AGENDA SETTING AND CARBON CAPTURE AND STORAGE (CCS) TECHNOLOGIES IN THE UK: LESSONS FOR PROPONENTS OF EMERGING TECHNOLOGIES

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DEDICATION

This work is dedicated to my beloved parents, Mr. Joseph Kwame Mensah and Mrs. Josephine Mensah, whose immeasurable sacrifices, unflinching support, and continued prayers have brought me this far.

DECLARATION

I, **GLORIA MATEKO MENSAH** declare that this thesis and the work contained therein is my own work and is the result of a study I personally conducted except where otherwise stated by reference or acknowledgement. I further state that this work has not been previously submitted in part, or entirety to any other university for the award of any other degree.

Signed….G.M.M……..

Date…09/12/2020…

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ABSTRACT

Social and political barriers exist in advancing engineering technological developments and solutions for addressing environmental problems such as climate change. Government intervention is required in some cases before a particular technology can be deployed at scale. This raises the importance of government agenda setting and policy making, since the agenda constitutes the list of things that government is seriously considering. Where an engineering technological development or solution comes on the government agenda, it could be deemed that government is more likely considering the issue for action as compared to issues that do not appear on the agenda.

In the UK, Carbon Capture and Storage (CCS), a technology aimed at addressing climate change, has received attention by the government within the last two decades. However, this attention has been fluid, with the technology often appearing to break through, only to be frustrated in practice. Specifically, there have been variations in the levels of government investment, which show the complexities of the policy process. As engineering research continues to advance, this thesis argues that it is important to understand the insights that can be gained by examining how policy solutions come to gain favour as governmental policy responses to climate change, and what factors affect the ongoing support of policy ideas using CCS as a case study.

The purpose of this thesis is therefore aimed at employing insights from policy theory, and specifically agenda setting, to understand and re-construct the dynamics of the agenda setting and policy making process of CCS, in order to identify lessons of value to proponents of emerging technologies. Accordingly, this thesis adopts an interdisciplinary approach to apply insights from scholarship on agenda setting developed by political scientists to the issue of CCS (the preserve of scientists and engineers). This thesis draws on document analysis and elite interviews with government officials, industry stakeholders, academics and CCS trade union organisations to offer a first agenda setting perspective to CCS developments in the UK, arguing that this can be understood by employing a public policy framework – Kingdon's Multiple Streams Framework (MSF) – to the data.

Findings from this thesis showed a range of factors which were important in the agenda setting process in the CCS case, both in terms of drawing attention and lessening attention to the subject. In terms of drawing attention to the subject, the factors include: political pressure from NGOs; industry lobbying; growing domestic and international saliency on the *'problem'* and the perceived need for action; focusing events; economic analysis; and the influential roles and strategies of visible actors. The factors which lessened attention to the subject include: the emergence of new problems; change of government; technical feasibility; and cost concerns.

Lessons drawn from these findings show that there are a number of things proponents may want to consider in facilitating policy change. Of importance, is for proponents to consider an integrative holistic thinking of the policy solution. These include framing the policy solution as a reaction to multiple problems as well as recognising the value in cultivating alliances with environmental NGOs and other civil society actors. In addition, developing a consistent narrative of the policy solution, being well prepared for disruptive changes to the environment, anticipating possible competition, and keeping up the pressure with policy makers.

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LIST OF ABBREVIATIONS AND ACRONYMS

BEIS	Department for Business, Energy and Industrial Strategy
CCS	Carbon Capture and Storage
CB	Carbon Brief
CCC	Committee on Climate Change
CCSA	Carbon Capture and Storage Association
DECC	Department of Energy and Climate Change
GCCSI	Global Carbon Capture and Storage Institute
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
MSF	Multiple Streams Framework
NOAA	National Oceanic and Atmospheric Administration
NGO	Non-Governmental Organisation
OECD	Organisation for Economic Co-operation and Development
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
WHO	World Health Organisation
WMO	World Meteorological Organisation

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CHAPTER 1: INTRODUCTION

> *"Viewing the UK you know, as a regular visitor, but not a resident here, this is an area I've found really quite fascinating…I have not seen a big movement that's anti-CCS [Carbon Capture and Storage] in the UK. That seems to me to be one of its features. In the UK, it's hard to find support, but it's equally hard to find opposition…They're silent, or if they've got a comment, it's not at the heart of CCS. It's around the way things might be being done in government policy. So, that actually is a bit unusual in the world…In the UK, I haven't seen the politics as a problem. I've seen governments changing their mind about the policy. And that's really unusual, that's not the experience elsewhere. I find this really odd because to this day, there's bipartisan support for CCS" (CCS Trade Union Association Rep).*

The above excerpt is from an interview I had with one of my elite interviewees during this study that highlights my motivations for pursuing this research. While I do not claim that the above statements are entirely true, in simple terms, I argue that they reveal that difficulties and complexities can arise in government *agenda setting* and policy making surrounding the formulation of policy responses to a problem such as climate change (in this case, Carbon Capture and Storage (CCS) (See Section 1.0.3)). In light of the difficulties in developing policy responses to a problem such as climate change, this thesis aims to cast light on one specific focus – to apply a conceptual model in policy theory to better describe and understand the policy process of CCS, focusing on how ideas get on the political agenda (*agenda setting*) and come to be taken seriously by policy makers. By seeking to explain the political *agenda setting* process for CCS, this thesis aims to identify lessons that may be of value to proponents of other emerging technologies for future policy initiatives. In this thesis, I argue that it is not only important to consider what technology is available, but also how socio-political issues surrounding a particular technology can be overcome.

Before providing a more detailed overview of the research gap and contributions of this thesis, it is first necessary to provide a contextual overview, reviewing current debates around climate change and existing forms of policy responses. This is necessary to introduce the precise focus adopted in this thesis.

1.0 RESEARCH PROBLEM: AN OVERVIEW OF CLIMATE CHANGE

Climate change remains a topical issue in global discussions with many nations seeking policy responses to mitigate or adapt to the growing crises. Climate change is a phenomenon resulting from the increasing concentrations of greenhouse gases in the atmosphere, principally carbon dioxide gas (CO_2), which leads to global warming and results in severe changes in weather patterns which can be experienced over a prolonged period of time (IPCC, 2019a). There is a general consensus amongst the scientific community that climate change is induced by human anthropogenic activities such as the burning of fossil fuels for energy, industrialisation, population growth, amongst others (Cook *et al.*, 2016). Some of the sources of greenhouse gas emissions include those from the power sector, transport sector, residential sector, industrial sectors such as iron, steel and cement, and the agriculture sector (IEA, 2018; IPCC, 2014). See Figure 1 below for the proportions of global greenhouse emissions coming from different sectors based on data from the IEA (2018) and Climate Watch (2020).

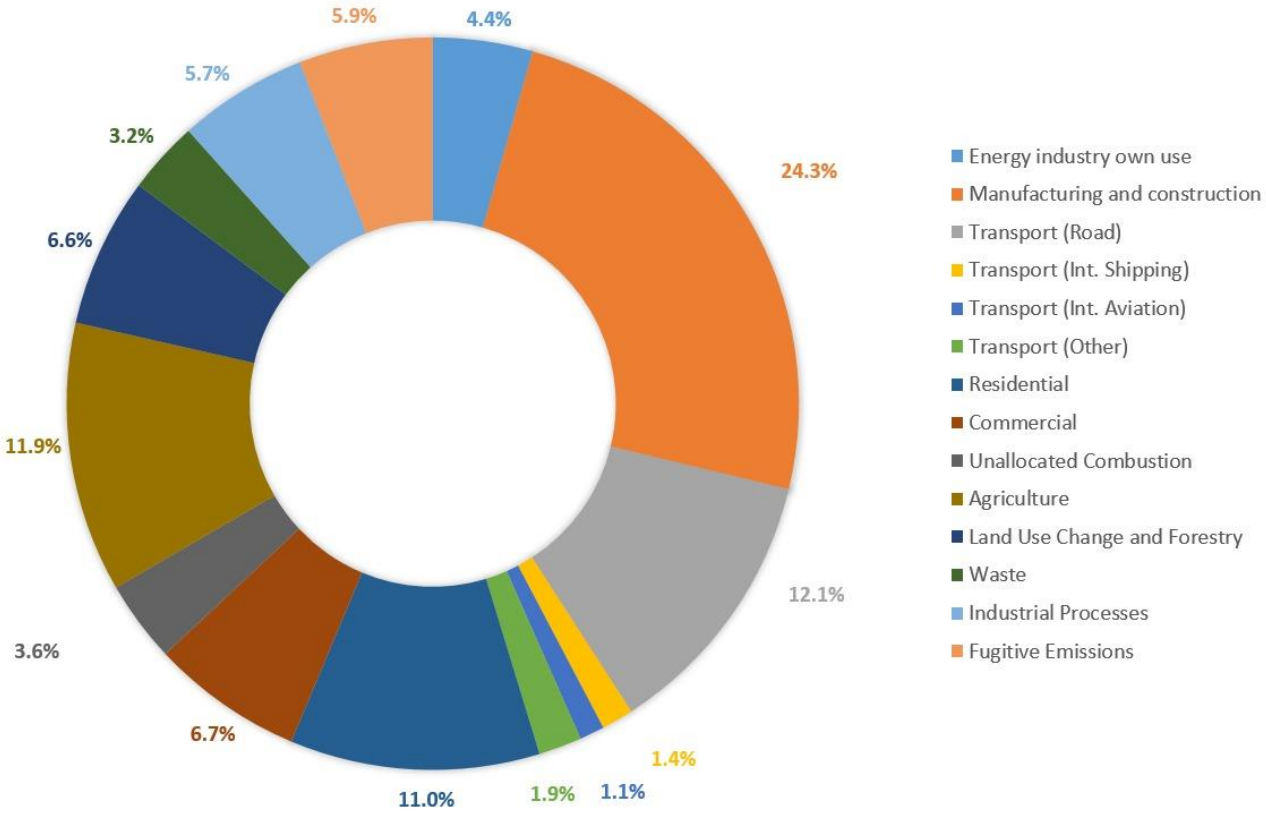

Figure 1: 2016 Global Greenhouse Gas Emissions by Sector (Adapted from EarthCharts, 2020)
Source: http://earthcharts.org/emissions-sources/

The physical impacts associated with climate change have been widely elaborated in the literature (IPCC, 2019a; 2018; 2014; 1990). For instance, climate change results in extreme weather patterns such as floods and droughts, increased land and ocean heat, accelerated sea level rise, increased melting of ice caps and glaciers, ocean acidification, tropical cyclones,

stronger hurricanes, to name a few. The impacts of climate change are not only seen on the physical environment, the effects on health and the socio-economic well-being of humans have been well-documented (IPCC, 2019a; 2019b; 2018). Climate change could lead to water shortages, affect food security, cause increased migration and displacement, destroy land and marine ecosystems, and affect human health (Bausch and Koziol, 2020; IPCC, 2019a; 2019b; 2018).

