and Public Policy*, *41*(4), pp.480-492.

Evans, J.S.B. (2003). In two minds: dual-process accounts of reasoning. *Trends in cognitive sciences*, *7*(10), pp.454-459.

Evans, J.S.B. and Stanovich, K.E. (2013). Dual-process theories of higher cognition: Advancing the debate. *Perspectives on psychological science*, *8*(3), pp.223-241.

Fairclough, N. (1995). *Media discourse* (pp. 9-14). London: Edward Arnold.

Fast, S. and Mabee, W. (2015). Place-making and trust-building: The influence of policy on host community responses to wind farms. *Energy Policy*, *81*, pp.27-37.

Feldman, S. (1988). Structure and consistency in public opinion: The role of core beliefs and values. *American Journal of political science*, pp.416-440.

Fereday, J. and Muir-Cochrane, E. (2006). Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. *International journal of qualitative methods*, *5*(1), pp.80-92.

Fereday, J. and Muir-Cochrane, E. (2006). Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. *International journal of qualitative methods*, *5*(1), pp.80-92.

Few, R., Brown, K., and Tompkins, E.L. (2007). Public participation and climate change adaptation: avoiding the illusion of inclusion. *Climate policy*, *7*(1), pp.46-59.

Fiorino, D.J. (1990). Citizen participation and environmental risk: A survey of institutional mechanisms. *Science, Technology, & Human Values*, *15*(2), pp.226-243.

Fishkin, J.S., Luskin, R.C. and Jowell, R., (2000). Deliberative polling and public consultation. *Parliamentary affairs*, *53*(4).

Flynn, R. (2007). Risk and the public acceptance of new technologies. In *Risk and the public acceptance of new technologies* (pp. 1-23). London: Palgrave Macmillan UK.

Forsyth, D. (2016). *Impediments implementing renewable energy projects in South Africa*. University of Pretoria (South Africa).

Fossey, E., Harvey, C., McDermott, F. and Davidson, L. (2002). Understanding and evaluating qualitative research. *Australian & New Zealand journal of psychiatry*, *36*(6), pp.717-732.

Foster, D. and Warren, J. (2022). The NIMBY problem. *Journal of Theoretical Politics*, *34*(1), pp.145-172.

Fournis, Y. and Fortin, M.J. (2017). From social 'acceptance' to social 'acceptability' of wind energy projects: towards a territorial perspective. *Journal of environmental planning and management*, *60*(1), pp.1-21.

Fried, M. (2000). Continuities and discontinuities of place. *Journal of environmental psychology*, *20*(3), pp.193-205.

Gambhir, A., Green, F. and Pearson, P.J. (2018). Towards a just and equitable low-carbon energy transition. *Grantham Institute Briefing Paper*, *26*.

Gamson, W.A. and Modigliani, A. (1989). Media discourse and public opinion on nuclear power: A constructionist approach. *American journal of sociology*, *95*(1), pp.1-37.

Gârdan, I.P., Micu, A., Paștiu, C.A., Micu, A.E. and Gârdan, D.A. (2023). Consumers' attitude towards renewable energy in the context of the energy crisis. *Energies*, *16*(2), p.676.

Gebeyehu, B., Adugna, B., Gammie, T., Simane, B. and Mekuriaw, A. (2019). Environmental justice and sustainable development. *Encyclopedia of Sustainability in Higher Education*, pp.601-609.

Gelinas, L., Pierce, R., Winkler, S., Cohen, I.G., Lynch, H.F. and Bierer, B.E. (2017). Using social media as a research recruitment tool: ethical issues and recommendations. *The American Journal of Bioethics*, *17*(3), pp.3-14.

Gelinas, L., Pierce, R., Winkler, S., Cohen, I.G., Lynch, H.F. and Bierer, B.E. (2017). Using social media as a research recruitment tool: ethical issues and recommendations. *The American Journal of Bioethics*, *17*(3), pp.3-14.

Gibbs, G.R. (2012). Thematic Coding and Categorizing In: Analyzing Qualitative Data. *Sage Publications Ltd*. Pp 8.

Gibson, C.B. (2017). Elaboration, generalization, triangulation, and interpretation: On enhancing the value of mixed method research. *Organizational Research Methods*, *20*(2), pp.193-223.

Gigerenzer, G. (2004). Fast and frugal heuristics: The tools of bounded rationality. *Blackwell handbook of judgment and decision making*, *62*, p.88.

Gigerenzer, G. (2008). Why heuristics work. *Perspectives on psychological science*, *3*(1), pp.20-29.

Gigerenzer, G. and Todd, P.M. (1999). Simple heuristics that make us smart. Oxford University Press.

Goedkoop, F. and Devine-Wright, P. (2016). Partnership or placation? The role of trust and justice in the shared ownership of renewable energy projects. *Energy Research & Social Science*, *17*, pp.135-146.

Goffman, E. (1974). *Frame analysis: An essay on the organization of experience*. Harvard University Press.

Golubchikov, O. and O'Sullivan, K. (2020). Energy periphery: Uneven development and the precarious geographies of low-carbon transition. *Energy and Buildings*, *211*, p.109818.

Google Maps. (2022). [Online] Available at: https://www.google.co.uk/maps [Accessed: 30/08/22].

Gordon, J.A., Balta-Ozkan, N. and Nabavi, S.A. (2022). Beyond the triangle of renewable energy acceptance: the five dimensions of domestic hydrogen acceptance. *Applied Energy*, *324*, p.119715.

Gough, C. and Mander, S. (2019). Beyond social acceptability: applying lessons from CCS social science to support deployment of BECCS. *Current sustainable/renewable energy reports*, *6*, pp.116-123.

GOV. (2018). Consultation and pre-decision matters. [Online] Available at: https://www.gov.uk/guidance/consultation-and-pre-decision-matters#Public-consultation [Accessed: 18/08/2023].

GOV. (2018). Consultation and pre-decision matters. [Online] Available at: https://www.gov.uk/guidance/consultation-and-pre-decision-matters#Public-consultation [Accessed: 18/08/2023].

Gov. (2019). Prime Minister hails 'world-leading' fusion research at Culham. [Online] 09 August 2019. Available at: https://www.gov.uk/government/news/prime-minister-hails-world-leading-fusion-research-at-culham [Accessed: 15/02/2023].

GOV. (2020). The Ten Point Plan for a Green Industrial Revolution. [Online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/936567/10_POINT_PLAN_BOOKLET.pdf [Accessed: 10/12/21].

Gov. (2021). First results from UK experiment point to a solution to one of fusion's hottest problems. [Online] 26 May 2021. Available at: https://www.gov.uk/government/news/first-results-from-uk-experiment-point-to-a-solution-to-one-of-fusions-hottest-problems [Accessed: 15/02/2023].

Gov. (2021). New Science Minister chooses UKAEA for first major visit. [Online] 20 October 2021. Available at: https://www.gov.uk/government/news/new-science-minister-chooses-ukaea-for-first-major-visit [Accessed: 03/02/2023].

GOV. (2022). West Burton selected as home of STEP fusion plant. [Online] Available at: https://www.gov.uk/government/news/west-burton-selected-as-home-of-step-fusion-plant#full-publication-update-history [Accessed: 17/08/2023].

Grant, A. (2022). Expert urges Scottish Government to back bid for world's first fusion power plant. *The Scotsman*. [Online] 15 May 2022. Available at: https://www.scotsman.com/news/politics/expert-urges-scottish-government-to-back-bid-for-worlds-first-fusion-power-plant-3693701 [Accessed: 17/02/2023].

Gravelle, T.B. and Lachapelle, E. (2015). Politics, proximity and the pipeline: Mapping public attitudes toward Keystone XL. *Energy Policy*, *83*, pp.99-108.

Gravelle, T.B. and Lachapelle, E. (2015). Politics, proximity and the pipeline: Mapping public attitudes toward Keystone XL. *Energy Policy*, *83*, pp.99-108.

Graystone, M. (2022). Anti-nuclear campaigners mount opposition to Ardeer fusion energy plant. *The Herald*. [Online] 10 February 2022. Available at: https://www.ardrossanherald.com/news/19913861.ayrshire-cnd-more-transparency-needed-ardeer-fusion-plant-plans/ [Accessed: 17/02/2023].

Grechyna, D. (2025). Raising awareness of climate change: Nature, activists, politicians?. *Ecological Economics*, *227*, p.108374.

Greenbank, P. (2003). The role of values in educational research: The case for reflexivity. *British educational research journal*, *29*(6), pp.791-801.

Greenwood, D. (2022). York star role in making energy cheaper. *York Press*. [Online] 09 February 2022. Available at: https://www.yorkpress.co.uk/news/19907142.university-yorks-star-role-making-cheap-energy/ [Accessed: 15/02/2023].

Gregory, R.S. and Satterfield, T.A. (2002). Beyond perception: The experience of risk and stigma in community contexts. *Risk analysis*, *22*(2), pp.347-358.

Griffin, D., Gonzalez, R. and Varey, C. (2001). The heuristics and biases approach to judgment under uncertainty. *Blackwell handbook of social psychology: Intraindividual processes*, *1*, pp.207-235.

Griffiths, T., Pearson, R., Bluck, M. and Takeda, S. (2022). The commercialisation of fusion for the energy market: a review of socio-economic studies. *Progress in Energy*, *4*(4), p.042008.

Gross, C. (2007). Community perspectives of wind energy in Australia: The application of a justice and community fairness framework to increase social acceptance. *Energy policy*, *35*(5), pp.2727-2736.

Gründinger, W. (2017). Drivers of energy transition.

Guan, Y., Yan, J., Shan, Y., Zhou, Y., Hang, Y., Li, R., Liu, Y., Liu, B., Nie, Q., Bruckner, B. and Feng, K., (2023). Burden of the global energy price crisis on households. *Nature Energy*, *8*(3), pp.304-316.

Guess, A.M., Lerner, M., Lyons, B., Montgomery, J.M., Nyhan, B., Reifler, J. and Sircar, N. (2020). A digital media literacy intervention increases discernment between mainstream and false news in the United States and India. *Proceedings of the National Academy of Sciences*, *117*(27), pp.15536-15545.

Gupta, K., Jenkins-Smith, H., Ripberger, J., Silva, C., Fox, A. and Livingston, W. (2024). Americans' Views of Fusion Energy: Implications for Sustainable Public Support. *Fusion Science and Technology*, pp.1-17.

Gustafsson, J. (2017). Single case studies vs. multiple case studies: A comparative study.

Haas, P. (2004). When does power listen to truth? A constructivist approach to the policy process. *Journal of European public policy*, *11*(4), pp.569-592.

Hafenbrädl, S., Waeger, D., Marewski, J.N. and Gigerenzer, G. (2016). Applied decision making with fast-and-frugal heuristics. *Journal of Applied Research in Memory and Cognition*, *5*(2), pp.215-231.

Haggett, C. (2011). Understanding public responses to offshore wind power. *Energy policy*, *39*(2), pp.503-510.

Halfacree, K.H. (2017). Locality and social representation: space, discourse and alternative definitions of the rural. In *The rural* (pp. 245-260). Routledge.

Hall, G. (2022). Giant energy plant near Goole could generate 8,000 jobs in huge economic boost. *Hull Daily Mail*. [Online] 04 July 2022. Available at: https://www.hulldailymail.co.uk/news/jobs/giant-energy-plant-near-goole-7288299 [Accessed: 15/02/2023].

Hamilton, A. (2021). 'STEP' forward in bid to build new Spherical Tokamak power plant at Ardeer. *Ardrossan Herald*. [Online] 01 September 2021. Available at: https://www.ardrossanherald.com/news/19551905.ardeer-bid-build-new-spherical-tokamak-power-plant/ [17/02/2023].

Hanvidge, R. (2022). Ardeer misses out in host site bid for STEP fusion plant. *The Herald*. [Online] 04 October 2022. Available at: https://www.ardrossanherald.com/news/23017652.ardeer-misses-host-site-bid-step-fusion-plant/ [Accessed: 15/03/2023].

Happer, C. and Philo, G. (2013). The role of the media in the construction of public belief and social change. *Journal of social and political psychology*, *1*(1), pp.321-336.

Hawley, Z. (2021). Ratcliffe makes the short list for site of fusion energy plant. Nottingham Post. [Online] 9 December 2021. Available at: https://www.nottinghampost.com/news/local-news/fusion-energy-plant-shortlisting-welcomed-6316955 [Accessed: 16/07/2024].

Heiskanen, E., Hodson, M., Mourik, R.M., Raven, R.P.J.M., Feenstra, C.F.J., Alcantud, A., Brohmann, B., Daniels, A., Di Fiore, M., Farkas, B. and Fritsche, U. (2008). Factors influencing the societal acceptance of new energy technologies: meta-analysis of recent European projects. *Work Package*, *2*.