According to the World Meteorological Organization, in 2019, greenhouse gas concentrations continued to increase with global mean earth's surface temperature rising by 1.1^{0}C above pre-industrial levels (1850–1900) (WMO, 2020). Figure 2 below shows how global temperatures have evolved from pre-industrial conditions.

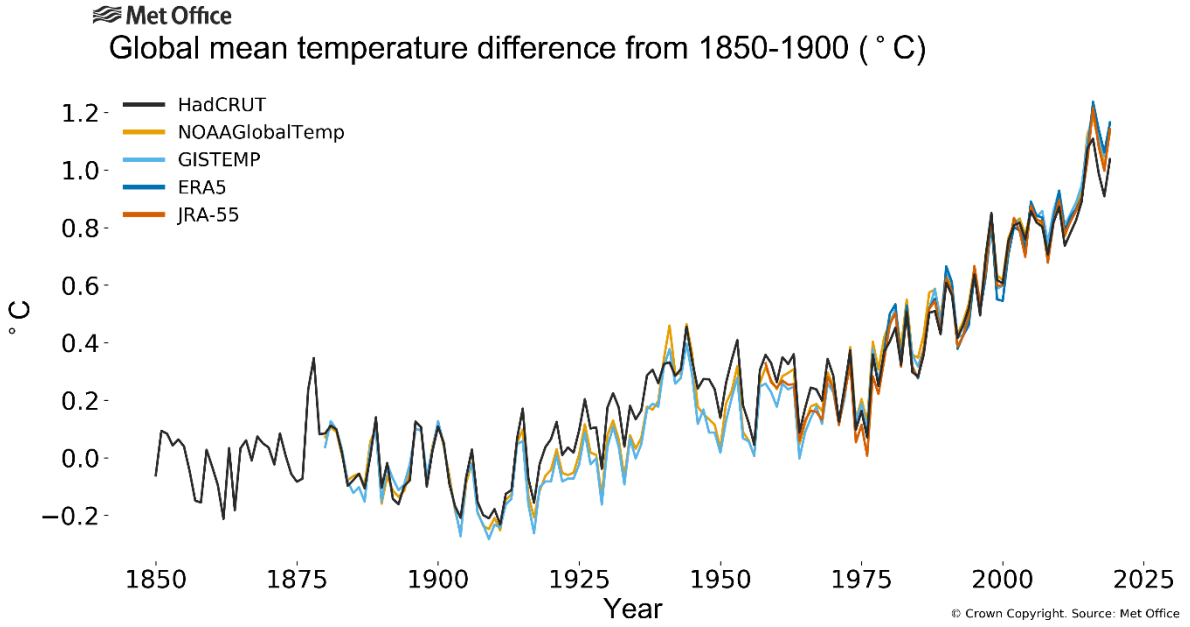

Figure 2: Global annual mean temperature difference from pre-industrial conditions (1850–1900) (WMO, 2020)

Source: https://public.wmo.int/en/media/press-release/2019-concludes-decade-of-exceptional-global-heat-and-high-impact-weather

Figure 3 below also depicts weekly trends of atmospheric changes in CO_2 reported from Mauna Loa Observatory (located on the island of Hawaii). CO_2 levels have increased to over 400 parts per million (ppm). At the time of writing this thesis, levels reached a record of 414.28 ppm (by the week beginning 15/03/2020) (NOAA, 2020) compared to pre-industrial levels of ~280 ppm.

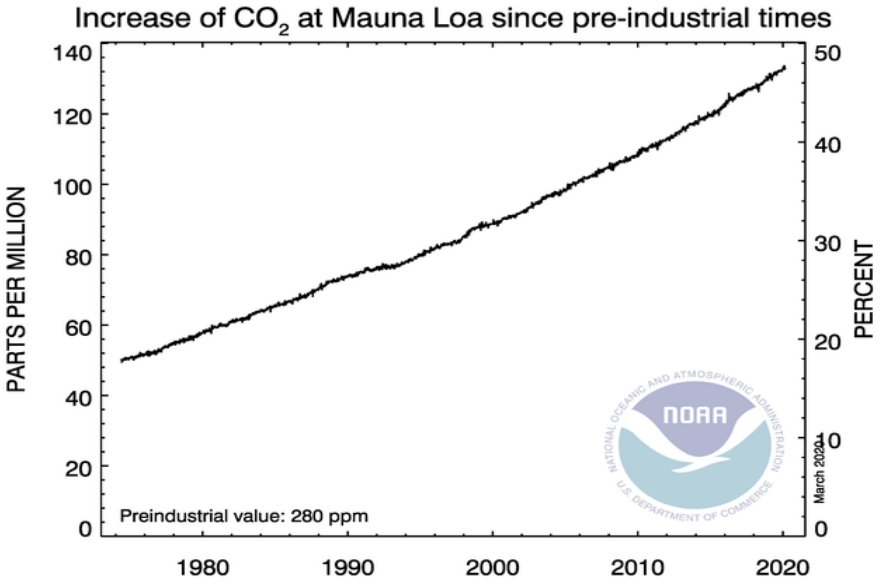

Figure 3: Weekly trends showing increasing levels of CO_2 observed at Mauna Loa (NOAA, 2020)
Source: https://www.esrl.noaa.gov/gmd/ccgg/trends/weekly.html

In our world today, climate change and its impacts are already being felt and have become increasingly visible (CCC, 2019a). Furthermore, the Intergovernmental Panel on Climate Change (IPCC), an intergovernmental body set up by the UN to provide scientific information on the risks and impacts of climate change, point out that the consequences of a 1^0C rise in global temperatures is already being experienced. Around the world, scientists have recorded extreme climate-related events. For instance, hotter heat waves, severe droughts, heavier downpours and stronger hurricanes have been observed (Vidal, 2017). Low-lying areas like Bangladesh and parts of Nepal have a long history of flooding attributed to climate change (Dewan, 2015). Climate change has also caused the destruction of natural oceanic habitats such as coral reefs causing losses to biodiversity and destruction of fisheries. In Australia, the Great Coral reef which is home to about 600 plus types of corals and more than 1,625 species of fish is under threat from climate change. There have been reports of coral bleaching in the Great Coral reef which scientists claim is as a result of the continuous warming of the ocean's temperature. About a fifth of the coral cover declined massively in 2016 (Sydney, 2017). In recent times wildfires have occurred in Australia, with Japan and the Bahamas having experienced tropical cyclones (WMO, 2020). The UK has also experienced extreme winter flooding, caused by Storms Ciara and Dennis in recent times (Iqbal and Tapper, 2020; Quinn and Pidd, 2020).

Recent IPCC Reports continue to highlight the urgency of the problem and call for urgent action from policy makers (IPCC, 2019a; 2018). The IPCC Special Report on *'Global Warming of 1.5^{0}C'*, indicate that the earth's surface temperature is rising beyond its limits, and without action, the earth faces catastrophic effects (IPCC, 2018). This same report points to one key message: i.e.

"rapid and far-reaching transitions in energy, land, urban and infrastructure (including transport and buildings), and industrial systems" would be required to limit global warming temperature to 1.5^{0}C' (IPCC, 2018, p. 17).

1.0.1 Global Policy Responses to Climate Change

The climate change challenge remains a focus of general discourse amongst many governments, institutions and various international bodies and organizations today. A number of policy responses exist to address the problem. These range from multi-lateral agreements on a global scale, to practical technological and behavioural solutions on the individual and country levels. On the global scale, the increase in legislation, international agreements and climate targets suggest that many nations agree that action needs to be taken in response to the global crises. These scenarios provide evidence that climate change has risen up the political agenda worldwide and thus is seen to be of increasing importance. Climate change issues have received political attention, at least, since the 1990s by the adoption of the United Nations Framework Convention on Climate Change (UNFCCC) at the Rio Earth Summit in 1992. This convention, coming into force in 1994, aimed at reducing greenhouse gas concentrations in the atmosphere to avoid 'dangerous anthropogenic interference with the climate system', began the international political response to tackling global climate change issues (UNFCCC, 2020a).

Down the line, international multilateral agreements such as the adoption of the 1997 Kyoto Protocol, 2012 Doha Amendment and the 2015 Paris Agreement demonstrate the international consensus for climate action. The Kyoto protocol, entered into force in 2005, committed parties to reduce their greenhouse gases based on agreed emission targets. Currently, there are 192 parties to the Kyoto Protocol, with the first commitment period having ended in 2012. By 2012, member states came together to adopt the Doha Amendment which updated the Kyoto Protocol i.e. new emission reduction targets were included to cover the second commitment period of the Kyoto Protocol (2012-2020) (UNFCCC, 2020b). Again, in December 2015, the Paris Agreement was adopted at the UNFCCC's 21st Conference of Parties (COP21). The Paris Agreement came into force in 2016 with the primary aim of strengthening the global response to the threat of climate change by urging nations to limit global temperature rise to well below 2^{0}C above pre-industrial levels and to pursue efforts to limit temperature rise to a further 1.5^{0}C. Currently, 189 out of 197 parties to the Convention have ratified the Paris Agreement, demonstrating the increasing political consensus for climate action (UNFCCC, 2020c). Furthermore, the United Nations recognises climate change as an important item which is listed in the Sustainable Development Goals (SDGs) Agenda 2030. The SDGs were adopted by UN member states in 2015 and they represent a set of 17 goals aimed at transforming the world by providing a framework for nations to set the agenda for eliminating poverty, fighting inequality, combating climate change issues and ensuring peace and prosperity for all over the next 15 years

(UN, 2020). Taken together, these policy responses reflect the solidarity that exist amongst many nations in bringing about positive change.