Herman, E.S. and Chomsky, N. (2002). *Manufacturing consent: The political economy of the mass media*. Random House.

Hertwich, E., de Larderel, J.A., Arvesen, A., Bayer, P., Bergesen, J., Bouman, E., Gibon, T., Heath, G., Peña, C., Purohit, P. and Ramirez, A. (2016). Green Energy Choices: The benefits, risks, and trade-offs of low-carbon technologies for electricity production.
Hess, D.J. (2007). *Alternative Pathways in Science and Industry: Activism, Innovation, and the Environment in an era of Globalisation*. Mit Press.

Hevia-Koch, P. and Ladenburg, J. (2019). Where should wind energy be located? A review of preferences and visualisation approaches for wind turbine locations. *Energy Research & Social Science*, *53*, pp.23-33.

Ho, S.S., Oshita, T., Looi, J., Leong, A.D. and Chuah, A.S. (2019). Exploring public perceptions of benefits and risks, trust, and acceptance of nuclear energy in Thailand and Vietnam: A qualitative approach. Energy policy, 127, pp.259-268.

Hobman, E.V. and Ashworth, P. (2013). Public support for energy sources and related technologies: The impact of simple information provision. *Energy Policy*, *63*, pp.862-869.

Hodgson, N. (2016). £3m contract win for nuclear specialist site; experts play key role in pioneering fusion project. *Liverpool Echo.* 29 January 2016. Pp. 50.

Hoffrage, U. and Reimer, T. (2004). Models of bounded rationality: the approach of fast and frugal heuristics. Manag Revue 15(4):437–459.

Holmes, A.G.D. (2020). Researcher Positionality--A Consideration of Its Influence and Place in Qualitative Research--A New Researcher Guide. *Shanlax International Journal of Education*, *8*(4), pp.1-10.

Horne, M. (2021). Former dynamite factory could be UK's first fusion energy plant. *The Times*. [Online] 15 October 2021. Available at: https://www.thetimes.co.uk/article/former-dynamite-factory-could-be-uks-first-fusion-energy-plant-vcqdwdbdc [Accessed: 15/02/2023].

Horton, H. (2024). Labour lifts Tories' 'absurd' ban on onshore windfarms. The Guardian. [Online] Available at: https://www.theguardian.com/environment/article/2024/jul/08/labour-lifts-ban-onshore-windfarms-planning-policy [Accessed: 26/10/2024].

Howley, S. and Korein, E. (2024). Social Perceptions of Offshore Wind Energy through the Lens of Acceptance and Justice. *Maritime Technologies, Livelihoods and Economies, 2*.

Hübner, G., Leschinger, V., Müller, F.J. and Pohl, J. (2023). Broadening the social acceptance of wind energy–An Integrated Acceptance Model. *Energy Policy*, *173*, p.113360.

Hulme, M. (2009). *Why we disagree about climate change: Understanding controversy, inaction and opportunity*. Cambridge University Press.

IAEA (2024). Fusion Energy: Status and Future Prospects. International Atomic Energy Agency. [Online] Available at: https://www-pub.iaea.org/MTCD/Publications/PDF/p15777-24-02766E_WFO_web.pdf [Accessed: 15/01/2026]

IAEA. (2023). Fusion - Frequently asked questions. *Can fusion cause a nuclear accident?* [Online] Available at: https://www.iaea.org/topics/energy/fusion/faqs#:~:text=Nuclear%20fission%20power%20plants%20have,which%20is%20an%20inert%20gas. [Accessed: 03/09/2023].

IAEA. (2023). Fusion - Frequently asked questions. *Does Fusion produce radioactive nuclear waste the same way fission does?* [Online] Available at: https://www.iaea.org/topics/energy/fusion/faqs#:~:text=Nuclear%20fission%20power%20plants%20have,which%20is%20an%20inert%20gas. [Accessed: 24/08/2023].

IEA (2022), *Nuclear Power and Secure Energy Transitions*, IEA, Paris. [Online] Available at: https://www.iea.org/reports/nuclear-power-and-secure-energy-transitions [Accessed: 16/09/22].

IEA (2022), *Nuclear Power and Secure Energy Transitions*, IEA, Paris. [Online] Available at: https://www.iea.org/reports/nuclear-power-and-secure-energy-transitions [Accessed: 16/09/2022].

IEA. (2019). Energy Security. [Online] Available at: https://www.iea.org/areas-of-work/energy-security [Accessed] 20/02/2023].

Ikejemba, E.C. and Schuur, P.C. (2020). The empirical failures of attaining the societal benefits of renewable energy development projects in Sub-Saharan Africa. *Renewable energy*, *162*, pp.1490-1498.

Innes, J.E. and Booher, D.E. (2004). Reframing public participation: strategies for the 21st century. *Planning theory & practice*, *5*(4), pp.419-436.

Jacobs, P.T., Baiphethi, M., Ngcobo, N. and Hart, T. (2010). The potential of social grants expenditure to promote local economic development and job creation.

Jacobsson, S. and Lauber, V. (2006). The politics and policy of energy system transformation—explaining the German diffusion of renewable energy technology. *Energy policy*, *34*(3), pp.256-276.

Jacquet, J.B. and Stedman, R.C. (2014). The risk of social-psychological disruption as an impact of energy development and environmental change. *Journal of Environmental Planning and Management*, *57*(9), pp.1285-1304.

Jahn, R.G. and Dunne, B.J. (2007). Science of the subjective. *Explore*, *3*(3), pp.295-305.

Jami, A.A. and Walsh, P.R. (2014). The role of public participation in identifying stakeholder synergies in wind power project development: The case study of Ontario, Canada. *Renewable energy*, *68*, pp.194-202.

Jami, A.A. and Walsh, P.R. (2017). From consultation to collaboration: A participatory framework for positive community engagement with wind energy projects in Ontario, Canada. *Energy research & social science*, *27*, pp.14-24.

Jamieson, K.H. (1993). *Dirty politics: Deception, distraction, and democracy*. Oxford Paperbacks.

Jasanoff, S. (2004). *States of knowledge*. Abingdon, UK: Taylor & Francis.

Jasanoff, S. (2011). Designs on nature: Science and democracy in Europe and the United States. In *Designs on Nature*. Princeton University press.

Jasanoff, S. and Kim, S.H. (2009). Containing the atom: Sociotechnical imaginaries and nuclear power in the United States and South Korea. *Minerva*, *47*, pp.119-146.

Jenkins, S., Parkhill, K., & Demski, C. (2024). Public risk, trust and emerging nuclear technologies: Implications for fusion governance. Energy Research & Social Science, 108, 103348.

Jenkins, K., McCauley, D., Heffron, R., Stephan, H. and Rehner, R. (2016). Energy justice: A conceptual review. *Energy research & social science*, *11*, pp.174-182.

Johansson, B. (2013). Security aspects of future renewable energy systems–A short overview. *Energy*, *61*, pp.598-605.

Johnstone, P. and Hielscher, S. (2017). Phasing out coal, sustaining coal communities? Living with technological decline in sustainability pathways. *The Extractive Industries and Society*, *4*(3), pp.457-461.

Johnstone, P., and Stirling, A. (2021). Hidden military implications of 'building back' with new nuclear in the UK. *Responsible Science Journal*. Issue 3.

Jones, C.R., Oltra, C. and Prades, A. (2021). Predicting attitudes towards fusion energy in Europe: Results of a cross-national public survey in Austria, Finland, Spain and the UK. *Energy research & social science*, *75*, p.102028.

Jones, C.R., Oltra, C., Giacometti, A., Čok, V., Povh, J., Lamut, U., Meskens, G., Kenens, J., Geysmans, R., Turcanu, C. and Ferencz, Z. (2024). The clock is ticking: Understanding the 'mixed feelings' about fusion energy in Europe. *Energy Research & Social Science*, *113*, p.103538.

Ju, A., Jeong, S.H. and Chyi, H.I. (2014). Will social media save newspapers? Examining the effectiveness of Facebook and Twitter as news platforms. *Journalism practice*, *8*(1), pp.1-17.

Jung, H. (2019). The evolution of social constructivism in political science: past to present. *SAGE Open*, *9*(1), p.2158244019832703.

Kaaronen, R.O. (2017). Affording sustainability: Adopting a theory of affordances as a guiding heuristic for environmental policy. *Frontiers in Psychology*, *8*, p.294090.

Kaldellis, J.K., Kapsali, M., Kaldelli, E. and Katsanou, E. (2013). Comparing recent views of public attitude on wind energy, photovoltaic and small hydro applications. *Renewable energy*, *52*, pp.197-208.

Kallis, G., Stephanides, P., Bailey, E., Devine-Wright, P., Chalvatzis, K. and Bailey, I. (2021). The challenges of engaging island communities: Lessons on renewable energy from a review of 17 case studies. *Energy Research & Social Science*, *81*, p.102257.

Kandil, S. (2023). Public Participation Guide: Stakeholder Interviews. United States Environmental Protection Agency. [Online] Available at: https://www.epa.gov/international-cooperation/public-participation-guide-stakeholder-interviews#:~:text=The%20primary%20purpose%20of%20these,agency%20in%20its%20decision%20process. [Accessed: 13/03/2023].

Kandil, S. (2023). Public Participation Guide: Stakeholder Interviews. United States Environmental Protection Agency. [Online] Available at: https://www.epa.gov/international-cooperation/public-participation-guide-stakeholder-interviews#:~:text=The%20primary%20purpose%20of%20these,agency%20in%20its%20decision%20process. [Accessed: 13/03/2023].

Karlstrøm, H. and Ryghaug, M. (2014). Public attitudes towards renewable energy technologies in Norway. The role of party preferences. *Energy policy*, *67*, pp.656-663.

Kasemir, B., Dahinden, U., Swartling, Å.G., Schüle, R., Tabara, D. and Jaeger, C.C. (2000). Citizens' perspectives on climate change and energy use. *Global environmental change*, *10*(3), pp.169-184.

Keller, C., Siegrist, M. and Gutscher, H. (2006). The role of the affect and availability heuristics in risk communication. *Risk analysis*, *26*(3), pp.631-639.

Kemmis, D. (1990). *Community and the Politics of Place*. University of Oklahoma Press.

Kerley, B. and Starr, G. (2000). Public consultation: adding value or impeding policy?. Agenda: A Journal of Policy Analysis and Reform, pp.185-192.

Kettley, S. (2021). Brexit Britain on cusp of huge win as five UK sites shortlisted for star fusion plant. *Express Online*. [Online] 14 October 2021. Available at: https://www.express.co.uk/news/science/1506158/brexit-britain-nuclear-fusion-plant-five-sites-shortlisted-step-reactor-star-power [Accessed: 15/02/2023].

Khan, J. (2004). Local politics of renewable energy. *Project Planning, Siting Conflicts and Citizen Participation (Lund University, Doctoral Thesis), Lund*.

Khan, M.T., Durrani, M., Ali, A., Inayat, I., Khalid, S. and Khan, K.H. (2016). Sentiment analysis and the complex natural language. *Complex Adaptive Systems Modelling*, *4*, pp.1-19.

Kim, Y., Kim, W. and Kim, M. (2014). An international comparative analysis of public acceptance of nuclear energy. *Energy Policy*, *66*, pp.475-483.

Kimpton, A., Wickes, R. and Corcoran, J. (2014). Greenspace and place attachment: Do greener suburbs lead to greater residential place attachment?. *Urban Policy and Research*, *32*(4), pp.477-497.

Kitt, S., Axsen, J., Long, Z. and Rhodes, E. (2021). The role of trust in citizen acceptance of climate policy: Comparing perceptions of government competence, integrity, and value similarity. *Ecological Economics*, *183*, p.106958.

Klein, J.T. (2007). Interdisciplinary approaches in social science research. *The SAGE handbook of social science methodology. SAGE Publications, Los Angeles*, pp.32-50.

Knauf, J. (2022). Can't buy me acceptance? Financial benefits for wind energy projects in Germany. *Energy Policy*, *165*, p.112924.

Knott, E., Rao, A.H., Summers, K. and Teeger, C. (2022). Interviews in the social sciences. *Nature Reviews Methods Primers*, *2*(1), p.73.

Komendantova, N., Yazdanpanah, M. and Shafiei, R. (2018). Studying young peoples' views on deployment of renewable energy sources in Iran through the lenses of Social Cognitive Theory. *AIMS Energy*, *6*(2), pp.216-228.

Kosenius, A.K. and Ollikainen, M. (2013). Valuation of environmental and societal trade-offs of renewable energy sources. *Energy Policy*, *62*, pp.1148-1156.