The evidence gathered here suggests that climate change issues have remained an item on the political agenda, with countries taking practical steps to reduce greenhouse gas emissions, at least since the inception of the United Nations Framework Convention on Climate Change (UNFCCC) in 1994. Countries in the European Union, for example, enacted regional and national laws designed to meet Kyoto targets; the Japanese government explored market-based policies to reduce carbon emissions (Pralle, 2009). Taken together, these show that there has been considerable international political attention given to climate change.

1.0.2 The UK Government Policy Responses to Climate Change

Like many other nations, there is evidence to suggest that the United Kingdom is committed to the climate agenda. Over the past decade, the UK government has developed policy responses in the form of ambitious legislations that translate to specific policy actions to reduce its greenhouse gas emissions domestically (CCC, 2016). Pre-eminent was the passing into law of the 2008 Climate Change Act; an Act aimed at reducing greenhouse gas emissions by at least 80% against the 1990 baseline by the year 2050. Under the provisions of the Act, the UK government was required to set legally-binding carbon budgets which placed a cap on the amount of greenhouse gas emissions permissible in the UK over a five-yearly period (CCC, 2016). Carbon budgets for the UK have been set until 2032 and the UK is currently in the period of its third carbon budget (2018 to 2022). In 2019, the government set even more ambitious targets to reduce greenhouse gas emissions to net-zero (i.e. at least a 100% reduction) by 2050 (CCC, 2019b). The UK has also demonstrated its commitment to reducing greenhouse gas emissions by ratifying the Paris agreement during the United Nations Conference on Climate Change in Marrakesh on the 18th November 2016.

Furthermore, as part of efforts to tackle climate change, the UK government delegated the responsibilities of climate change and energy issues to particular government departments such as the disbanded Department of Energy and Climate Change (DECC), now the Department for Business, Energy and Industrial Strategy (BEIS). Non-departmental public bodies such as the Committee on Climate Change (CCC) were also established to provide independent advice on greenhouse gas emission targets and to report on the UK's progress made in reducing greenhouse gas emissions (CCC, 2020).

A range of additional policy responses exist to tackle climate change in the UK. These include changes to the fuel mix for energy generation (i.e. using less coal and gas as a fuel source), switching to low carbon fuels, adopting cleaner energy technologies such as renewables, energy efficiency measures, improvements to building insulations, changes to transport use e.g.

switching to electric cars, carbon capture and storage, amongst others. Over the years, the UK government adopted some of these policy actions to deal with climate change. These include increasing the share of renewable technologies such as solar and wind power for electricity generation, using less coal and gas in energy generation, improving energy efficiency in various sectors, establishing measures to reduce greenhouse gas emissions in energy-intensive industries and improvements in building insulations, amongst others (CCC, 2019a). Published reports on national statistics from BEIS indicate that the adoption of these policy actions has led to positive results, helping to reduce greenhouses emissions in the UK year on year. For instance, in 2018, emissions from the known 'seven' Kyoto greenhouse gases [i.e. carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFC), perfluorocarbons (PFC), sulphur hexafluoride (SF_6) and nitrogen trifluoride (NF_3)], were estimated at 451.5 ($MtCO_2e$) in the UK, while they were estimated at 461.0 ($MtCO_2e$) in 2017. Latest national statistics data also show that in 2018, the UK was able to reduce its greenhouse gas emissions by an estimated value of 43.1% against 1990 levels (BEIS, 2020). Figure 4 below depicts the downward trends in UK greenhouse gas emissions.

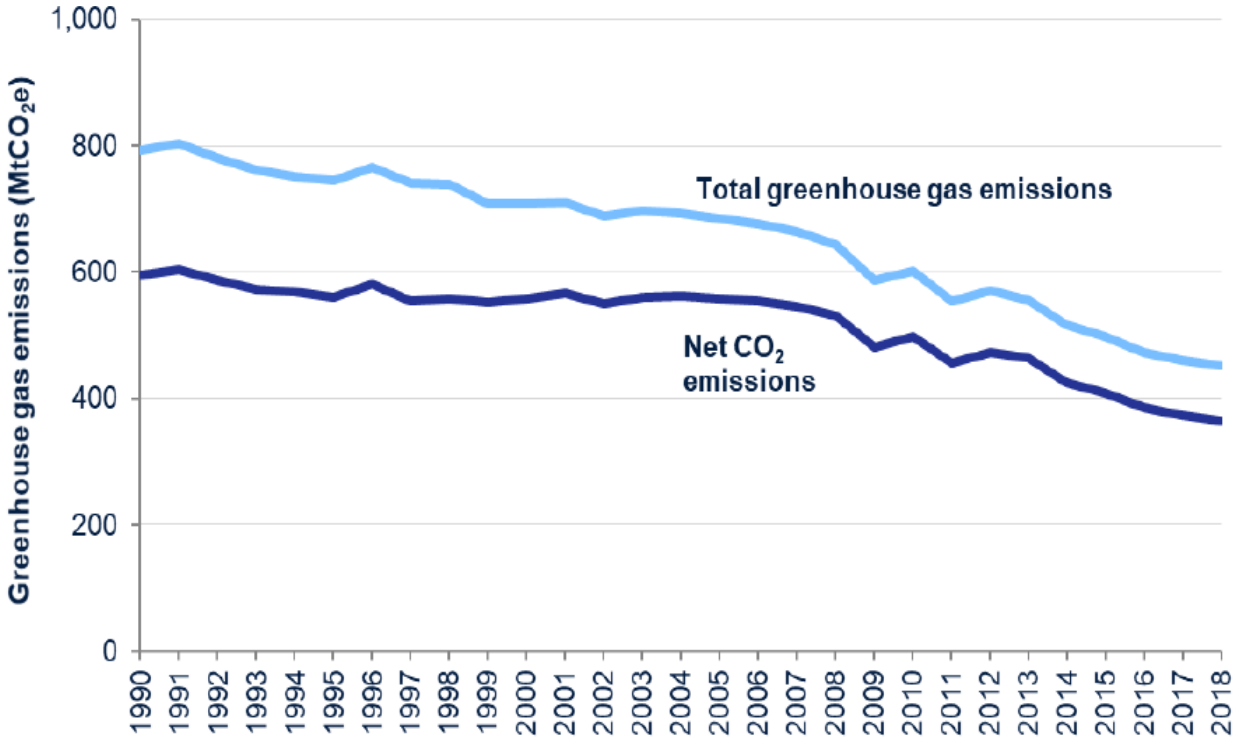

Figure 4: Total UK greenhouse gas emissions from 1990-2018 ($MtCO_2e$)

Source: (BEIS, 2020, p. 5)

CO_2 gas has been the major contributor to greenhouse gas emissions in the UK, accounting for 81% of total greenhouse gas emissions in 2018 (See Figure 5 below).

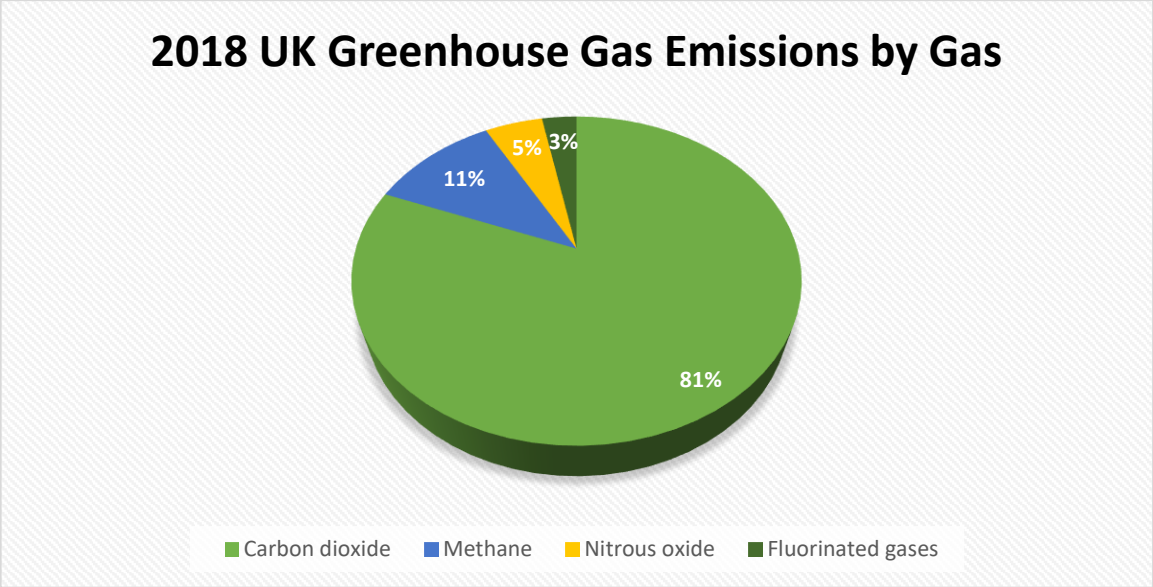

Figure 5: UK Greenhouse Gas Emissions by Gas

Source: (Adapted from BEIS, 2020)

Latest statistics show that net CO_2 emissions continue to decrease in the UK. For instance, net CO_2 emissions were estimated to be 365.7 (Mt) in 2018, a 2.2% reduction of the 2017's estimated value of 373.8 (Mt). Overall, net CO_2 emissions have reduced by 38.6% between 1990 and 2018, mainly due to the decreased use of coal in power stations (BEIS, 2020).

Though the policy actions adopted in the UK have led to positive results in emission reductions, the Committee on Climate Change (CCC) advise that current strategies in place are not sufficient to meet the UK's carbon budgets set for the 4th and 5th periods. The table below indicates the carbon budgets currently set in place.

Table 1: UK legally-binding carbon budgets

Budget	Carbon budget level	Reduction below 1990 levels
1st carbon budget (2008 to 2012)	3,018 $MtCO_2e$	25%
2nd carbon budget (2013 to 2017)	2,782 $MtCO_2e$	31%
3rd carbon budget (2018 to 2022)	2,544 $MtCO_2e$	37% by 2020
4th carbon budget (2023 to 2027)	1,950 $MtCO_2e$	51% by 2025
5th carbon budget (2028 to 2032)	1,725 $MtCO_2e$	57% by 2030

Source: https://eciu.net/analysis/briefings/uk-energy-policies-and-prices/how-is-the-uk-tackling-climate-change

The CCC report that though the 1st and 2nd carbon budgets have been met with an outperformance of the 3rd carbon budget, they advise that to meet the even more ambitious 100% (net-zero) target, substantial policy actions that lead to steeper emission reductions would be required. The latest CCC's *'Reducing UK emissions – 2019 Progress Report to Parliament'*, indicate that, *"overall, actions to date have fallen short of what is needed for the previous targets and well short of those required for the net-zero target"* (CCC, 2019a, p.11). They advise that in reaching the net-zero target, *"emissions will need to fall by 15 $MtCO_2e$ every year, equivalent to 3% of emissions in 2018"* (CCC, 2019a, p. 17).

It is worth also looking at the impact of the Covid-19 pandemic on global CO_2 emissions and what this means for the UK. In the wake of the global Covid-19 pandemic, new research has shown that despite a reduction of daily CO_2 emissions globally which occurred at the peak of global confinement, there is still more to be done about climate change. Thus, governments have been urged to continue to pursue policies to tackle climate change. The research conducted by Le Quéré *et al.* (2020) estimated that government lockdown restrictions imposed on nations have significantly changed patterns in energy demand and consumption and have led to a temporary reduction of daily CO_2 emissions globally. The analysis was done for 69 countries which represent about 97% of all global CO_2 emissions. It was reported that average daily CO_2 emissions decreased by -17% as at early April, 2020 (lower than the average mean levels for 2019). At the peak of global shutdown, CO_2 emissions reduced by -26% on average in individual countries. The authors estimated that the total change in CO_2 emissions from Covid-19 were 1,048 $MtCO_2$ by April, with the UK's estimated change in CO_2 emissions amounting to 18 $MtCO_2$ from January till April. While

the authors reckon that the impact of the Covid-19 pandemic have been positive with regard to reducing daily CO_2 emission levels, they throw in a caveat – that this trend may not be maintained - and that governments should continue to pursue policies to tackle climate change.

The previous sections have focused on providing an overview to the research problem – climate change – including providing an overview of governmental policy responses and policy solutions to this phenomenon from a global and UK perspective. In this thesis however, I focus on a specific policy solution i.e. the case of Carbon Capture and Storage (CCS) technology, seeking to explore the fortunes of this technology, and the insights this reveals about the way that policy solutions to climate change can be advanced. This focus is interesting because many countries, including the UK continue to explore ways to curb the climate change menace, prominently with the setting of more ambitious climate change targets. This makes it interesting to ask what affects government support for particular responses to climate change. This thesis therefore seeks to contribute to understanding *agenda setting* and policy making processes of the UK government to reveal insights about what seems to be influential in bringing about change using CCS as a case study.

1.0.3 Carbon Capture and Storage (CCS) Technology as a Policy Response to Climate Change

Carbon Capture and Storage technologies (CCS), represent a broad range of technologies which involve the capture of CO_2 emissions from the burning of fossil fuels in energy generation and in industrial processes to prevent it from being released directly into the atmosphere (Gibbins and Chalmers, 2008; Vannan and Gemmell, 2012). This policy solution is of interest because it has become a prominent policy proposal for attempts to reduce climate change around the world (Bäckstrand *et al.*, 2011; Glessner and Young, 2008; Jones, 2009). The CCS process first involves the separation of CO_2 from energy generation and industrial process. The CO_2 is then captured and transported through pipelines, trucks or by rail for subsequent disposal and storage in deep onshore or offshore geological formations e.g. deep saline aquifers. This CO_2 may also be used in industrial processes such as enhanced oil recovery (IPCC, 2005; Szulczewski *et al.*, 2012) (See Figure 6 below). According to the Carbon Capture and Storage Association (CCSA), CCS can capture up to 90% of CO_2 emissions from power generations and industrial processes (CCSA, 2020). The IEA (2010) have also reported that, with CCS, global emissions can be reduced by up to 19% by 2050. In addition, the CCC indicate that CCS is critical in meeting the UK's 2050 target and can help to achieve up to an 80% reduction in CO_2 emissions, and could play an important role in achieving even steeper reductions (CCC, 2018).

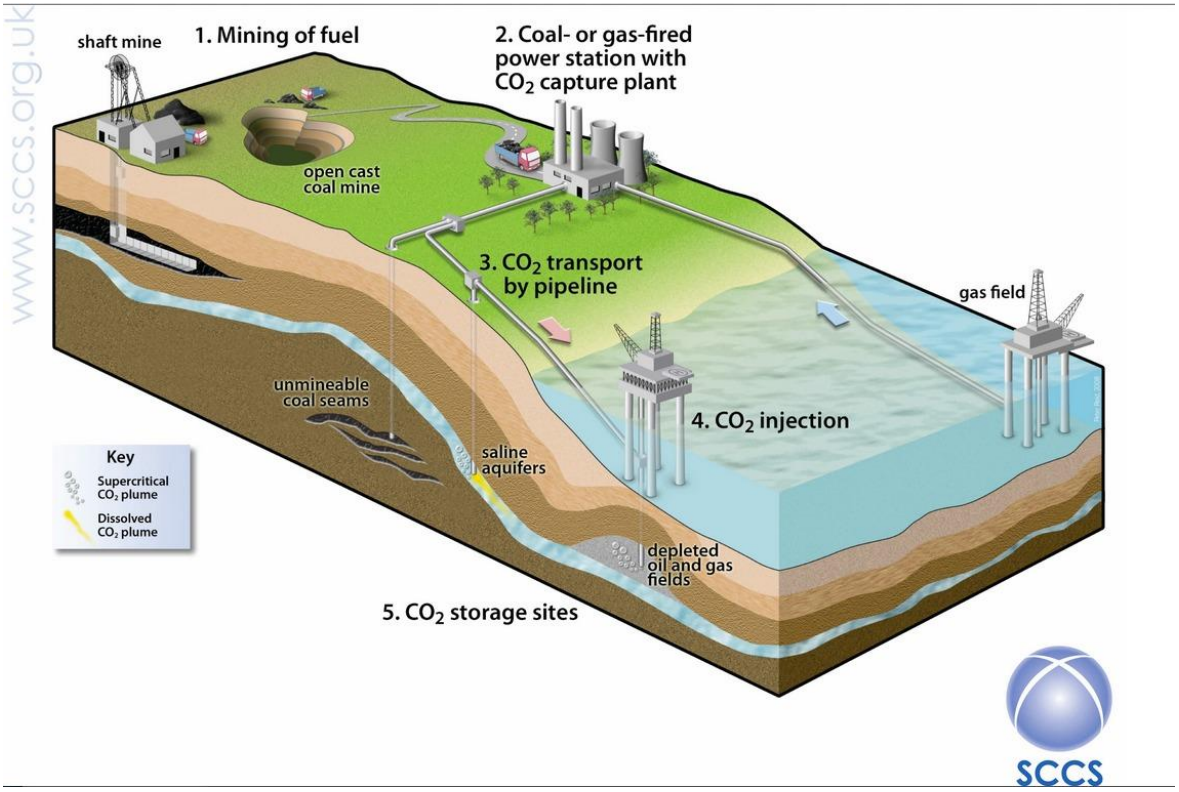

Figure 6: 'What is CCS' – An illustration (CB, 2020)

Source: https://www.carbonbrief.org/everything-you-wanted-to-know-about-ccs-but-were-afraid-to-ask

CCS has been described as *"versatile"* and known to have a variety of applications (GCCSI, 2019, p. 4). For instance, it can be applied to the decarbonisation of the power sector and industrial sectors such as iron, cement and steel. CCS can also be combined with direct air capture (DAC) (removing CO_2 directly from the atmosphere) to deliver net zero emissions (net removal of CO_2 from the atmosphere). In the same way, it has been noted that CCS can be combined with bioenergy (BECCS) to achieve negative emissions (Negative Emissions Technologies (NETs) (Bui *et al.*, 2018; GCCSI, 2019). Furthermore, CCS has also been noted to enable the production of low-cost hydrogen from fossil fuels or biomass, with the fuel being useful for domestic or industrial purposes (CCC, 2018; GCCSI, 2019). The stated ambitions for CCS show the potential for environmental technologies to affect environmental change, and yet there can be substantial social and political barriers to effecting such change (Kern *et al.*, 2016; L'Orange Seigo *et al.*, 2014).

1.0.4 The UK: An Interesting Place to study CCS

Within this thesis, analysis focuses on the UK context. This focus is interesting as government support for and investment in CCS has been sporadic and inconsistent over the past 14 years (discussed further below). This dynamic policy environment makes the UK context interesting for understanding more about what leads a policy to be supported over time and

raises questions that are likely to be of interest to those promoting other policy responses to climate change.

As indicated in Section 1.0.2, the UK demonstrated its commitment to tackling climate change issues by creating the 2008 Climate Change Act which sets ambitious targets to reduce greenhouse gas emissions to 80% lower than the 1990 baseline by the year 2050 (CCC, 2016). To meet the said target, CCS technology came under consideration by the UK government because it was seen as a technology that could play a crucial role in decarbonising the UK's economy. In 2007, the UK government announced the first CCS competition and committed an amount of £1 billion to support the first commercial-scale CCS demonstration project (Chalmers *et al.*, 2013, 2009). In 2011, funding for a first CCS demonstration - 'Longannet' - in Scotland was withdrawn. In 2012, a second round of CCS competition was launched with the UK government making a commitment to provide £1 billion funds for the full-scale demonstrations of two major CCS projects; the Peterhead project in Scotland and the WhiteRose project in Yorkshire and the Humber (HOCPA, 2017). The second competition however, ended abruptly in 2015 with the HM Treasury department withdrawing the £1 billion grant for the competition. BEIS,[1] the government department with responsibility for climate change issues, has over the past decade launched two competitions for the first full scale CCS demonstration project. However, CCS has faced challenges with continued government support and investment and there have been historical inconsistencies both in keeping the idea sustained on the UK government agenda and implementing the idea in practice (i.e. wide-scale deployment of CCS) (BEIS, 2017; Cozier, 2016).