Kox, T., Göber, M., Wentzel, B., Freundl, E. and Rust, H.W. (2020), September. Fostering weather and climate literacy among pupils by engagement in a weather citizen science project. In *Proceedings of Austrian Citizen Science Conference*.

Krippendorff, K. (2018). *Content analysis: An introduction to its methodology*. Sage publications.

Kuchler, M. and Stigson, G.M. (2024). Unravelling the 'collective' in sociotechnical imaginaries: A literature review. *Energy Research & Social Science*, *110*, p.103422.

Kühne, O. (2018). *Landscape and power in geographical space as a social-aesthetic construct*. Springer.

Küpers, S. and Batel, S. (2023). Time, history and meaning-making in research on people's relations with renewable energy technologies (RETs)–A conceptual proposal. *Energy Policy*, *173*, p.113358.

Kvale, S. (2009). Interviews: Learning the craft of qualitative research interviewing.

Labour. (2024). Make Britain A Clean Energy Superpower. [Online] Available at: https://labour.org.uk/change/make-britain-a-clean-energy-superpower/ [Accessed: 10/09/24].

Lachapelle, E., Montpetit, É. and Gauvin, J.P. (2014). Public perceptions of expert credibility on policy issues: The role of expert framing and political worldviews. *Policy Studies Journal*, *42*(4), pp.674-697.

Laerd Statistics (2018) [Online] Available at: https://statistics.laerd.com/statistical-guides/independent-t-test-statistical-guide.php [Accessed: 12/10/2022].

Lai, H.L., Devine-Wright, P., Hamilton, J., Mander, S., Clery, D., Rattle, I., Martin, A., Ryder, S. and Taylor, P. (2025). A Place-based, Just Transition framework can guide industrial decarbonisation with a social licence. *Energy Research & Social Science*, *121*, p.103967.

Larson, K.L., Casagrande, D., Harlan, S.L. and Yabiku, S.T. (2009). Residents' yard choices and rationales in a desert city: social priorities, ecological impacts, and decision trade-offs. *Environmental management*, *44*, pp.921-937.

Lauri, M.A. (2011). Triangulation of data analysis techniques. *Papers on Social Representations*, *20*(2), pp.34-1.

Lawson, T. (2019). *The nature of social reality: Issues in social ontology*. Routledge.

Lazarus, R.J. (1992). Pursuing Environment Justice: The Distributional Effects of Environmental Protection. *Nw. UL Rev.*, *87*, p.787.

Lee, C.J., Scheufele, D.A. and Lewenstein, B.V. (2005). Public attitudes toward emerging technologies: Examining the interactive effects of cognitions and affect on public attitudes toward nanotechnology. *Science communication*, *27*(2), pp.240-267.

Lee, C.J.G. (2012). 'Reconsidering constructivism in qualitative research'. *Educational Philosophy and theory*, *44*(4), pp.403-412.

Lee, J. and Reiner, D.M. (2023). Determinants of public preferences on low-carbon energy sources: Evidence from the United Kingdom. *Energy*, *284*, p.128704.

Lefèvre, N. (2010). Measuring the energy security implications of fossil fuel resource concentration. *Energy policy*, *38*(4), pp.1635-1644.

Lejarraga, J. and Pindard-Lejarraga, M. (2020). Bounded rationality: Cognitive limitations or adaptation to the environment? The implications of ecological rationality for management learning. *Academy of Management Learning & Education*, *19*(3), pp.289-306.

Lennon, B., Dunphy, N.P. and Sanvicente, E. (2019). Community acceptability and the energy transition: A citizens' perspective. *Energy, Sustainability and Society*, *9*(1), pp.1-18.

Letters. (2022). Letters: We should not fall for nuclear spin. Let's look to fulfil our green energy potential. [Online] 06 July 2022. Available at: https://www.heraldscotland.com/news/20258112.letters-not-fall-nuclear-spin-look-fulfil-green-energy-potential/ [Accessed: 17/02/2023].

Levenda, A.M., Behrsin, I. and Disano, F. (2021). Renewable energy for whom? A global systematic review of the environmental justice implications of renewable energy technologies. *Energy Research & Social Science*, *71*, p.101837.

Levitt, M. (2003). Public consultation in bioethics. What's the point of asking the public when they have neither scientific nor ethical expertise?. Health care analysis, 11(1), pp.15-25.

Lewicka, M. (2008). Place attachment, place identity, and place memory: Restoring the forgotten city past. *Journal of environmental psychology*, *28*(3), pp.209-231.

Linstrom, M. and Marais, W. (2012). Qualitative news frame analysis: a methodology. Communitas, 17, pp.21-38.

Lippmann, W. (1922). Public Opinion. New York: Harcourt, Brace & Comp.
Liu, B. (2010). Sentiment analysis and subjectivity. *Handbook of natural language processing*, *2*(2010), pp.627-666.

Liu, L., Bouman, T., Perlaviciute, G. and Steg, L. (2019). Effects of trust and public participation on acceptability of renewable energy projects in the Netherlands and China. *Energy Research & Social Science*, *53*, pp.137-144.

Llewellyn, S., Brookes, S. and Mahon, A. (2013). *Trust and confidence in government and public services*. Routledge.

Longhurst, R. (2003). Semi-structured interviews and focus groups. *Key methods in geography*, *3*(2), pp.143-156.

Low, S.M. and Lawrence-Zúñiga, D. (2003). The anthropology of space and place: Locating culture. *(No Title)*.

Luan, S., Reb, J. and Gigerenzer, G. (2019). Ecological rationality: Fast-and-frugal heuristics for managerial decision making under uncertainty. *Academy of Management Journal*, *62*(6), pp.1735-1759.

Lucas, C. (2010). Nuclear is not a viable energy stop-gap. *Sunday Herald*. 07 November 2010. Pp. 5.

Lucas, H., Carbajo, R., Machiba, T., Zhukov, E. and Cabeza, L.F. (2021). Improving public attitude towards renewable energy. *Energies*, *14*(15), p.4521.

Lynch, D. (2022). UK's first prototype fusion energy plant to be built by 2040 – Rees-Mogg. *Evening Standard*. [Online] 03 October 2022. Available at: https://www.standard.co.uk/tech/science/jacob-reesmogg-conservative-party-birmingham-david-lynch-oxfordshire-b1029912.html [Accessed: 16/02/2023].

MacArthur, J.L. (2016). Challenging public engagement: participation, deliberation and power in renewable energy policy. *Journal of Environmental Studies and Sciences*, *6*, pp.631-640.

McCauley, D., Ramasar, V., Heffron, R.J., Sovacool, B.K., Mebratu, D. and Mundaca, L., (2019). Energy justice in the transition to low carbon energy systems: Exploring key themes in interdisciplinary research. *Applied energy*, *233*, pp.916-921.

Macdonald, C., Glass, J. and Creamer, E. (2017). What is the benefit of community benefits? Exploring local perceptions of the provision of community benefits from a commercial wind energy project. *Scottish Geographical Journal*, *133*(3-4), pp.172-191.

Macintosh, A. (2004). Using information and communication technologies to enhance citizen engagement in the policy process.

MacLeod, C. and Campbell, L. (1992). Memory accessibility and probability judgments: an experimental evaluation of the availability heuristic. *Journal of personality and social psychology*, *63*(6), p.890.

Macnaghten, P., Davies, S.R. and Kearnes, M. (2019). Understanding public responses to emerging technologies: a narrative approach. *Journal of Environmental Policy & Planning*, *21*(5), pp.504-518.

Magidi, M. (2024). The Cost of Premature Deindustrialisation and the Economic Crisis for Young People in a Zimbabwean Town. *Commonwealth Youth and Development*, pp.19-pages.
Mah, A. (2012). *Industrial ruination, community, and place: Landscapes and legacies of urban decline*. University of Toronto Press.

Maheswaran, D., Mackie, D.M. and Chaiken, S. (1992). Brand name as a heuristic cue: The effects of task importance and expectancy confirmation on consumer judgments. *Journal of consumer psychology*, *1*(4), pp.317-336.

Mail Online. (2014). Is this the holy grail of green power? Zero-emission fusion reactor promises 'cheaper than coal' energy. Mail Online. [Online] 14 October 2014. Available at: https://www.dailymail.co.uk/sciencetech/article-2792848/is-holy-grail-green-power-zero-emission-fusion-reactor-promises-cheaper-coal-energy.html [Accessed: 16/07/2024].

Manzo, L.C. and de Carvalho, L.P. (2020). The role of qualitative approaches to place attachment research. In *Place Attachment* (pp. 111-126). Routledge.

Marriott, S. (2021). Power station site near Gainsborough in running for 'world-leading' fusion energy plant. *Gainsborough Standard*. [Online] 17 March 2021. Available at: https://www.lincolnshireworld.com/news/people/power-station-site-near-gainsborough-in-running-for-world-leading-fusion-energy-plant-3169045 [Accessed: 17/02/2023].

Martins, A.C., Marques, R.C. and Cruz, C.O. (2011). Public–private partnerships for wind power generation: The Portuguese case. *Energy policy*, *39*(1), pp.94-104.

Martos, A., Pacheco-Torres, R., Ordóñez, J. and Jadraque-Gago, E. (2016). Towards successful environmental performance of sustainable cities: Intervening sectors. A review. *Renewable and Sustainable Energy Reviews*, *57*, pp.479-495.

Mason, R. (2021). Anti-nuclear campaigners slam fusion reactor as attempt to 'keep industry alive'. *The National*. [Online] 15 October 2021. https://www.thenational.scot/news/19651051.scottish-cnd-slam-fusion-reactor-attempt-keep-industry-alive/ [Accessed: 17/02/2023].

Massey, N. (2022). Major landmark on road to creating fusion energy. *National Edition*. 10 February 2022. Pg. 5.

Mathews, J.A. (2013). The renewable energies technology surge: A new techno-economic paradigm in the making?. *Futures*, *46*, pp.10-22.

Mbah, R.E. and Wasum, D.F. (2022). Russian-Ukraine 2022 War: A review of the economic impact of Russian-Ukraine crisis on the USA, UK, Canada, and Europe. *Advances in Social Sciences Research Journal*, *9*(3), pp.144-153.

McCombs, M. (2005). A look at agenda-setting: Past, present, and future. *Journalism studies*, *6*(4), pp.543-557.

McCombs, M. and Ghanem, S.I. (2001). The convergence of agenda setting and framing. *Framing public life: Perspectives on media and our understanding of the social world*, pp.67-81.

McCombs, M. and Shaw, D. (1972). The agenda-setting function of mass media. Public Opinion Quarterly, 36, 176-185.

McCombs, M. and Valenzuela, S. (2020). *Setting the agenda: Mass media and public opinion*. John Wiley & Sons.

McConnell, S. (2022). Anti-nuclear campaigners' rail against new power facility plans on Ayrshire coast. *Daily Record*. [Online] 07 April 2022. Available at: https://www.dailyrecord.co.uk/ayrshire/anti-nuclear-campaigners-rail-against-26658767 [Accessed: 16/02/2023].

McGowan, E. (2021). Ayrshire site in running to be future home of UK prototype fusion energy plant. *Daily Record*. [Online] 18 July 2021. Available at: https://www.dailyrecord.co.uk/ayrshire/ayrshire-site-running-future-home-24550703 [Accessed: 17/02/2023].

McGrath, C. (2018). 'The Holy Grail' Scientists claim nuclear fusion method could mean LIMITLESS energy supply. *Express Online*. [Online] 19 June 2018. Available at: https://www.express.co.uk/news/science/976653/scientists-nuclear-fusion-method-limitless-energy-supply-decades [Accessed: 15/02/2023].

McWilliams, B., Sgaravatti, G., Tagliapietra, S. and Zachmann, G. (2023). How would the European Union fare without Russian energy?. *Energy Policy*, *174*, p.113413.

Milbourne, P. (2010). The geographies of poverty and welfare. *Geography Compass*, *4*(2), pp.158-171.

Milbourne, P. and Kitchen, L. (2014). Rural mobilities: Connecting movement and fixity in rural places. *Journal of rural studies*, *34*, pp.326-336.

Milchram, C., Van de Kaa, G., Doorn, N. and Künneke, R. (2018). Moral values as factors for social acceptance of smart grid technologies. *Sustainability*, *10*(8), p.2703.

Milligan, M.J. (1998). Interactional past and potential: The social construction of place attachment. *Symbolic interaction*, *21*(1), pp.1-33.

Mlilo, N., Brown, J. and Ahfock, T. (2021). Impact of intermittent renewable energy generation penetration on the power system networks–A review. *Technology and Economics of Smart Grids and Sustainable Energy*, *6*(1), p.25.