There could be many possible barriers to the introduction of environmental technologies like CCS that include the wider political context, public opinion, and technological advances. The CCS case demonstrates the challenges that advocates can face in promoting a policy solution and hence can be used as a case study through which we can develop our understanding of how policy ideas come to gain prominence and be taken seriously by policy makers. In light of these developments, and in view of the UK Government's on-going commitment to meeting climate change targets, it will be of value to consider not only what technology is available to governments seeking to address environmental issues, but also how social and political barriers surrounding a particular technology can be overcome. As such, this thesis draws lessons from the CCS case to explore and understand the political process, considering how ideas get on the political agenda and come to be taken seriously by policy makers. This analysis is used to identify lessons from the CCS case that are of likely interest and relevance to proponents of emerging technologies designed to fight climate change.

[1]The Department for Business, Energy and Industrial Strategy (BEIS) has been called different names in this period. BEIS, formed in 2016 merged responsibilities from the Department for Energy and Climate Change (DECC) and Department for Business, Innovation and Skills (BIS). DECC was created in 2008 to take over the responsibilities for energy and climate change from the Department for Business, Enterprise and Regulatory Reform (BERR) and the Department for Environment, Food and Rural Affairs (DEFRA)

1.1 RESEARCH GAP

This thesis adopts an interdisciplinary approach to apply insights from scholarship on *agenda setting* developed by political scientists to the issue of CCS (the preserve of scientists and engineers). This focus is interesting and brings to light factors which affect ongoing support of policy ideas, thus generating insights which are valuable to proponents seeking to promote other technology options. The discussion that follows gives a flavour of the broader extant literature on CCS.

Existing studies on CCS have primarily tended to focus on technical aspects, including environmental analysis. The technical studies have generally focused on different CCS applications, advancements in the CCS technology chain (i.e. CO_2 capture, CO_2 transport and CO_2 storage), life cycle assessments, amongst others. For instance, Gibbins and Chalmers (2008) looked at advances in CO_2 capture technologies. MacDowell *et al.* (2010) provided an overview of CO_2 capture technologies focusing on aspects such as oxyfuel combustion, carbonate looping and the application of solvent-based chemisorption (for instance, amines and ionic liquids). Boot-Handford *et al.* (2014) provided updates on capture systems such as amine scrubbing, ionic liquids, calcium looping, amongst others. In addition, other scholars like Bui *et al.* (2018) elaborated on aspects such as solid and liquid phase sorbents in capture systems as well as alternative technologies for CCS such as chemical looping combustion, membranes and ionic liquids. Their study also considered developments in CO_2 transport, to include pipeline, shipping and rail as well as the challenges that exist in the monitoring of stored CO_2. Pickard *et al.*'s (2014) study looked at the reactivity of biomass sample fuels under different combustion temperatures to provide insights for large-scale carbon capture and storage demonstrations. Mandova *et al.*'s (2019) study explored the potential of deploying bio-energy with CCS (BECCS) in reducing CO_2 emissions in the iron and steel industry in Europe. Other scholars like Stauffer *et al.* (2011) considered the challenges encountered in the process of capturing CO_2 from point source till storage in coal-fired power generation. In relation to environmental analysis, Lake and Lomax (2019) for instance, considered the risks posed to plants in the event of CO_2 leakage from CCS infrastructure either during transport or storage. Their study considered the effect of soil type on plant stresses in the event of CO_2 leakage. Again, Lake *et al.* (2016) studied the interactions between soils and CCS pipeline temperatures. Taken together, these have provided detailed insights into the mechanics of CCS, but do not include a discussion of policy developments.

There has also been a growing body of literature – particularly originating within the social sciences – which have contributed other kinds of insights into CCS. These have focused on the social acceptance of CCS, including public perceptions of and attitudes towards the technology. For instance, Carley *et al.*'s (2012) and Warren *et al.*'s (2014) studies analysed public perceptions and attitudes to CCS in a coal-intensive state i.e. Indiana state. De Coninck *et al.*

(2009) examined public acceptability of CCS in Europe. Ashworth *et al.* (2009) also examined public acceptance of CCS in a proposed demonstration site. Oltra *et al.* (2012) examined public responses to CCS by drawing on five European case studies. Similarly, scholars like Sharp *et al.* (2009) examined public attitudes to CO_2 storage. Similar studies have investigated stakeholder perceptions of CCS in Europe (Shackley *et al.*, 2009, 2007) and the UK (Shackley *et al.*, 2005). Furthermore, scholars like L'Orange Seigo *et al.* (2014) conducted a comprehensive review on the public perception of CCS from 42 different articles. Tcvetkov *et al.*'s (2019) study provided current insights into public perceptions of CCS, drawing from 135 articles published between 2002-2018. Krause *et al.* (2014) also examined public acceptance of CCS infrastructure. Again, other scholars like Singleton *et al.* (2009) explored the perception of risk amongst the public in relation to CCS. Similarly, Moon *et al.*'s (2020) study examined the roles of stakeholders' perception, social capital and perceived risk and benefit in gaining insights into public support for CCS. Another study by Gough *et al.* (2014) also investigated public perceptions of carbon dioxide transport through pipelines. Gough *et al.* (2017) also drew on the media, stakeholders, and the public to provide insights into societal responses of CCS in the UK.

Within the literature on public acceptability, some scholars have also sought to delineate the impact of specific factors such as, religious beliefs, trust, framing and communication for CCS acceptability. For instance, Hope and Jones' (2014) study explored the influence of people's religious views and beliefs on the decisions they make about climate change and acceptability for CCS technology. Similar studies on beliefs and public attitudes towards CCS projects have been conducted (Gough *et al.*, 2013; Terwel *et al.*, 2012). In relation to communication, Brunsting *et al.* (2011) applied insights from communication theory to develop understanding into public communication and participation with CCS projects. Similar studies surrounding the importance and effect of CCS communication for social acceptability have been studied (Ashworth *et al.*, 2010; L'Orange Seigo *et al.*, 2013, 2011; Reiner, 2008). Whitmarsh *et al.* (2019) also studied framing effects around CCS and its impact on acceptability. In the context of trust, Terwel *et al.* (2011) also studied how trust in stakeholders affects public acceptability for CCS.

Taken together, these studies reveal insights about the need to consider pertinent factors in understanding the acceptance or the fortunes of CCS within the society, to avoid protest or conflicts from the public and to help relevant stakeholders in making informed decisions. These factors include people's feelings or attitudes towards the technology; people's perception of risk; the activities of stakeholders; public trust in stakeholders; perceived understanding of the *'problem'* to which CCS is addressing; perceived costs and benefits of CCS projects; people's knowledge and experience with the technology; the impact of people's religious views; the importance, style and form of communicating CCS; amongst others. Indeed, the studies outlined above cast light on what informs people's decisions about adopting an 'unfamiliar technology',

the risks involved and why the technology should matter for people. The consideration of these useful insights is aimed at helping policy makers to take decisions that are aligned with the public's views. Taken together, these studies offer something useful for understanding wider societal issues and debates around CCS technology.

Still, some other areas of scholarship within the social sciences, have contributed other insights into CCS. These include economics, legal and regulatory, health and safety and other overarching aspects of CCS. In terms of economic aspects, Rubin and Zhai (2012) focused on the cost of deploying CCS for Natural Gas Combined Cycle power plants (NGCC). Budinis *et al.*'s (2018) work reviewed the barriers and costs associated with CCS deployment. In terms of legal and regulatory aspects related to CCS, Glessner and Young (2008) in their study, for instance, explored the Intellectual Property (IP) protection available for CCS innovations. Another study by Vannan and Gemmell (2012) explored regulatory risks associated with CCS. Other scholars like Wilson *et al.* (2007) examined the risks, regulations, and liabilities for doing CCS. With regard to health and safety aspects of CCS, Fogarty and McCally (2010) explored the health, safety, and environmental risks resulting from CO_2 injection. Their study explored the risks of contamination of drinking water supplies and health risks such as respiratory diseases as a result of the combustion of coal. Similarly, scholars like Damen *et al.* (2006) examined the health, safety and environmental risks of storing CO_2 underground. With regard to other overarching studies regarding CCS, Gough (2008) explored stakeholder insights to provide an overview of the status, opportunities and barriers to deploying CCS in the UK. Similarly, Kapila and Haszeldine (2009) provided an overview of the barriers and opportunities for implementing CCS in India. Taken together, these studies offer further insights into CCS i.e. regulatory and environmental risks; opportunities and constraints for doing CCS.

Finally, a few CCS studies have been conducted in the political science field, primarily being focused on the recognition of the importance of political factors surrounding the uncertainties for CCS deployment, including the political economy and making decisions about CCS projects (Evar, 2011; Kern *et al.*, 2016; Markusson *et al.*, 2012; Torvanger and Meadowcroft, 2011; Watson *et al.*, 2014). Other studies have focused on international relations and global politics of CCS technologies (de Coninck and Bäckstrand, 2011), socio-political context surrounding CCS deployment (Wilson *et al.*, 2011), and other policy science dimensions of CCS (Bäckstrand *et al.*, 2011; Carley *et al.*, 2012; Rubin and Zhai, 2012). Taken together, such studies have offered a range of different CCS insights in key areas such as the political factors affecting CCS deployment; the effectiveness of different CCS policy solutions; the importance of policy instruments and regulatory frameworks to support CCS; the socio-political context within which CCS projects are deployed; institutional contexts shaping CCS policies; CCS deployment within national and international contexts; the interplay of politico-economic factors which shape

policy; amongst others. While these insights generally show that scholars are implicitly highlighting the importance of politics and other non-technical factors to CCS, they are limited as they fail to provide a holistic framework, that can allow people to systematically think about how policy solutions come to gain prominence on the government agenda to be taken seriously by policy makers. This specific issue foregrounds the gap that this thesis addresses.

Against this backdrop, this thesis examines how policy solutions come to gain favour as governmental policy responses to climate change, and what factors affect the ongoing support of policy ideas. This thesis therefore brings together interdisciplinary insights from literature on public policy and, specifically, *agenda setting* with work on climate change and carbon capture and storage technologies.

In adopting this focus, this thesis looks primarily at the issue of *agendas* and the process of *agenda setting.* This concept can be defined in different ways, however in this thesis I ascribe the following definition by Kingdon (2014) who conceives the *'agenda'* as the *"list of subjects or problems to which government officials, and people outside of government closely associated with those officials, are paying some serious attention at any given time"* (p. 3); while *agenda setting* describes *"the process by which agendas are set"* (p. 16). Several studies suggest that the ways issues come to prominence on a government's agenda can be influenced by a number of factors including, the influence of policy actors (Baumgartner and Jones, 1993; Hilgartner and Bosk, 1988; Kingdon, 2014, 1995; Sabatier and Jenkins-Smith, 1999), contextual factors (Grindle and Thomas, 1991), framing (Rochefort and Cobb, 1994) and political events (Kingdon, 2014), amongst others.

In embarking on this thesis, I employ Kingdon's Multiple Streams Framework (MSF) to guide the collation and analyses of data. Kingdon's MSF conceptualizes why some issues come to be taken seriously by policy makers while others are ignored on the agenda. It will be useful to distinguish between the two types of *agendas* Kingdon describes; the *'governmental agenda'* and the *'decision agenda'*. Kingdon (2014) explains that, *"governmental agendas include subjects to which people in and around government are paying serious attention"* (p. 142), while *"decision agendas include only those subjects that are moving into position for some sort of authoritative decision…"* (p. 142). His framework suggests that policy change occurs when three independent streams - *'problem'*, *'policy'* and *'politics'* - flowing in their own trajectories connect at 'critical junctures' to create a *'policy window'* for an issue to come onto the agenda (Kingdon, 2014). Kingdon (2014) further explains that certain influential people known as *'policy entrepreneurs'* can act in *'policy windows'* to push forward their preferred proposals on the policy agenda.

Applying Kingdon's MSF to the CCS case in the UK, this thesis seeks to: (1) investigate the *'problem'* to which CCS was connected; (2) examine the *'policy'* process in the CCS case; (3) inquire into the happenings in the *'politics'* stream; (4) determine the *'policy entrepreneurs'* and analyse

the roles and strategies they adopted; and (5) determine the *'policy windows'* for CCS in the UK context. In doing so, this analysis will produce key insights for proponents of CCS and other potential policy solutions to climate change, offering lessons for future policy initiatives.

1.2 RESEARCH AIM & RESEARCH QUESTIONS

1.2.1 Research Aim

The overall aim of this thesis is to gain understanding into *agenda setting* for CCS by applying Kingdon's Multiple Streams Framework (MSF) (2014) as the conceptual framework, to generate insights that will be of value to proponents of emerging technology options designed to tackle climate change.

1.2.2 Research Main Question

Based on the research gap identified in the literature, this thesis seeks to address the main research question:

- *How can agenda setting for Carbon Capture and Storage technologies (CCS) in the UK in the period (2000-2017) be currently understood and what lessons could be gained for proponents of emerging technologies designed to tackle climate change?*

1.2.3 Research Sub-questions

In addressing the main research question above, three sub-questions will be asked. These are:

Sub-question 1

What do official government documents reveal about the trends and dynamics of agenda setting for Carbon Capture and Storage technologies (CCS) in the period (2000-2017)?

Sub-question 2

What do interviews with experts reveal about the trends and dynamics of agenda setting for Carbon Capture and Storage technologies (CCS) in the period (2000-2017)?

Sub-question 3

What lessons can be drawn from the CCS case which may be of value to proponents of emerging technologies for addressing climate change?

By exploring these questions, this thesis examines how CCS evolved on the government agenda, why it grew in prominence and why investment varied in this period. These questions structure the thesis and will be addressed in turn in forthcoming chapters.

1.3 RESEARCH APPROACH, SCOPE OF ANALYSIS AND METHODS

In embarking on this thesis, a case study research approach is employed, focusing my analysis on *agenda setting* of CCS in the UK between [2000-2017]. This approach allows a systematic, comprehensive, in-depth analysis of phenomena within a real-life context (Creswell, 2013; Merriam, 1998; Yin, 2009). In this sense, it allows me to build up a multifaceted picture of the fortunes of CCS technology across an extended period of time, a form of analysis that would not be possible if looking at multiple technologies or sites of analysis. The chosen dates [2000-2017] representing my scope of analysis were selected on the premise that, (i) the year 2000 was the first point CCS was mentioned in UK policy documents and, (ii) this scope allows me to observe and hence develop insights into variations in investment in CCS technology over time, thus allowing me to observe the conditions under which the technology was favoured and not favoured.

In gathering relevant data for this thesis, I will employ two complementary sources of data – documents and elite interviews. Document analysis will be valuable because it will aid in mapping and tracing the sequence of events by the identification of policy actors and the *agenda setting* process of CCS using Kingdon's MSF (2014). By doing so, document analysis adds value and understanding in this research because it will help to: (i) generate insights into how CCS came on the government agenda; (ii) provide understanding into why CCS grew in prominence (and faltered) on the government agenda; and (iii) help explain the variations in the levels of government investment it received. Within this thesis, documents will be identified using a set of inclusion criteria outlined in Chapter 3. The selected documents will lead me to develop a *heuristic framework*, which will provide the template for my data analysis in this research. This *heuristic framework* is developed to capture the ebbs and flows of CCS on the government agenda. Upon closer reading of the documents, this *heuristic framework* is divided into 5 periods of time based on my line of reasoning that these periods highlight key events on the profile i.e. the floating period of CCS (1st period), the active period of CCS (2nd period), the first struggles of CCS (3rd period), the rejuvenation period of CCS (4th period) and the second struggles of CCS (5th period). For each period, Kingdon's MSF (outlined further in Chapter 2 and 3) will be applied to the data to trace and analyse the *'problem'*, *'policy'* and *'politics'* streams, as well as the *'policy windows'* and *'policy entrepreneurs'* in the CCS case. This approach allows me to determine the nature and characteristics of the *agenda setting* process around CCS, identifying trends and patterns in the data to isolate factors that can account for the technology's fortunes.

Within this thesis, documentary analysis alone was not enough to explore *agenda setting* for CCS and, hence, elite interviews were found to be valuable to add rich detail and provide additional insights which were not readily found in the documents. In this way, interviews were employed to triangulate the findings gathered from the documentary analysis in order to construct meaning into the CCS case. By employing interviews, rich insights were gained from the

views of politicians and policy makers, government officials (e.g. civil servants), industry leaders, senior academics and representatives of CCS trade union associations, to construct meaning in this research. In particular, these insights show the influential roles and strategies of *'policy entrepreneurs'*, the political pressure to pursue change and the dynamics of the policy *agenda setting* process. Consequently, based on the insights gathered from both documents and elite interviews, the lessons that may be of value to proponents of other emerging technologies are delineated.

1.4 ORIGINAL CONTRIBUTION

This thesis makes three types of contribution that relate to empirical, practical, and theoretical concerns, each of which is introduced in turn.

a) *Empirical insight into CCS by applying agenda setting theory*

As indicated in Section 1.1, scholarship in engineering disciplines looking at technologies such as CCS often fails to engage with insights from the policy literature. The current thesis is therefore important and builds on existing literature surrounding CCS by employing insights from policy theory, in particular, *agenda setting* to the CCS case. By so doing, this thesis offers a different perspective to CCS issues and provides empirical insights by examining how policy solutions come to gain favour as governmental policy responses to climate change, and what factors affect the ongoing support of policy ideas. This thesis adopts an interdisciplinary approach to provide the first study that applies *agenda setting* theory to the specific topic of CCS.

This thesis argues that while scholarship in engineering continues to advance for technologies such as CCS and others alike, it is important to understand the insights that can be gained by studying political discourses and events gathered through documentary analysis and interviews. By applying a policy theory perspective, in particular, *agenda setting* to CCS and analysing the insights that could be offered, this thesis aims to cast light on the factors that may affect the fortunes of other emerging technology options. The findings generated in this thesis are therefore intended to conceptualize our understanding on the nature of *agenda setting* processes of environmental technologies such as CCS, contributing to existing theory in this area.

In terms of the insights generated in this work, a number of useful conclusions are offered. First, my analysis of the UK CCS case demonstrates how different '*streams*' of Kingdon's Multiple Streams Framework (2014) – *'problem'*, *'policy'* and *'politics'* - came together to create a *'policy window'* for CCS to come on the government agenda and revealed the factors which led to how CCS emerged on the agenda, why it grew in prominence and the reasons for the variations in levels of government investment it received. For instance, in relation to insights surrounding how CCS came on the agenda and why it grew in prominence, my analysis revealed that there was

political pressure to pursue change and that different groups of actors including industry, government and civil society organisations were involved in the *agenda setting* process.

Second, my analysis showed that two *'problems'* - *climate change* & *energy security*, were linked to CCS and that these *'problems'* remained consistent across the period of time studied here, however events in *'politics'* and *'policy'* seemed influential to explain the *'change'* that occurred i.e. the ebbs and flows of CCS on the government agenda. These events included the 2008 Global Financial Crisis, the increase in renewables and its relatively cheaper cost and the gradual phase out of coal which led to a shift of government's attention to deprioritise CCS.

Third, this thesis argues that while there were factors that seemed influential in *'opening'* a *'policy window'* for CCS idea to be taken up, insights from this thesis highlight the importance of *'maintaining'* a *'policy window'*, once an idea has been taken up. Insights from the documentary analysis and interviews reveal that actors missed opportunities to keep CCS idea retained on the government agenda; the absence of which was notable and seems to be important in *'maintaining'* a *'policy window'*. In the following section, I offer the factors that seem influential in terms of both *'opening'* a *'policy window'* and *'maintaining'* the *'policy window'*. I argue that these factors may serve as valuable lessons for proponents seeking to promote emerging forms of technologies for addressing climate change.

b) ***Practical insights for those seeking to promote emerging technology***

Based on the findings gathered from my analysis, as we will see in detail in Chapter 4 and 5 of this thesis, in terms of the factors that appear influential in getting an issue on the government agenda, proponents of emerging technologies may want to consider doing the following:

- cultivate alliances with environmental NGOs and other civil society actors in order to generate a shared belief about a *'problem'* and its *'solution'*;
- be aware of the value of increasing the saliency of a political issue both nationally and internationally (by driving more attention to it and increasing public awareness and interest in the issue);
- find opportunities to act as *'policy entrepreneurs'* to link their policy solutions to pressing problems in order to raise the profile of an issue;
- recognise the value in testing different *'problem frames'* to which their *'policy solution'* addresses, to show the importance of the issue in different ways (one of which is economic analysis);
- lobby visible or mainstream actors and *policy makers* (for instance, MPs and opinion leaders) for their chosen policy solution;
- recognise the value in establishing industry associations to build consensus around a preferred *'policy solution'* to lobby *policy makers*;

- make attempts to build relationships and links with politicians to promote their chosen *'solution'*; and
- make attempts to utilise election cycles to promote their technologies.