Mojtahed, R., Nunes, M.B., Martins, J.T. and Peng, A. (2014). Equipping the constructivist researcher: The combined use of semi-structured interviews and decision-making maps. *Electronic Journal of Business Research Methods*, *12*(2), pp. 87-95.

Morris, C. and Jungjohann, A. (2016). Energy democracy. *Germanys Energiewende to Renewables*. Springer.

Morris, P. and Smyth, J. H. (2007) 'An epistemological evaluation of research into projects and their management: Methodological issues', *International Journal of Project Management,* 25(4), pp.423- 436.

Morrison, H. (2022). Nicola Sturgeon hits back after UK Government's nuclear plans revealed. *The National*. [Online] 09 April 2022. Available at: https://www.thenational.scot/news/20057654.nicola-sturgeon-hits-back-scottish-nuclear-site-deliberations/ [Accessed: 17/02/2023].

Morrison, H. (2022). Scotland loses out to England in bid for new nuclear fusion plant. *The National*. [Online] 04 October 2022. Available at: https://www.thenational.scot/news/a23018022.scotlands-ardeer-bid-new-nuclear-fusion-plant-beaten-nottinghamshire-site/ [Accessed: 15/03/2023].

Morrissey, J., Axon, S., Aiesha, R., Hillman, J., Lennon, B. and Dunphy, N. (2017). Energy system visioning and low-carbon configurations.

Moy, P. and Bosch, B. (2013). Theories of public opinion.

Munro, F.R. and Cairney, P. (2020). A systematic review of energy systems: The role of policymaking in sustainable transitions. *Renewable and Sustainable Energy Reviews*, *119*, p.109598.

National Audit Office (NAO). (2022). *The energy supplier market*. [online] London: NAO. Available at: https://www.nao.org.uk/reports/the-energy-supplier-market/ [Accessed 23 May 2025].

Nawaz, S., Peterson St-Laurent, G. and Satterfield, T. (2023). Public evaluations of four approaches to ocean-based carbon dioxide removal. *Climate Policy*, *23*(3), pp.379-394.

Nazir, M.S., Bilal, M., Sohail, H.M., Liu, B., Chen, W. and Iqbal, H.M. (2020). Impacts of renewable energy atlas: Reaping the benefits of renewables and biodiversity threats. *International Journal of Hydrogen Energy*, *45*(41), pp.22113-22124.

NEA (National Energy Action). (2023). UK FUEL POVERTY MONITOR 2021-2022. The hardest hit: Impact of the energy crisis.

Neresini, F. and Lorenzet, A. (2016). Can media monitoring be a proxy for public opinion about technoscientific controversies? The case of the Italian public debate on nuclear power. Public Understanding of Science, 25(2), pp.171-185.

Nerlich, B. and McLeod, C. (2016). The dilemma of raising awareness "responsibly" The need to discuss controversial research with the public raises a conundrum for scientists: when is the right time to start public debates?. *EMBO reports*, *17*(4), pp.481-485.

Nijaki, L.K. (2015). Justifying and juxtaposing environmental justice and sustainability: Towards an inter-generational and intra-generational analysis of environmental equity in public administration. *Public Administration Quarterly*, pp.85-116.

Nguyen, M.T. and Batel, S. (2021). A critical framework to develop human-centric positive energy districts: towards justice, inclusion, and well-being. *Frontiers in Sustainable Cities*, *3*, p.691236.

Nguyen, V.P. and Yim, M.S. (2018). Examination of different socioeconomic factors that contribute to the public acceptance of nuclear energy. Nuclear Engineering and Technology, 50(5), pp.767-772.

Nicolopoulou, A. (1993). Play, cognitive development, and the social world: Piaget, Vygotsky, and beyond. *Human development*, *36*(1), pp.1-23.

Nisbet, M.C. and Scheufele, D.A. (2009). What's next for science communication? Promising directions and lingering distractions. *American journal of botany*, *96*(10), pp.1767-1778.

Nisbet, M.C. (2009). Communicating climate change: Why frames matter for public engagement. *Environment: Science and policy for sustainable development*, *51*(2), pp.12-23.

Norris, L., Bristow, G., Cotterill, E., Healy, A. and Marshall, A.P. (2024). Decarbonisation, place attachment and agency: just transition in old industrial regions. *Contemporary Social Science*, pp.1-20.

North Ayrshire Council. (2024). Stevenston Local Place Plan. [Online] Available at: https://www.north-ayrshire.gov.uk/Document-library/stevenston-local-place-plan.pdf [Accessed: 17/09/2024].

Office for National Statistics (ONS) (2024) *Labour market profile: West Lindsey*. Office for National Statistics. Available at: https://www.ons.gov.uk/visualisations/labourmarketlocal/E07000142/ (Accessed: 24/01/2026.)

Oliffe, J.L., Kelly, M.T., Gonzalez Montaner, G. and Yu Ko, W.F. (2021). Zoom interviews: Benefits and concessions. *International Journal of Qualitative Methods*, *20*, p.16094069211053522.

Oliver, M. (2017). Didcot-based Tokamak Energy says fusion energy could power grid by 2030. *Oxford Mail*. [Online] 26 January 2017. Available at: https://www.oxfordmail.co.uk/news/15050198.didcot-based-tokamak-energy-says-fusion-energy-power-grid-2030/ [Accessed: 03/02/2023].

Ong, A.K.S., Prasetyo, Y.T., Salazar, J.M.L.D., Erfe, J.J.C., Abella, A.A., Young, M.N., Chuenyindee, T., Nadlifatin, R. and Redi, A.A.N.P. (2022). Investigating the acceptance of the reopening bataan nuclear power plant: Integrating protection motivation theory and extended theory of planned behavior. Nuclear Engineering and Technology, 54(3), pp.1115-1125.

Oskamp, S. and Schultz, P.W. (2005). *Attitudes and opinions*. Psychology Press.

Ouayed, A.J. (1990). *Manipulation of semantics and syntax: the use of emotive language in English and Arabic news reports and editorials with reference to translation* (Doctoral dissertation, University of Glasgow).

Packer, M.J. and Goicoechea, J. (2000). Sociocultural and constructivist theories of learning: Ontology, not just epistemology. *Educational psychologist*, *35*(4), pp.227-241

Palaganas, E.C., Sanchez, M.C., Molintas, M.V.P. and Caricativo, R.D. (2017). Reflexivity in qualitative research.

Parkhill, K.A., Butler, C. and Pidgeon, N.F. (2014). Landscapes of threat? Exploring discourses of stigma around large energy developments. *Landscape Research*, *39*(5), pp.566-582.

Parkhill, K., Demski, C.C., Butler, C., Spence, A. and Pidgeon, N.F. (2013). Transforming the UK energy system: public values, attitudes and acceptability-synthesis report.

Parkhill, K.A., Pidgeon, N.F., Henwood, K.L., Simmons, P. and Venables, D. (2010). From the familiar to the extraordinary: local residents' perceptions of risk when living with nuclear power in the UK. *Transactions of the Institute of British Geographers*, *35*(1), pp.39-58.

Parkins, J.R., Rollins, C., Anders, S. and Comeau, L. (2018). Predicting intention to adopt solar technology in Canada: The role of knowledge, public engagement, and visibility. *Energy Policy*, *114*, pp.114-122.

Paul, J. (2022). Brexit Britain handed major boost as scientists crack code to harness STAR energy. Express Online. [Online] 27 January 2022. Available at:

https://www.express.co.uk/news/science/1556626/brexit-britain-star-energy-nuclear-fusion-plasma-net-zero-climate-change [Accessed: 16/07/2024].

Paul, J. (2022). UK's nuclear fusion quest to harness 'limitless clean energy' takes major step forward. *Express Online*. [Online] 13 October 2022. Available at: https://www.express.co.uk/news/science/1682515/uk-nuclear-fusion-energy-tokamak-ukaea [Accessed: 16/02/2023].

Payne, J.W., Bettman, J.R. and Johnson, E.J. (1993). The adaptive decision maker. Cambridge University Press.

Pehl, M., Arvesen, A., Humpenöder, F., Popp, A., Hertwich, E.G. and Luderer, G. (2017). Understanding future emissions from low-carbon power systems by integration of life-cycle assessment and integrated energy modelling. *Nature Energy*, *2*(12), pp.939-945.

Perlaviciute, G. and Steg, L. (2014). Contextual and psychological factors shaping evaluations and acceptability of energy alternatives: Integrated review and research agenda. *Renewable and Sustainable Energy Reviews*, *35*, pp.361-381.

Perlaviciute, G. and Steg, L. (2015). The influence of values on evaluations of energy alternatives. *Renewable energy*, *77*, pp.259-267.

Perlaviciute, G., Schuitema, G., Devine-Wright, P. and Ram, B. (2018). At the heart of a sustainable energy transition: The public acceptability of energy projects. *IEEE Power and Energy Magazine*, *16*(1), pp.49-55.

Peters, M., Fudge, S. and Sinclair, P. (2010). Mobilising community action towards a low-carbon future: Opportunities and challenges for local government in the UK. *Energy Policy*, *38*(12), pp.7596-7603.

Peterson, T.R., Stephens, J.C. and Wilson, E.J. (2015). Public perception of and engagement with emerging low-carbon energy technologies: A literature review. *MRS Energy & Sustainability*, *2*, p.E11.

Petty, R.E. and Briñol, P. (2011). The elaboration likelihood model. *Handbook of theories of social psychology*, *1*, pp.224-245.

Phellas, C.N., Bloch, A. and Seale, C. (2011). Structured methods: interviews, questionnaires and observation. *Researching society and culture*, *3*(1), pp.23-32.
Piaget, J. (1976). Piaget's theory.

Pidgeon, N. and Demski, C.C. (2012). From nuclear to renewable: Energy system transformation and public attitudes. *Bulletin of the Atomic Scientists*, *68*(4), pp.41-51.

Pidgeon, N.F., Lorenzoni, I. and Poortinga, W. (2008). Climate change or nuclear power—No thanks! A quantitative study of public perceptions and risk framing in Britain. Global Environmental Change, 18(1), pp.69-85.

Pidgeon, N., Simmons, P., Sarre, S., Henwood, K. and Smith, N. (2008). The ethics of socio-cultural risk research.

Pintus, V., Sulfaro, N. and Ţiganea, O.C. (2024). Production Landscapes in an Energy Transition Perspective. Industrial Heritage Preservation, Socio-Political Issues, and Potential Reuse. In *INTERNATIONAL SYMPOSIUM: New Metropolitan Perspectives* (pp. 75-84). Cham: Springer Nature Switzerland.

Planning Act 2008, c. 2. London: The Stationary Office.

Poortinga, W., Pidgeon, N. and Lorenzoni, I. (2006). Public perceptions of nuclear power, climate change and energy options in Britain: summary findings of a survey conducted during October and November 2005. Tyndall Centre for Climate Change Research. School of Environmental Sciences. University of East Anglia.

Poria, S., Hazarika, D., Majumder, N. and Mihalcea, R. (2020). Beneath the tip of the iceberg: Current challenges and new directions in sentiment analysis research. *IEEE transactions on affective computing*, *14*(1), pp.108-132.

Potter, W.J. (2018). *Media literacy*. Sage publications.

Poumadère, M., Bertoldo, R. and Samadi, J. (2011). Public perceptions and governance of controversial technologies to tackle climate change: nuclear power, carbon capture and storage, wind, and geoengineering. *Wiley Interdisciplinary Reviews: Climate Change*, *2*(5), pp.712-727.

Prades, A., Delicado, A., Schmidt, L., Turcanu, C., Meskens, G., Perko, T., Ward, D. and Oltra, C. (2018). Social Research on Fusion (No. IAEA-CN--234).

Price, V. (1992). *Public opinion* (Vol. 4). Sage.

Prindle, B., Eldridge, M., Eckhardt, M. and Frederick, A. (2007). The twin pillars of sustainable energy: synergies between energy efficiency and renewable energy technology and policy. *Washington, DC: American Council for an Energy-Efficient Economy*.

Pryor, J., (2001). 'Highlights of Recent Epistemology'. *British Journal for the Philosophy of Science*, *52*(1).

Punch, K.F. (2013). *Introduction to social research: Quantitative and qualitative approaches*. sage.

Qazi, A., Hussain, F., Rahim, N.A., Hardaker, G., Alghazzawi, D., Shaban, K. and Haruna, K. (2019). Towards sustainable energy: a systematic review of renewable energy sources, technologies, and public opinions. *IEEE access*, *7*, pp.63837-63851.

Qi, W.H., Qi, M.L. and Ji, Y.M., 2020. The effect path of public communication on public acceptance of nuclear energy. Energy Policy, 144, p.111655.