Furthermore, this thesis argues that policy actors must not relent but may need to do more in keeping an issue *'maintained'* on the government agenda. It therefore may be beneficial to proponents of emerging technologies if they make attempts to do the following:

- lobby government for legislative commitments as well as clear regulated policy mechanisms to support their *'policy solution'* to secure commitment to ongoing exploration of a policy with a view to developing a viable response;
- be well prepared for disruptive changes to the political landscape and environment; and
- lobby for a cross-departmental government networking group (if it does not already exist) which will coordinate the activities of all relevant parties to facilitate engagement around a policy idea.

c) *Theoretical insight by developing existing agenda setting theory*

From the analyses offered in this work, this thesis offers one theoretical contribution that extends Kingdon's work (2014) by showing that the process of policy development can occur as part of the *agenda setting* process. While Kingdon's work (2014) suggests that a *policy proposal* generally needs to be *"already worked out"* (pp. 142 & 172) or *"ready to go"* (p. 142) before being considered seriously on the policy agenda, my analysis and findings show that this is not always the case, and that *policy makers* can still take a *policy proposal* seriously by working to facilitate its implementation. My analysis therefore suggests that there is a need to think about the agenda both in terms of taking an idea seriously, and actually being able to enact or implement that idea. This may suggest that proponents promoting other forms of technologies should not be put off from floating their idea if it is not fully *'worked out'* or demonstrated. However, while proponents may pursue efforts to promote their idea, insights from this thesis suggest that they may need to be aware that external factors (such as less resources or alternative policy solutions) may exist to shift policy maker attention. As such, they may want to recognise that they only have a limited *policy window* in which to act if they do secure investment to explore the idea.

1.5 THESIS STRUCTURE

In advancing the research aims of the current study, my thesis is organised into the following chapters:

Chapter 2: Theoretical Underpinnings & Proposed Analysis

This chapter comprises an in-depth discussion and justification of the proposed framework that underpins the current research – Kingdon's Multiple Streams Framework (MSF) (2014). I begin by providing an overview of *agenda setting* and policy making in the policy theory literature, highlighting that Kingdon's Multiple Streams Framework (MSF) has been dominant and widely used for conceptualising why certain issues come to gain attention on the government agenda while others fail to do so. Introducing Kingdon's MSF and the arguments he makes, I seek to justify why Kingdon's ideas are valuable for the approach adopted in subsequent analysis in this thesis. Given the centrality of Kingdon's MSF for the form of analysis pursued in this thesis, I go further to discuss the origins and development of his framework, providing a summary of how his ideas have been applied across different policy domains. Furthermore, recognising the insights of Kingdon's MSF, I provide an in-depth discussion of the various components of his framework and the processes involved, seeking to reveal the key areas of interest in further analysis in this thesis and how the framework can be applied to understand *agenda setting* in the CCS case. In this section, I also review existing CCS studies to show how scholarship in the engineering disciplines resonate with Kingdon's ideas and why an appreciation of policy theory is valuable to understanding the 'social' context within which technologies such as CCS are to be introduced.

Chapter 3: Methodology

This chapter comprises a discussion of the methodological approach that guides the current research. I begin by detailing the research strategy and design adopted in the current research, provide an in-depth discussion of the chosen methods – documentary analyses and elite interviews – and show their relevance for the current research. I go further to describe how the chosen methods will be used for carrying out investigation in the research. In relation to documentary analysis, I detail the procedure for the identification of relevant documents included in this thesis i.e. Command Papers and other wider documents. In doing so, I provide a discussion about my search strategy, the search tool and database employed, keywords and phrases and the inclusion criteria adopted. Furthermore, I present in graphical form my initial search results of Command Papers which forms the basis of the development of the *heuristic framework* I offer for further investigation and analysis in this thesis. In relation to elite interviews, I detail the interview process undertaken in preparing for the interviews, recruitment

of participants and conducting the interview itself. The chapter ends with a discussion of the analytical procedure adopted in this thesis.

Chapter 4 (Study 1): Trends & dynamics of agenda setting for CCS technologies from documentary evidence

This chapter is aimed at presenting the first set of analysis and results from documentary analysis. In this chapter, I begin by offering the *heuristic framework* developed as a template for analysing *agenda setting* in the CCS case. Within this chapter, I provide a profile of governmental discussion on CCS to determine the origin and prominence of the idea. With the kind of analysis conducted, I show that CCS did not feature consistently on the government agenda but had mixed fortunes. Dividing the profile into '5 periods' of time which characterise the status of CCS on the governmental agenda, this leads me to explore and analyse in-depth the specific references made to CCS in each period. For each period, I apply Kingdon's MSF to guide the investigation, seeking to present the analysis of the three *'streams'*; '*problem'*, '*policy'* and '*politics'*, including *'policy windows'* and *'policy entrepreneurs'* of the CCS case. Through this analysis, I contend that documentary analysis revealed changes in how the *'problem'* was understood, divisions in how the *'policy'* was conceived, and *'political'* events affected the fortunes of CCS. In this chapter, I show that while certain conditions came together to create a *'policy window'* for CCS idea to be taken up and gain prominence, events in *'policy'* and '*politics'* led to a shift of government's attention to prioritise the issue. This chapter therefore seeks to show the value that documentary analysis can offer to our understanding of *agenda setting* by aligning the data with the principles of Kingdon's MSF.

Chapter 5 (Study 2): Trends & dynamics of agenda setting for CCS technologies from elite interviews

Building on the insights gained from the previous chapter, this chapter aims at first testing whether or not the *heuristic framework* was relevant in the eyes of the respondents and second, testing respondents' accounts of the CCS story to reveal the insights that supported existing analysis or extended/challenged the insights gained from previous documentary analysis. In doing so, I examine in-depth the 'unofficial story' of CCS, seeking to offer insights into the three *'streams'* of Kingdon's MSF; *'problem'*, *'policy'* and *'politics'*, including *'policy windows'* and *'policy entrepreneurs'*. In presenting the findings and analysis in this chapter, I focus on the *'streams'* that caused 'change' in explaining *agenda setting* for CCS. In particular, I show that the interview analysis revealed new insights which were found to be influential in explaining the *agenda setting* process for CCS. These centred around the influential roles and strategies of *'policy entrepreneurs'*, the changing dynamics of the policy process and the political pressure to pursue change. Taken

together, in this chapter, I provide further nuanced details that offer additional insights into *agenda setting* developments in the CCS case.

Chapter 6: Lessons of value to proponents of emerging technologies for addressing climate change

Drawing upon the insights gained from documentary and interview analyses, this chapter aims to offer key lessons from the CCS case which may be of benefit to those seeking to promote other emerging technology options. In doing so, in this chapter, I argue that aspects of the *'problem'*, *'policy'* and *'politics streams'* are influential in first, *'opening'* of a *'policy window'* and second, *'maintaining'* a *'policy window'*. Through detailed analysis of the factors of influence, I demonstrate that proponents of other emerging technologies may be able to find ways to pursue change to promote their policy ideas. This leads me on to make a number of proposals that may prove valuable to proponents in terms of finding ways to introduce their policy ideas to policy makers and ensuring that their proposals could be considered seriously by them, supporting these proposals with evidence from existing literature. Therefore, in this chapter I aim to contribute to existing knowledge of the factors that seem influential in *agenda setting*, drawing on insights from my specific case study – CCS. In doing this, I will also contend that there is more work that may need to be considered by proponents of emerging technologies in ensuring that an issue is *'maintained'* on the agenda i.e. it retains its prominence on the government agenda for serious consideration by policy makers.

Chapter 7: Conclusion

This chapter will entail a general reflection of the study, a summary of the main findings and the insights gained in the study in terms of the empirical, practical and theoretical contributions. It will also reflect on the usefulness of Kingdon's MSF for the study and the general value of the work for proponents of emerging technologies. The chapter ends by highlighting some of the limitations of the study and areas for further research.

CHAPTER 2: THEORETICAL UNDERPINNINGS AND PROPOSED ANALYSIS

2.0 INTRODUCTION

This chapter has one specific aim – to set out the theoretical framework for understanding *agenda setting* in the CCS case within the scope of analysis in this thesis. The chapter is divided into four sections. Section 1 begins with an overview of *agenda setting* and policy making. This will lead me to an introduction of Kingdon's Multiple Streams Framework (MSF) (2002); the chosen framework for analysis in this thesis. Kingdon's work has been dominant in the field of *agenda setting* and has helped to conceptualize why certain issues rise into prominence on the government agenda and why others fail to do so. While the MSF is primarily connected with *agenda setting* and the process of getting ideas on the agenda, it can also be applied to understand other stages of the policy making process, including decision making and implementation (Herweg *et al.*, 2015; Weible and Sabatier, 2018, p. 18). This therefore makes it a suitable framework for subsequent analysis in this thesis to investigate: (1) how CCS came on the government agenda, (2) why CCS grew in prominence on the government agenda and, (3) the frustrations it faced on the government agenda, including the variations in levels of government investment it received.

Kingdon's main argument is that policy change occurs by the 'coupling' or (de-coupling) of three streams: *'problem stream'*, *'policy stream'* and *'politics stream'* in a *'policy window'*; a process often facilitated by special policy actors in the policy process i.e. '*policy entrepreneurs'.* The MSF can therefore be applied to map out the policy actors and policy process of CCS by exploring the happenings in the three *'streams'*. This section will therefore provide an overview of Kingdon's MSF, to include its origins and development. It will also provide justification as to why Kingdon's ideas are valuable for the approach adopted in subsequent analysis in this thesis. The section ends with a brief summary of how his ideas have been applied across different policy domains.