Quinn, B., and Stacey, K. (2023). Keir Starmer says nuclear power is 'critical part' of UK's energy mix. The Guardian. [Online] Available at: https://www.theguardian.com/politics/2023/jun/04/keir-starmer-says-nuclear-power-is-critical-part-of-uks-energy-mix [Accessed: 11/09/2024].

Raddon, A., (2010). 'Early stage research training: Epistemology & ontology in social science research'. *Generic Skills Training for Research Students*, pp.1-14.

Radowitz, J.V. (2014). Defence firm hails new atomic age. *Huffington Post*. https://www.huffingtonpost.co.uk/2014/10/16/lockheed-martin-unveils-compact-fusion-reactor_n_5997130.html [Online] 16 October 2014. Available at: [Accessed: 15/02/2023].

Randall, I. (2022). Brexit triumph: UK to beat European project in race to commercial fusion. *Express Online*. [Online] 09 July 2022. Available at: https://www.express.co.uk/news/science/1638061/brexit-news-energy-uk-beat-european-project-commercial-fusion-update [Accessed: 02/02/2023].

Rayner, S. (2010). Trust and the transformation of energy systems. *Energy Policy*, *38*(6), pp.2617-2623.

Reed, M.S. (2008). Stakeholder participation for environmental management: a literature review. *Biological conservation*, *141*(10), pp.2417-2431.

Reilly, K., O'Hagan, A.M. and Dalton, G. (2016). Moving from consultation to participation: A case study of the involvement of fishermen in decisions relating to marine renewable energy projects on the island of Ireland. *Ocean & Coastal Management*, *134*, pp.30-40.

Reitz, S., Goshen, L. and Ohlhorst, D. (2022). Trade-offs in German wind energy expansion: building bridges between different interests, values, and priorities. *Energy, Sustainability and Society*, *12*(1), p.39.

Renn, O. and Benighaus, C. (2013). Perception of technological risk: insights from research and lessons for risk communication and management. *Journal of Risk Research*, *16*(3-4), pp.293-313.

Revez, A., Dunphy, N., Harris, C., Rogan, F., Byrne, E., McGookin, C., Bolger, P., Ó Gallachóir, B., Barry, J., Ellis, G. and O'Dwyer, B. (2022). Mapping emergent public engagement in societal transitions: a scoping review. *Energy, Sustainability and Society*, *12*, pp.1-18.

Rice, L. (2022). Major breakthrough made in county in copying process which powers the sun. *Oxford Mail*. [Online] 09 February 2022. Available at: https://www.oxfordmail.co.uk/news/19908606.major-breakthrough-fusion-research-made-oxfordshire/ [Accessed: 16/02/2023].

Richards, X. (2022). UK Government IS considering new nuclear site in Scotland \xE2 despite Tory pledge. *The National*. [Online] 22 January 2022. Available at: https://www.thenational.scot/news/19867784.uk-government-consider-ayrshire-coast-nuclear-plant-despite-scottish-government-opposition/ [Accessed: 17/02/2023].

Robins, N., Gouldson, A., Irwin, W. and Sudmant, A. (2019). Investing in a just transition in the UK: How investors can integrate social impact and place-based financing into climate strategies. *UK: Grantham Research Institute at LSE and the Sustainability Research Institute at the University of Leeds*.

Robinson, O.C. (2014). Sampling in interview-based qualitative research: A theoretical and practical guide. *Qualitative research in psychology*, *11*(1), pp.25-41.

Robinson, P. (2008). The role of media and public opinion. *Foreign policy: theories, actors, cases*, pp.137-154.

Roddis, P., Roelich, K., Tran, K., Carver, S., Dallimer, M. and Ziv, G. (2020). What shapes community acceptance of large-scale solar farms? A case study of the UK's first 'nationally significant' solar farm. *Solar Energy*, *209*, pp.235-244.

Roe, T., and Smith, A. (2023). Nuclear fusion plant to be built at West Burton A power station.

BBC News. [Online] Available at: https://www.bbc.co.uk/news/uk-england-nottinghamshire-63119465 [Accessed: 11/09/2024].

Rogers-Hayden, T. and Pidgeon, N. (2007). Moving engagement “upstream”? Nanotechnologies and the Royal Society and Royal Academy of Engineering's inquiry. *Public Understanding of Science*, *16*(3), pp.345-364.

Rogge, K.S. and Johnstone, P. (2017). Exploring the role of phase-out policies for low-carbon energy transitions: The case of the German Energiewende. *Energy research & social science*, *33*, pp.128-137.

Rompf, S.A. (2014). *Trust and rationality: an integrative framework for trust research*. Springer.

Rotolo, D., Hicks, D. and Martin, B.R. (2015). What is an emerging technology?. *Research policy*, *44*(10), pp.1827-1843.

Rowan, W., McCarthy, S., Mebrahtu, S., Ertiö, T., Dimova, A., Asenova, D., Moraitis, N. and Revez, A. (2024). Promoting active citizen engagement in sustainable energy transitions: a co-creation approach. *Journal of Decision Systems*, pp.1-12.

Rowley, J. (2002). Using case studies in research. Management research news.

Royce, R. and Jefford, W. (2022). ‘No guarantee’ £20bn fusion power plant will work. BBC. [Online] Available at: https://www.bbc.co.uk/news/uk-england-nottinghamshire-63163966#:~:text=The%20UKAEA%20has%20said%20the,about%20£20bn%20to%20complete. [Accessed: 03/05/2024].

Rudolph, D. and Kirkegaard, J.K. (2019). Making space for wind farms: Practices of territorial stigmatisation in rural Denmark. *Antipode*, *51*(2), pp.642-663.

Russell, A. and Firestone, J. (2021). What’s love got to do with it? Understanding local cognitive and affective responses to wind power projects. *Energy Research & Social Science*, *71*, p.101833.

Sampson, B. (2024). *Fear and Loathing in Ashington: Investigating the impact of deindustrialisation on social capital and its social and political consequences* (Doctoral dissertation, Durham University).

Sanz-Hernández, A. (2020). How to change the sources of meaning of resistance identities in historically coal-reliant mining communities. *Energy Policy*, *139*, p.111353.

Sanz-Hernández, A. (2024). Temporal negotiations and injustices in the energy transition: Perspectives from a Spanish coal region. *Energy Research & Social Science*, *110*, p.103453.

Sarewitz, D. (2004). How science makes environmental controversies worse. *Environmental science & policy*, *7*(5), pp.385-403.

Scannell, L. (2013). *The bases of bonding: The psychological functions of place attachment in comparison to interpersonal attachment*. University of Victoria (Canada).

Schäfer, M.S., O'Neill, S., Nisbet, M., Ho, S., Markowitz, E. and Thaker, J. (2017). Frame analysis in climate change communication: approaches for assessing journalists' minds, online communication and media portrayals.

Scheer, D., Konrad, W. and Wassermann, S. (2017). The good, the bad, and the ambivalent: A qualitative study of public perceptions towards energy technologies and portfolios in Germany. *Energy Policy*, *100*, pp.89-100.

Scheiring, G. and King, L. (2023). Deindustrialization, social disintegration, and health: a neoclassical sociological approach. *Theory and Society*, *52*(1), pp.145-178.

Scheufele, D.A. (1999). Framing as a theory of media effects. *Journal of communication*, *49*(1), pp.103-122.

Schlosberg, D. (2007). Defining Environmental Justice: Theories, Movements, and Nature.

Schmidt, W. (2023). *Public Opinion on Nuclear Power: Conspiratorial Thinking, Narratives, and Misperceptions* (Doctoral dissertation, University of Kansas).

Schwartz, B., Ben-Haim, Y.A.K.O.V. and Dacso, C. (2011). What makes a good decision? Robust satisficing as a normative standard of rational decision making. *Journal for the Theory of Social Behaviour*, *41*(2), pp.209-227.

Schwartz, D. (2018). Designing Contrasting Cases for Inductive Learning. Stanford. [Online]. Available at: https://hstar.stanford.edu/research/designing-contrasting-cases-for-inductive-learning/#:~:text=Based%20on%20prior%20research%2C%20problem,for%20inducing%20similarities%20and%20differences. [Accessed: 13/03/2023].

Schwartz, D. (2018). Designing Contrasting Cases for Inductive Learning. Stanford. [Online]. Available at: https://hstar.stanford.edu/research/designing-contrasting-cases-for-inductive-learning/#:~:text=Based%20on%20prior%20research%2C%20problem,for%20inducing%20similarities%20and%20differences. [Accessed: 13/03/2023].

Scottish Government (2023) *Draft Energy Strategy and Just Transition Plan*. Scottish Government, Edinburgh. Available at: https://www.gov.scot/publications/draft-energy-strategy-transition-plan/ (Accessed: 22/01/2026).

Scottish Government (2020) *Scottish Index of Multiple Deprivation 2020: Local Authority Summary – North Ayrshire*. Scottish Government. Available at: https://northayrshire.community/wp-content/uploads/2020/01/SIMD-2020-Briefing.pdf (Accessed: 24/01/2026).

Scottish Government. (2023). Nuclear Energy. [Online] Available at: https://www.gov.scot/policies/nuclear-energy/#:~:text=We%20are%3A,fulfilling%20our%20nuclear%20responsibilities [Accessed: 18/08/2023].

Scottish Government. (2023). Nuclear Energy. [Online] Available at: https://www.gov.scot/policies/nuclear-energy/#:~:text=We%20are%3A,fulfilling%20our%20nuclear%20responsibilities [Accessed: 18/08/2023].

Scottish Government. (2023). Nuclear Energy. [Online] Available at: https://www.gov.scot/policies/nuclear-energy/#:~:text=We%20are%3A,fulfilling%20our%20nuclear%20responsibilities [Accessed: 18/08/2023].

Scottish Government. (2024) Saltcoats and Stevenston. [Online] Available at: https://statistics.gov.scot/atlas/resource?uri=http%3A%2F%2Fstatistics.gov.scot%2Fid%2Fstatistical-geography%2FS13003149 [Accessed: 17/09/2024].

Seabrook, A. (2021). Council bidding to turn power station into first nuclear fusion plant. *South Wales Echo*. [Online] 23 April 2021. Available at: https://nation.cymru/news/council-bidding-for-worlds-first-nuclear-fusion-power-plant/ [Accessed: 02/02/2023].

Segreto, M., Principe, L., Desormeaux, A., Torre, M., Tomassetti, L., Tratzi, P., Paolini, V. and Petracchini, F. (2020). Trends in social acceptance of renewable energy across Europe—a literature review. *International Journal of Environmental Research and Public Health*, *17*(24), p.9161.

Segreto, M., Principe, L., Desormeaux, A., Torre, M., Tomassetti, L., Tratzi, P., Paolini, V. and Petracchini, F. (2020). Trends in social acceptance of renewable energy across Europe—a literature review. *International Journal of Environmental Research and Public Health*, *17*(24), p.9161.

Seidl, R., Drögemüller, C., Krütli, P. and Walther, C. (2022). The role of trust and risk perception in current German nuclear waste management. Risk Analysis, 42(12), pp.2704-2719.

Selten, R. (1990). Bounded rationality. *Journal of Institutional and Theoretical Economics (JITE)/Zeitschrift für die gesamte Staatswissenschaft*, *146*(4), pp.649-658.

Semadeni, M., Hansmann, R. and Flüeler, T. (2004). Public attitudes in relation to risk and novelty of future energy options. *Energy & Environment*, *15*(5), pp.755-777.

Sen, S. and Ganguly, S. (2017). Opportunities, barriers and issues with renewable energy development–A discussion. *Renewable and sustainable energy reviews*, *69*, pp.1170-1181.

Shah, D.V., McLeod, D.M., Gotlieb, M.R. and Lee, N.J. (2009). Framing and agenda setting. *The Sage handbook of media processes and effects*, pp.83-98.

Shahbaz, M., Raghutla, C., Song, M., Zameer, H. and Jiao, Z. (2020). Public-private partnerships investment in energy as new determinant of CO2 emissions: the role of technological innovations in China. *Energy Economics*, *86*, p.104664.

Sharman, A. and Perkins, R. (2017). Post-decisional logics of inaction: The influence of knowledge controversy in climate policy decision-making. *Environment and Planning A*, *49*(10), pp.2281-2299.

Shaw, K., Hill, S.D., Boyd, A.D., Monk, L., Reid, J. and Einsiedel, E.F. (2015). Conflicted or constructive? Exploring community responses to new energy developments in Canada. *Energy Research & Social Science*, *8*, pp.41-51.

Shipley, R. and Utz, S. (2012). Making it count: A review of the value and techniques for public consultation. *Journal of Planning Literature*, *27*(1), pp.22-42.

Shore, B. and Cross, B.J. (2005). Exploring the role of national culture in the management of large-scale international science projects. *International Journal of Project Management*, *23*(1), pp.55-64.

Simis, M.J., Madden, H., Cacciatore, M.A. and Yeo, S.K. (2016). The lure of rationality: Why does the deficit model persist in science communication?. *Public understanding of science*, *25*(4), pp.400-414.

Simon, H.A. (1990). Bounded rationality. *Utility and probability*, pp.15-18.

Simpson, A. (2021). Ardeer site could be world leader in nuclear fusion after being shortlisted. *The Herald*. [Online] 15 October 2021. Available at: https://www.ardrossanherald.com/news/19647404.ardeer-shortlist-prototype-fusion-energy-plant/ [Accessed: 15/02/2023].

Slevitch, L. (2011). Qualitative and quantitative methodologies compared: Ontological and epistemological perspectives. *Journal of quality assurance in hospitality & tourism*, *12*(1), pp.73-81.

Slovic, P. (1987). Perception of risk. *science*, *236*(4799), pp.280-285.

Smith III, J.P., DiSessa, A.A. and Roschelle, J. (1994). Misconceptions reconceived: A constructivist analysis of knowledge in transition. *The journal of the learning sciences*, *3*(2), pp.115-163.

Smith, D.E. (1999). *Writing the social: Critique, theory, and investigations*. University of Toronto Press.

Smith, E.R. (2002). *Energy, the environment, and public opinion*. Rowman & Littlefield.

Sonnberger, M., Ruddat, M., Arnold, A., Scheer, D., Poortinga, W., Böhm, G., Bertoldo, R., Mays, C., Pidgeon, N., Poumadère, M. and Steentjes, K. (2021). Climate concerned but anti-nuclear: Exploring (dis) approval of nuclear energy in four European countries. *Energy Research & Social Science*, *75*, p.102008.

South West Scotland Environmental Information Centre (swseic). (2022). The secret wildlife of derelict Ardeer. [Online] Available at: https://swseic.org.uk/2017/07/secret-wildlife-derelict-ardeer/ [Accessed: 18/08/2023].

South West Scotland Environmental Information Centre (swseic). (2022). The secret wildlife of derelict Ardeer. [Online] Available at: https://swseic.org.uk/2017/07/secret-wildlife-derelict-ardeer/ [Accessed: 18/08/2023].

South West Scotland Environmental Information Centre (swseic). (2022). The secret wildlife of derelict Ardeer. [Online] Available at: https://swseic.org.uk/2017/07/secret-wildlife-derelict-ardeer/ [Accessed: 18/08/2023].

Sovacool, B.K. and Dworkin, M.H. (2015). Energy justice: Conceptual insights and practical applications. *Applied energy*, *142*, pp.435-444.

Sovacool, B.K., Hess, D.J., Amir, S., Geels, F.W., Hirsh, R., Medina, L.R., Miller, C., Palavicino, C.A., Phadke, R., Ryghaug, M. and Schot, J. (2020). Sociotechnical agendas: Reviewing future directions for energy and climate research. *Energy Research & Social Science*, *70*, p.101617

Sovacool, B.K., Hess, D.J., Cantoni, R., Lee, D., Brisbois, M.C., Walnum, H.J., Dale, R.F., Rygg, B.J., Korsnes, M., Goswami, A. and Kedia, S. (2022). Conflicted transitions: Exploring the actors, tactics, and outcomes of social opposition against energy infrastructure. *Global environmental change*, *73*, p.102473.

Spijkers, O. (2018). Intergenerational equity and the sustainable development goals. *Sustainability*, *10*(11), p.3836.

Spowart, N. (2021). Pressure grows on Scottish Government to oppose nuclear fusion site in Ayrshire. *The National (Scotland)*. [Online] 24 October 2021. Available at: https://www.thenational.scot/news/19668665.pressure-grows-scots-government-oppose-nuclear-fusion-site-ayrshire/ [Accessed: 17/02/2023].

Stadelmann-Steffen, I. and Dermont, C. (2021). Acceptance through inclusion? Political and economic participation and the acceptance of local renewable energy projects in Switzerland. *Energy research & social science*, *71*, p.101818.

Steele, R. (2022). Council backs plans for low-carbon power plant. *Greenock Telegraph*. [Online] 31 January 2022. Available at: https://www.greenocktelegraph.co.uk/news/19881891.ayrshire-low-carbon-power-plant-plan-backed-inverclyde/ [Accessed: 17/02/2023].

Stern, P.C. and Dietz, T. eds. (2008). *Public participation in environmental assessment and decision making*. National Academies Press.

Stilgoe, J., Owen, R. and Macnaghten, P. (2020). Developing a framework for responsible innovation. In *The Ethics of Nanotechnology, Geoengineering, and Clean Energy* (pp. 347-359). Routledge.

Stirling, A. (2005). Opening up or closing down? Analysis, participation and power in the social appraisal of technology. *Science and citizens: Globalization and the challenge of engagement*, *2*, p.218.

Stoutenborough, J.W., Sturgess, S.G. and Vedlitz, A. (2013). Knowledge, risk, and policy support: Public perceptions of nuclear power. Energy Policy, 62, pp.176-184.

Strielkowski, W., Civín, L., Tarkhanova, E., Tvaronavičienė, M. and Petrenko, Y. (2021). Renewable energy in the sustainable development of electrical power sector: A review. *Energies*, *14*(24), p.8240.

Stroud, D., Fairbrother, P., Evans, C. and Blake, J. (2018). Governments matter for capitalist economies: Regeneration and transition to green and decent jobs. *Economic and Industrial Democracy*, *39*(1), pp.87-108.

Stroud, N.J. (2008). Media use and political predispositions: Revisiting the concept of selective exposure. *Political behaviour*, *30*, pp.341-366.

Stryker, S. and Vryan, K.D. (2003). The symbolic interactionist frame. *Handbook of social psychology*, pp.3-28.

Strzelecka, M., Boley, B.B. and Woosnam, K.M. (2017). Place attachment and empowerment: Do residents need to be attached to be empowered?. *Annals of Tourism Research*, *66*, pp.61-73.

Sturgis, P. and Allum, N. (2004). Science in society: Re-evaluating the deficit model of public attitudes. *Public understanding of science*, *13*(1), pp.55-74.

Susur, E. and Karakaya, E. (2021). A reflexive perspective for sustainability assumptions in transition studies. *Environmental Innovation and Societal Transitions*, *39*, pp.34-54.

Svobodova, K., Owen, J.R. and Harris, J. (2021). The global energy transition and place attachment in coal mining communities: Implications for heavily industrialized landscapes. *Energy Research & Social Science*, *71*, p.101831.

Szarka, J. (2007). *Wind power in Europe: politics, business and society*. Springer.

Tanny, T.F. and Al-Hossienie, C.A. (2019). Trust in government: Factors affecting public trust and distrust. *Jahangirnagar Journal of Administrative Studies, Department of Public Administration*, *12*, p.52.

Taylor, J.L. (2022). *Knowledge Controversies and Renewable Energy Transition: Exploring Science and Policy Debates* (Doctoral dissertation, University of Toronto (Canada).

Tewksbury, D. and Scheufele, D.A. (2009). News framing theory and research. In *Media effects* (pp. 33-49). Routledge.

Thaker, J., Howe, P., Leiserowitz, A. and Maibach, E. (2019). Perceived collective efficacy and trust in government influence public engagement with climate change-related water conservation policies. *Environmental Communication*, *13*(5), pp.681-699.

The Rivers Trust. (2024). State of Our Rivers. [Online]. Available at: https://theriverstrust.org/key-issues/state-of-our-rivers [Accessed: 14/07/2024].

Thomas, G., Cherry, C., Groves, C., Henwood, K., Pidgeon, N. and Roberts, E. (2022). "It's not a very certain future": Emotion and infrastructure change in an industrial town. *Geoforum*, *132*, pp.81-91.

Thomas, M., DeCillia, B., Santos, J.B. and Thorlakson, L. (2022). Great expectations: Public opinion about energy transition. *Energy Policy*, *162*, p.112777.

Tietjen, O., Pahle, M. and Fuss, S. (2016). Investment risks in power generation: A comparison of fossil fuel and renewable energy dominated markets. *Energy Economics*, *58*, pp.174-185.

Timmons, D., Harris, J.M. and Roach, B. (2014). The economics of renewable energy. *Global Development And Environment Institute, Tufts University*, *52*, pp.1-52.

Todd, P.M. and Gigerenzer, G. (2012). *Ecological rationality: Intelligence in the world*. OUP USA.

Tonkin, S. (2021). The world's first working nuclear fusion reactor could be coming soon near your town: Five UK sites including Ardeer, Moorside and Severn Edge have been shortlisted for a plant - with operations as early as 2040. *Mail Online*. [Online] 14 October 2021. Available at: https://www.dailymail.co.uk/sciencetech/article-10091755/Five-sites-shortlisted-UKs-prototype-fusion-energy-plant.html [Accessed: 15/02/2023].

Tonkin, S. (2022). 'Artificial sun' nuclear fusion reactor sets a new world record after releasing 59 MEGAJOULES of energy for five seconds - taking world closer towards 'limitless clean energy'. *Mail Online*. [Online] 09 February 2022. Available at: https://www.dailymail.co.uk/sciencetech/article-10493401/Britains-artificial-sun-nuclear-fusion-reactor-sets-new-world-record.html [Accessed: 15/02/2023].

Tonkin, S. (2022). China's 'artificial sun' nuclear fusion reactor sets a new world record after running at 126MILLION°F for more than 17 minutes. *Mail Online*. [Online] 04 January 2022. Available at: https://www.dailymail.co.uk/sciencetech/article-10368259/Chinas-nuclear-fusion-reactor-runs-126MILLION-F-17-minutes.html [Accessed: 16/02/2023].

Torgler, B. and Garcia-Valiñas, M.A. (2007). The determinants of individuals' attitudes towards preventing environmental damage. *Ecological economics*, *63*(2-3), pp.536-552.

Toschi, R. (1997). Nuclear fusion, an energy source. Fusion engineering and design, 36(1), pp.1-8.

Trumbo, C. (1996). Constructing climate change: Claims and frames in US news coverage of an environmental issue. *Public understanding of science*, *5*(3), p.269.

Tsang, K.K., (2013). 'Methodological ontology'. *Scientific Journal of Review*, *2*(5), pp.128-130.

Turcanu, C., Prades, A., Sala, R., Perko, T. and Oltra, C. (2020). Fusion energy: A deeper look into attitudes among the general public. Fusion Engineering and Design, 161, p.111891.

Turley, B., Cantor, A., Berry, K., Knuth, S., Mulvaney, D. and Vineyard, N. (2022). Emergent landscapes of renewable energy storage: Considering just transitions in the Western United States. *Energy Research & Social Science*, *90*, p.102583.

Tversky, A. and Kahneman, D. (1974). Judgment under Uncertainty: Heuristics and Biases: Biases in judgments reveal some heuristics of thinking under uncertainty. *science*, *185*(4157), pp.1124-1131.

Twidell, J. (2021). *Renewable energy resources*. Routledge.

UK Energy Research Centre. (2023). Britain is a Net Electricity Exporter for First Time in 44 years. [Online] Available at: https://ukerc.ac.uk/news/britain-net-electricity-exporter/#:~:text=Over%20the%20past%20decade%2C%20an,began%20exporting%20more%20than%20importing. [Accessed: 25/08/2023].

UK Energy Research Centre. (2023). Britain is a Net Electricity Exporter for First Time in 44 years. [Online] Available at: https://ukerc.ac.uk/news/britain-net-electricity-exporter/#:~:text=Over%20the%20past%20decade%2C%20an,began%20exporting%20more%20than%20importing. [Accessed: 25/08/2023].

UKAEA. (2021). JET: the Joint European Torus. [Online] Available at: https://ccfe.ukaea.uk/research/joint-european-torus/ [Accessed: 16/09/2022].

UKAEA. (2022). A Step To Making Fusion A Reality. [Online] Available at: https://step.ukaea.uk/wp-content/uploads/2022/01/UKAEA-STEP-Programme-Overview-12pp.pdf [Accessed: 16/09/2022].

UKAEA. (2022). STEP's New Home. UK Atomic Energy Authority. [Online] Available at: https://step.ukaea.uk/step-siting/ [Accessed: 08/08/2023].

UKAEA (2023a). Fusion Energy Explained. UK Atomic Energy Authority. [Online Available at: https://www.ukaea.org/fusion-energy/ [Accessed 15/01/2026]

UKAEA (2023b). Safety and Environmental Aspects of Fusion Energy. UK Atomic Energy Authority. Online Available at: https://scientific-publications.ukaea.uk/papers/technology-report-safety-and-waste-aspects-for-fusion-power-plants/ [Accessed 15/01/2026]

UKAEA. (2023). Spherical Tokamak for Energy Production. [Online] Available at: https://step.ukaea.uk/ [Accessed: 01/09/2023].

UK Government (2023). Towards a Regulatory Framework for Fusion Energy in the UK. Department for Energy Security and Net Zero. Online Available at: https://assets.publishing.service.gov.uk/media/65301b78d06662000d1b7d0f/towards-fusion-energy-strategy-2023-update.pdf [Accessed 15/01/2026]

UN. (2023). Sustainability. *United Nations*. [Online] Available at: https://www.un.org/en/academic-impact/sustainability [Accessed: 20/02/2023].

University of Nottingham. (2024). Key to English Place Names. [Online] Available at: http://kepn.nottingham.ac.uk/map/place/Nottinghamshire/West%20Burton [Accesses: 17/09/2024].

Upham P. and Shackley, S. (2006) Stakeholder opinion of a proposed 21.5MWe biomass gasifier in Winkleigh, Devon: implications for bioenergy planning and policy. *Journal of Environmental Policy and Planning*, 8(1), 45-66.

Upreti, B.R. and van der Horst, D. (2004). National renewable energy policy and local opposition in the UK: the failed development of a biomass electricity plant. *Biomass and bioenergy*, *26*(1), pp.61-69.

Ürge-Vorsatz, D., Kelemen, A., Tirado-Herrero, S., Thomas, S., Thema, J., Mzavanadze, N., Hauptstock, D., Suerkemper, F., Teubler, J., Gupta, M. and Chatterjee, S. (2016).

Measuring multiple impacts of low-carbon energy options in a green economy context. *Applied Energy*, *179*, pp.1409-1426.

Valentini, C. (2021). Trust research in public relations: an assessment of its conceptual, theoretical, and methodological foundations. *Corporate Communications: An International Journal*, *26*(1), pp.84-106.

Van Atteveldt, W., Van der Velden, M.A. and Boukes, M. (2021). The validity of sentiment analysis: Comparing manual annotation, crowd-coding, dictionary approaches, and machine learning algorithms. *Communication Methods and Measures*, *15*(2), pp.121-140.

van de Grift, E. and Cuppen, E. (2022). Beyond the public in controversies: A systematic review on social opposition and renewable energy actors. *Energy Research & Social Science*, *91*, p.102749.

van den Berg, K. and Tempels, B. (2022). The role of community benefits in community acceptance of multifunctional solar farms in the Netherlands. *Land Use Policy*, *122*, p.106344.

Van der Horst, D. (2007). NIMBY or not? Exploring the relevance of location and the politics of voiced opinions in renewable energy siting controversies. *Energy policy*, *35*(5), pp.2705-2714.

Van Der Waal, E.C. (2020). Local impact of community renewable energy: A case study of an Orcadian community-led wind scheme. *Energy Policy*, *138*, p.111193.

Van Rijnsoever, F.J., Van Mossel, A. and Broecks, K.P. (2015). Public acceptance of energy technologies: The effects of labeling, time, and heterogeneity in a discrete choice experiment. *Renewable and Sustainable Energy Reviews*, *45*, pp.817-829.

Van Veelen, B. and Haggett, C., 2017. Uncommon ground: the role of different place attachments in explaining community renewable energy projects. *Sociologia Ruralis*, *57*, pp.533-554.

Venables, D., Pidgeon, N.F., Parkhill, K.A., Henwood, K.L. and Simmons, P. (2012). Living with nuclear power: Sense of place, proximity, and risk perceptions in local host communities. *Journal of Environmental Psychology*, *32*(4), pp.371-383.

Vidal, T., Troffa, R., Valera, S. and Fornara, F. (2012). Place identity as a useful psychological construct for approaching modern social challenges and new people-environment relations: residential mobility, restorative environments, and landscape. *The Role of Place Identity in the Perception, Understanding, and Design of Built Environments*, pp.78-91.

Vijayan, D.S., Koda, E., Sivasuriyan, A., Winkler, J., Devarajan, P., Kumar, R.S., Jakimiuk, A., Osinski, P., Podlasek, A. and Vaverková, M.D. (2023). Advancements in Solar Panel Technology in Civil Engineering for Revolutionizing Renewable Energy Solutions—A Review. *Energies*, *16*(18), p.6579.

Von Wirth, T., Grêt-Regamey, A., Moser, C. and Stauffacher, M. (2016). Exploring the influence of perceived urban change on residents' place attachment. *Journal of environmental psychology*, *46*, pp.67-82.

Vraga, E.K. and Tully, M. (2021). News literacy, social media behaviors, and skepticism toward information on social media. *Information, Communication & Society*, *24*(2), pp.150-166.

Walker, C. (2016). No easy fixes to our problems... but more trees would be helpful. East Anglian Daily Times. 8 January 2016. No longer available online.

Walker, C. and Baxter, J. (2017). "It's easy to throw rocks at a corporation": wind energy development and distributive justice in Canada. *Journal of Environmental Policy & Planning*, *19*(6), pp.754-768.

Walker, G., Devine-Wright, P., Hunter, S., High, H. and Evans, B. (2010). Trust and community: Exploring the meanings, contexts and dynamics of community renewable energy. *Energy policy*, *38*(6), pp.2655-2663.

Wang, J. and Kim, S. (2018). Comparative analysis of public attitudes toward nuclear power energy across 27 European countries by applying the multilevel model. *Sustainability*, *10*(5), p.1518.

Wang, S., Wang, J., Lin, S. and Li, J. (2019). Public perceptions and acceptance of nuclear energy in China: The role of public knowledge, perceived benefit, perceived risk, and public engagement. *Energy Policy*, *126*, pp.352-360.

Wang, S., Wang, J., Lin, S. and Li, J. (2020). How and when does information publicity affect public acceptance of nuclear energy?. *Energy*, *198*, p.117290.

Wang, Z., Li, D., Cheng, H. and Luo, T. (2020). Multifaceted influences of urbanization on sense of place in the rural–urban fringes of China: Growing, dissolving, and transitioning. *Journal of Urban Planning and Development*, *146*(1), p.04019026.

Warren, C., Cowell, R., Ellis, G., Strachan, P.A. and Szarka, J. (2012). *Learning from wind power: governance, societal and policy perspectives on sustainable energy*. Springer.

Warren, C.R., Lumsden, C., O'Dowd, S. and Birnie, R.V. (2005). 'Green on green': public perceptions of wind power in Scotland and Ireland. *Journal of environmental planning and management*, *48*(6), pp.853-875.

Watson, G. (2025). Five Bids to Build Nuclear Fusion Power Plant. BBC. [Online] https://www.bbc.co.uk/news/articles/c14n01d7d0po [Accessed: 04/02/2025].

Weart, S.R. (2012). *The rise of nuclear fear*. Harvard University Press.

Webler, T. and Tuler, S. (2021). Four decades of public participation in risk decision making. *Risk analysis*, *41*(3), pp.503-518.

West Lindsey District Council (2023) *State of the District Report 2023*. West Lindsey District Council. Available at: https://www.west-lindsey.gov.uk/sites/default/files/2023-06/State%20of%20the%20District%202023.pdf (Accessed: 24/01/2026).

West Lindsey District Council. (2024). Solar Development proposals for West Lindsay. [Online] Available at: https://www.west-lindsey.gov.uk/planning-building-control/planning-building-control/solar-development-proposals-west-lindsey [Accessed: 16/07/2024].

Whipple, T. (2019). 'Miniature sun' fusion reactor to be built in UK. *The Times*. [Online] 05 October 2019. Available at: https://www.thetimes.co.uk/article/miniature-sun-fusion-reactor-to-be-built-in-uk-9hwfvgfdc [Accessed: 17/02/2023].

Whitmarsh, L.E., Upham, P., Poortinga, W., McLachlan, C., Darnton, A., Sherry-Brennan, F., Devine-Wright, P. and Demski, C.C. (2011). Public attitudes, understanding, and engagement in relation to low-carbon energy. A selective review of academic and non-academic literatures: report for RCUK Energy Programme.

Wiersma, B. and Devine-Wright, P. (2014). Public engagement with offshore renewable energy: a critical review. *Wiley Interdisciplinary Reviews: Climate Change*, *5*(4), pp.493-507.

Wildavsky, A., and K. Dake. (1990). Theories of risk perception: Who fears what and why? Daedalus 119:41–50.

Wilsdon, J. and Willis, R. (2004). *See-through science: Why public engagement needs to move upstream*. Demos.

Wilson, L. (2022). Is the Scottish Government's anti-nuclear stance the right one? *Holyrood*. [Online] 13 September 2023. Available at: https://www.holyrood.com/inside-politics/view,is-the-scottish-governments-antinuclear-stance-the-right-one#:~:text=The%20Scottish%20Government%20currently%20takes,the%20government%20will%20back%20it. [Accessed: 18/08/2023].

Wilson, L. (2022). Is the Scottish Government's anti-nuclear stance the right one? *Holyrood*. [Online] 13 September 2023. Available at: https://www.holyrood.com/inside-politics/view,is-the-scottish-governments-antinuclear-stance-the-right-one#:~:text=The%20Scottish%20Government%20currently%20takes,the%20government%20will%20back%20it. [Accessed: 18/08/2023].

Wilson, L. (2022). Is the Scottish Government's anti-nuclear stance the right one? *Holyrood*. [Online] 13 September 2023. Available at: https://www.holyrood.com/inside-politics/view,is-the-scottish-governments-antinuclear-stance-the-right-one#:~:text=The%20Scottish%20Government%20currently%20takes,the%20government%20will%20back%20it. [Accessed: 18/08/2023].

Wilson, T. (2021). Investors are warming to clean-power promise of nuclear fusion. *Financial Times*. [Online] 29 October 2021. Available at: https://www.ft.com/content/f66d8965-ddf7-4458-a5ef-81e30b3ffa0f [Accessed: 15/02/2023].

Wilson, T. (2022). Fusion energy breakthrough by US scientists boosts clean power hopes. *Financial Times*. [Online] 11 December 2022. Available at: https://www.ft.com/content/4b6f0fab-66ef-4e33-adec-cfc345589dc7 [Accessed: 15/02/2023].
Winzer, C. (2012). Conceptualizing energy security. *Energy policy*, *46*, pp.36-48.

Wire. (2022). West Burton named as site for UK's first fusion energy power plant. *West Bridgford Wire*. [Online] 03 October 2022. Available at: https://westbridgfordwire.com/west-burton-named-as-site-for-uks-first-fusion-energy-power-plant/ [Accessed: 15/03/2023].

Wolsink, M. (2007). Wind power implementation: the nature of public attitudes: equity and fairness instead of 'backyard motives'. *Renewable and sustainable energy reviews*, *11*(6), pp.1188-1207.

Wolsink, M. (2012). Wind power: Basic challenge concerning social acceptance. *Encyclopaedia of sustainability science and technology*, *17*, pp.12218-12254.

World Nuclear Association. (2022). Three Mile Island Accident. [Online] Available at: https://world-nuclear.org/information-library/safety-and-security/safety-of-plants/three-mile-island-accident [Accessed: 16/07/2024].

Wüstenhagen, R., Wolsink, M. and Bürer, M.J. (2007). Social acceptance of renewable energy innovation: An introduction to the concept. *Energy policy*, *35*(5), pp.2683-2691.

WWF. (2023). What is the sixth mass extinction and what can we do about it? [Online] Available at: https://www.worldwildlife.org/stories/what-is-the-sixth-mass-extinction-and-what-can-we-do-about-it#:~:text=What's%20causing%20the%20sixth%20mass,energy%20use%2C%20and%20climate%20change. [Accessed: 22/08/2023].

WWF. (2023). What is the sixth mass extinction and what can we do about it? [Online] Available at: https://www.worldwildlife.org/stories/what-is-the-sixth-mass-extinction-and-what-can-we-do-about-

it#:~:text=What's%20causing%20the%20sixth%20mass,energy%20use%2C%20and%20climate%20change. [Accessed: 22/08/2023].

Yildiz, Ö., Rommel, J., Debor, S., Holstenkamp, L., Mey, F., Müller, J.R., Radtke, J. and Rognli, J. (2015). Renewable energy cooperatives as gatekeepers or facilitators? Recent developments in Germany and a multidisciplinary research agenda. *Energy Research & Social Science*, *6*, pp.59-73.

Yin, R.K. (1984). Case Study Research: Design and Methods. Newbury Park. Sage Publications. page 23.

Young, J.L. (2017). Numbering the mind: Questionnaires and the attitudinal public. *History of the Human Sciences*, *30*(4), pp.32-53.

Yuval-Davis, N. (2006). Belonging and the politics of belonging. *Patterns of prejudice*, *40*(3), pp.197-214.

Zaller, J. (1992). *The nature and origins of mass opinion*. Cambridge university press.

Zaller, J. (2012). What nature and origins leaves out. *Critical Review*, *24*(4), pp.569-642.

Zhang, D., Jiang, H. and Qiang, M. (2023). Public attitudes toward hydropower in China: The role of information provision and partisan identification. *Technological Forecasting and Social Change*, *195*, p.122800.

Zografakis, N., Sifaki, E., Pagalou, M., Nikitaki, G., Psarakis, V. and Tsagarakis, K.P. (2010). Assessment of public acceptance and willingness to pay for renewable energy sources in Crete. *Renewable and sustainable energy reviews*, *14*(3), pp.1088-1095.

Zohuri, B., Balgehshiri, S.K.M., Imani, M.A. and Seighalani, R.Z. (2024). Empowering Tomorrow: Strategic Decision-Making in Energy Planning A Balance of Renewables, Non-Renewables, and Nuclear Innovation (A Short Approach). *Journal of Earth and Environmental Science Research*. *(6)*, *216*, pp.2-10.

Zolfagharifard, E. (2013). Are we as step closer to living in a world with endless energy resources? Scientists make nuclear fusion break even for the first time. *The Daily Mail*. [Online] 09 October 2013. Available at: https://www.dailymail.co.uk/sciencetech/article-2451312/Scientists-make-nuclear-fusion-break-time.html [Accessed: 02/02/2023].

Zonabend, F. (1993). The nuclear peninsula.

Zoopla. (2022). Sold House Prices. [Online] Available at: https://www.zoopla.co.uk/house-prices/ [Accessed: 30/08/22].

Appendix 1 – Information and GDPR

GDPR and Information Sheet: Public attitudes to Fusion in the UK: A qualitative study
This Privacy Notice tells you what to expect when you participate in this semi structured interview. This is being carried out by Megan Connolly, at the University of York. For details of how your personal information is used in other ways, please see the other University Privacy Notices www.york.ac.uk/records-management/dp/your-info.
For the purposes of this privacy notice, University of York is the Data Controller as defined in the General Data Protection Regulation. We are registered with the Information Commissioner's Office and our entry can be found here. Our registration number is: Z4855807.

What data do we have?
We hold the data you provide in response to the interview and consent form. In particular, your zoom meeting will be recorded and transcribed but you have the opportunity to withdraw from the study's at any point.
Data will be secured on a password protected computer within google docs and backed up on google drive (the university approved and secure cloud service). The data will be used for the purpose of this thesis, alongside future scientific publications and conferences.

What is our legal basis for processing your data?
Under the General Data Protection Regulation (GDPR), the University has to identify a legal basis for processing personal data and, where appropriate, an additional condition for processing special category data.
In line with our charter which states that we advance learning and knowledge by teaching and research, the University processes personal data for research purposes under Article 6 (1) (e) of the GDPR:
Processing is necessary for the performance of a task carried out in the public interest
Special category data is processed under Article 9 (2) (j):
Processing is necessary for archiving purposes in the public interest, or scientific and historical research purposes or statistical purposes
Research will only be undertaken where ethical approval has been obtained, where there is a clear public interest and where appropriate safeguards have been put in place to protect data. In line with ethical expectations and in order to comply with common law duty of confidentiality, we will seek your consent to participate where appropriate. This consent will not, however, be our legal basis for processing your data under the GDPR.

How do we use your data?
Your data will be used to allow the mapping of different stakeholder opinions and what opinions stakeholders believe publics have surrounding nuclear fusion as a whole, as well as more specifically the new STEP site.

Who do we share your data with?
With the exception of my supervisor and examiners (on request), I will be the only person with access to the primary data and all data will be deleted 5 years after the submission of this thesis.

How do we keep your data secure?
The University takes information security seriously and has implemented appropriate technical and organisational measures to protect personal data and special category data. Access to information is restricted on a need-to-know basis and security arrangements are regularly reviewed to ensure their continued suitability. For further information see www.york.ac.uk/it-services/security/.

Transfer of data internationally
In certain circumstances it is necessary to transfer your Personal Data (including Special Category Data) outside the European Economic Area. In respect of such transfers the University will comply with our obligations under Data Protection Law and ensure an adequate level of protection for all transferred data.

How long will we keep your data?
Your data not used in the final thesis will be deleted 5 years after submission.

What rights do you have in relation to your data?
Under the General Data Protection Regulation (GDPR), you have a right of access to your data, a right to rectification, erasure (in certain circumstances), restriction, objection or portability (in certain circumstances). You also have a right to withdraw consent (where this applies). For more information, see: https://www.york.ac.uk/records-management/generaldataprotectionregulation/individualsrights/.

Questions or concerns
If you have any questions about this privacy notice or concerns about how your data is being processed, or if you wish to exercise your rights in relation to your data, please contact
If you have further questions, the University's Data Protection Officer can be contacted at dataprotection@york.ac.uk.

Right to complain
If you are unhappy with the way in which the University has handled your personal data, we ask you to contact us in the first instance, so that we can try to put things right. If you are unhappy with our response, you have a right to complain to the Information Commissioner's Office. For information on reporting a concern to the Information Commissioner's Office, see www.ico.org.uk/concerns.

Study information
This study is exploring public attitudes to fusion energy using a number of methods such as interviews and media analysis. Below outlined are some of the aims relevant to this chat.
Aims:

- - To develop an understanding of public attitudes towards fusion energy, in particular the perceived benefits and risks, and whether these attitudes are influenced by place attachment.
- To understand how fusion is framed by publics including the heuristics they use.
- To explore how fusion energy is framed within the media and what impact (if any) this has on public attitudes.

- To gather social intelligence and provide stakeholder recommendations regarding fusion energy and the STEP development for a UK Government research authority within the sector (UKAEA).

Your participation is voluntary, you may refuse to answer any questions and withdraw from the study at any point. If you have further questions related to this research following this chat, please contact me at mc1667@york.ac.uk.

Please note this research was given ethics approval by the Department of Environment and Geography's ethics committee on: 06/04/2023

Appendix 2 – Consent Form

Consent form for participants

This form is for you to state whether or not you agree to take part in the study. Please read and answer every question. If there is anything you do not understand, or if you want more information, please ask the researcher.

Have you read and understood the information leaflet about the study?	Yes ❒ No ❒
Have you had an opportunity to ask questions about the study?	Yes ❒ No ❒
Do you understand that the information you provide will be held in confidence by the research team?	Yes ❒ No ❒
Do you understand that you may withdraw from the study for any reason, without affecting any services you receive?	Yes ❒ No ❒
Do you understand that the information you provide may be used in future publications and conference material?	Yes ❒ No ❒
Do you agree to being directly quoted within the write up of this thesis?	Yes ❒ No ❒
Do you agree to take part in the study?	Yes ❒ No ❒
If yes, do you agree to your name being provided when directly quoting you? *(You may take part in the study without agreeing to this).*	Yes ❒ No ❒

Your name (in BLOCK letters): _____

Your signature: _____

Contact Details: _____

(so that quotes can be approved)

Interviewer's name: _____

Date: _____

Appendix 3 – Interview Structure

- Are you happy for me to start recording?

- Introduction – name, project, aims opinions of fusion, perceived benefits & risks and how people understand fusion. Your participation is voluntary, you may refuse to answer any questions and withdraw from the study at any point, while still receiving the compensation. The compensation will be in the form of £20 that will be bank transferred. I will send some forms after the call for you to fill in, if you them email me this back I will send them off and the money will be sent to you by the university.

- Give definition of fusion after getting initial understanding of participants awareness. According to UKAEA fusion is: Fusion is the bringing together of two nuclei which releases a burst of energy, the opposite reaction to fission and is the reaction that is the power source of stars. To produce a fusion reaction on earth hydrogen gasses are heated to over 100 million degrees Celsius and become plasma. The Nuclei in the plasma combine and a tiny fraction of this mass is converted to fusion energy. Millions of these reactions occur every second in the plasma and can provide huge amounts of energy from very small amounts of fuel. One way of controlling this plasma is by using powerful magnets. The most advanced form of this being a tokamak which is a ring-shaped magnet chamber and is the type that will be built for the STEP project.

- UKAEA safety description (only provided if asked or comes up in conversation): A large-scale nuclear accident is not possible in a fusion reactor. The amounts of fuel used in fusion devices are very small (about the weight of a postage stamp at any one time). Furthermore, as the fusion process is difficult to start and keep going, there is no risk of a runaway reaction which could lead to a meltdown.

Questions: West Burton

1. What is your level of understanding of fusion, could you describe it to me?
2. Where you aware of the STEP Fusion programme that will take place on the West Burton A site? If yes how did you become aware? Have you been involved in the public consultation process?
3. What if your opinion on public consultation?
4. With your knowledge of fusion what are the possible benefits this programme could bring?
5. What are in your opinion of the disadvantages/risks with this programme?
6. What are your feelings regarding this development in your area?
7. What are you feeling around the changing of the site?
8. What are the things that you don't understand or aren't too clear on with the upcoming project and with fusion in general?

- Anything you are not clear on but would like further clarification for example technical information I will provide you with my supervisor Chris's email in the follow up email I send with the compensation form.

Debrief

- Anything you want to talk about that wasn't brought up or any further comments you would like to add.
- Anything you are not clear on but would like further clarification for example technical information I will provide you with my supervisor Chris's email in the follow up email I send with the compensation form.

Questions: Ardeer

1. What is your level of understanding of fusion, could you describe it to me?
2. Where you aware of the STEP Fusion programme that was considered in Ardeer? If yes how did you become aware? Have you been involved in the public consultation process?
3. What benefits/implications do you believe there is with public consultation? Do you believe there should be more public consultation?
4. With what you know of fusion what are the possible benefits this programme could have brough?

5. What are in your opinion the risks with this programme?
6. What is your opinion on your area not being chosen to host this fusion development?
7. What are the things that you don't understand or aren't too clear on with the upcoming project and with fusion in general?

Debrief

- Anything you want to talk about that wasn't brought up or any further comments you would like to add.
- Anything you are not clear on but would like further clarification for example technical information I will provide you with my supervisor Chris's email in the follow up email I send with the compensation form.

Appendix 4 – Initial Coding Framework

Code	Definition
Low Carbon Alternative	Fission energy plants lower emissions of Carbon when compared to other energy production methods
Lower GHG Emissions	Fission lower emissions of other green house gases other than carbon
Sustainability	Where the sustainability of Fusion is discussed in comparison to other fossil fuels. E.g. Energy Efficiency
Future Generations	How fusion is framed as a way to protect the planet and produce energy for generations to come.
Urgency (Climate)	Referring to the urgency of investing and developing fusion in order to deal with the climate crisis
Urgency (Energy Security)	Referring to the urgency of investing and developing fusion in order to achieve energy security
Energy Security	Fusion power can produce energy domestically that is easily accessible and does not need importation
Technical Optimism	Where the description of technical feasibility is framed optimistically
Technical Pessimism	Where the description of technical feasibility is framed pessimistically

Socio-Economic Positive	Where the positive socio-economic impacts of fusion energy development nationally is discussed
Socio-Economic Negative	Where the negative Socio-economic impacts of fusion energy development nationally is discussed. E.g operational and construction demands.
Environmental Risks	Where the potential environmental risks from fusion power plants are discussed.
Safety Risks	Where the safety of fusion is discussed in terms of the potential risks a plant may cause.
Safe and reliable	Fusion can be described as a safe and reliable technology.
Scientific Experts	Where experts in the field give their insight into fusion
Global Impacts	Fusion can be linked with other global projects or have wider global interest.
Fission Heuristics	Fusion can be compared to fission in a way that allows publics to understand fusion in terms of an idea they already understand.
Fission Contrast	Where the differences between fission and fusion are outlined.
Fuel sources	Fusion can consume a number of different fuels in order to run, these can be found in varying abundances.

Nuclear Fusion	Where fusion energy is referred to as nuclear fusion.
Positive local impacts	where fusion will provide positive impacts such as jobs to the local area.
Negative local impacts	where fusion will cause negative impacts to the local community such as traffic
Scientific Language	where the procedure and technical aspects are documented
imagery	where similes are used, or comparisons such as size or impact
Emotive language (positive)	Where adjectives and metaphors are used to describe fusion positively
Emotive language (negative)	Where adjectives and metaphors are used to describe fusion negatively
Government Influence	Where the involvement of the government influence publics opinions of fusion.
Opposition Justifications	The reasons given by publics for opposing fusion development
Global Comparisons	Where fusion in the UK is compared to similar projects across the globe
Unsuccessful Site - Disappointment	Where the site shows disappointment that they were not chosen to host the new step site.
Unsuccessful Site - Positive	Where there is mention of residents at unsuccessful sites being happy that they were not chosen.