Given the centrality of Kingdon's MSF for the current analysis, Section 2 provides a detailed account of the components of Kingdon's MSF, to reveal specifically what will be of interest in the current thesis and how the framework can be applied to understand *agenda setting* in the CCS case study. The section will seek to explain in detail the ideas of *'problem'*, *'policy'*, *'politics'*, *'policy entrepreneurs'* and *'policy windows'*, and how these ideas interact to explain *agenda setting* and policy change, which Kingdon expounds. In this section, I therefore aim to set out Kingdon's arguments, seeking to explain the various mechanisms and processes under each *'stream'* and discussing how these processes help us to understand *agenda setting* and policy change. In this discussion, I also aim to explore how other scholars have applied his ideas in their own work to identify how his theory has been developed and critiqued, and how that informs my

own analysis, in the various *'streams'*, where necessary. Section 3 will entail a review of existing CCS studies to show how they resonate with Kingdon's ideas and why the MSF will be valuable to our understanding of *agenda setting* in the CCS case. Recognising the insights of the MSF, in Section 4, I will provide a summary of how Kingdon's ideas will be applied in subsequent analysis.

2.1 AGENDA SETTING, PUBLIC POLICY MAKING & KINGDON'S MSF

A wide range of scholars have studied public administration and policy making and have looked at different aspects of this process. Drawing from existing literature, it is possible to identify a number of useful insights for understanding policy making. These include concepts and theories concerning framing and problem definition for issue attention (Bacchi, 2009; Baumgartner and Jones, 2009, 1993; Cairney, 2015; Dery, 2000, 1984; Hogwood and Peters, 1983; Hogwood, 1987; Lindblom and Cohen, 1979; Mcbeth *et al.*, 2007; Rittel and Webber, 1973; Rochefort and Cobb, 1995, 1994; True *et al.*, 2007; Wood and Vedlitz, 2007), contextual factors that affect *agenda setting* (Grindle and Thomas, 1991), the role of actors in policy making (Sabatier and Jenkins-Smith, 1999), why certain policies remain stable on the agenda for long periods while others change dramatically (Baumgartner and Jones, 1993), how and why policy decisions are made (Jones and McBeth, 2010), why governments adopt new programs (Berry and Berry, 1990), roles of policy networks in policymaking (Rhodes and Marsh, 1992), amongst others.

A dominant idea in this literature has been the idea of the Stages Heuristic Model (Brewer and DeLeon, 1983) that distinguishes between the different stages of policy making. Within this heuristic, *agenda setting* is portrayed as the first stage of the policy making process - the moment an issue gains public or political interest. Within literature on *agenda setting*, John Kingdon's ideas have dominated the academic literature. Originally published in 1984, his book *Agendas, Alternatives and Public Policies* (subsequent editions published in 1995, 2003, 2011 and 2014) has been widely cited, with over 12,000 citations (Cairney and Jones, 2016). Kingdon's key contribution has been to theorise the process of *agenda setting*, offering a theoretical model that explains why some ideas come to be taken seriously by policy makers, and others are ignored. Kingdon's work builds on a longstanding tradition of attempts to understand this process, and indeed his work is seen to develop the *'garbage can'* model of organisational choice, outlined by Cohen *et al.* in 1972.

Cohen *et al.*'s *'garbage can'* model (1972) was developed to understand decision making in *"complex organizations"*, he termed *"organized anarchies"*, e.g. *"public, educational, and illegitimate organisations"* (p. 1). They observed that these organisations *"did not meet the conditions for more classical models of decision making"* (ibid., p. 16) i.e. rational policy making, but rather, were characterised by some or all of the following features: (i) *"problematic preferences"* - policy makers most often do not have clearly defined goals or policy preferences

i.e. their preferences are not fixed but are discovered through actions; (ii) *"unclear technology"* – policy actors may be accustomed to specific ways of doing things in organizations, and as such certain work processes within organizations may be unfamiliar to users; and, (iii) *"fluid participation"* – the participation of actors in decision taking is fluid i.e. *"participants vary in the amounts and time they devote to different domains; involvement varies from one time to another…the audiences and decision makers for any particular kind of choice change capriciously"* (ibid., p. 1). Cohen *et al.*'s theory (1972) was built on other ideas; for instance, they argued that issues (or problems) can be framed in different ways (i.e. the concept of *'ambiguity'*), a situation which affects how issues may be understood and prioritised. Again, they argued that *"participants within an organization are constrained by the amount of time they can devote to the various things demanding attention"* (ibid., p. 2). They suggest that policy makers have the cognitive ability to only attend to a relatively small number of issues on the policy agenda. These ideas which Cohen *et al.* (1972) identify, are the concepts which characterise *'organized anarchies'* and the assumptions which Kingdon drew upon in the development of his MSF. It is important to recognise here that Cohen *et al.*'s *'garbage can'* model (1972) has wider concepts, however I will focus my attention on the components that are relevant to understanding Kindgon's work on *agenda setting* (discussed below).

Cohen *et al.* (1972) discussed the concept of *'stream independence'*, the basis for Kingdon's multiple *'streams'* framework. They argued that *"in a garbage can model…a decision is an outcome or interpretation of several relatively independent streams within an organization"* (pp. 2-3). They suggested that, running through organisations are four *'streams'* (i.e. problems, solutions, participants and choice opportunities (*'garbage can'*)), each of which flow independently from each other. Explaining, they suggested that a myriad of problems and solutions are dumped by various participants into the *'garbage can'* i.e. choice opportunity. The model assumes that participants seek out solutions not necessarily because they have a problem to attach the solution to or because a particular opportunity avails itself. Furthermore, people making decisions may promote their preferred problems or solutions on the agenda for reasons different from whether an issue exists (ibid.). As they describe, this organisation is a *"collection of choices looking for problems, issues and feelings looking for decision situations in which they might be aired, solutions looking for issues to which they might be the answer, and decision makers looking for work"* (ibid., p. 2). Whilst the *'garbage can'* model was developed to look at decision making (and only a brief summary of pertinent ideas have been summarised here), it is possible to identify key themes and ideas upon which Kingdon's conception of *agenda setting* was built.

Turning to discuss Kingdon's work (2014) in detail, his own studies sought to explore the process of *agenda setting* in the US federal government, but he nevertheless utilised key ideas from Cohen *et al.* (1972). Kingdon's work (2014) draws on the idea of *'stream independence'* or *'separate streams'*, in which he proposed his own *streams'* metaphor (*'problem stream'*, *'policy*

stream' and *'politics stream'*) as he conceived of it in the US federal government. Kingdon's work particularly aimed to consider how the *'streams'* interacted and the role that actors played, in attempts to understand why some issues were considered more seriously than others in *agenda setting*. Kingdon's MSF evolved from policy studies in health and transport in the US in the 1980s. Employing interviews and documentary analyses, Kingdon aimed to gain insight into the development of public policy over time from the period 1976 to 1979, using case studies in health and transport (ibid). Kingdon observed that policy making involved many different policy actors who play different roles in the *agenda setting* and policy making process. He observed that some policy actors visibly raised issues on the government agenda (i.e. active participants), whilst others were less visible but played an important role in developing proposals (hidden participants) (ibid.). In the following discussions, I now consider what the MSF particularly argues.

As briefly indicated above, Kingdon (2014) proposed his own *streams'* metaphor to characterise his conception of the *agenda setting* process. To briefly introduce, the *'problem stream'* deals with how issues become recognised as problems; the *'policy stream'* refers to the processes through which policy proposals are developed, whereas the *'politics stream'* deals with the political forces that affect *agenda setting* and policy making (Kingdon, 2014). Kingdon contends that, *"the separate streams of problems, policies, and politics each have lives of their own; problems are recognized and defined according to processes that are different from the ways policies are developed or political events unfold"* (ibid, p. 201). Kingdon's particular contribution was thinking about how these streams came together and the role that actors play in the *agenda setting* process.

Kingdon (2014) argues that *agenda setting* is influenced by; (i) the visible and hidden participants inside or outside government; and (ii) the 'coupling' (or de-coupling) of the *'separate streams'* at *"critical junctures"* (p. 216). This *'coupling'* is facilitated by special groups of people called, *'policy entrepreneurs'* who utilise their knowledge, resources and strategies to bring together different streams in a favourable *'policy window'*; a process that enhances issue prominence. In the context of politics, visible participants are made up of strong influencers such as the government, including the President/Prime Minister and their political appointees, parliamentarians and other figures of authority who are usually involved in setting the agenda. On the other hand, hidden participants include specialists such as civil servants, academics, researchers, consultants and industry stakeholders who are involved in developing a range of solutions to tackle a problem - alternative specification. As Kingdon puts it, *"visible participants try to affect agendas, and then they turn to specialists in the less visible policy community like bureaucrats, staffers, researchers, and interest groups for the alternatives from which an authoritative choice can be made"* (ibid., p. 70). These participants together with the *'streams'* Kingdon talks about will be discussed in more depth in Section 2.2. But before I get into the details

of Kingdon's ideas, it is important to clarify what Kingdon means and understands by *agenda setting* and why his ideas are particularly valuable for the approach adopted in this thesis.

Kingdon's work (2014) is particularly useful in this thesis because he offers quite a distinctive conception of *agenda setting*, as we will later see in our discussion. He does not only look at how issues rise on the government agenda to get attention, but also looks at what actually causes issues to get enacted in government. In order to understand Kingdon's work and its particular value to this thesis, it is important to understand the specific ways in which he talks about *agenda setting*. For instance, in his book he stated that his study sought to understand, *"why some subjects become prominent on the policy agenda and others do not, and why some alternatives for choice are seriously considered while others are neglected"* (ibid., p. 3). Elsewhere, he stated, *"while governmental agendas are set in the problems or political streams, the chances of items rising on a decision agenda - a list of items up for actual action - are enhanced if all three streams are coupled together"* (ibid., p. 20). In another place, he added that, *"before a subject can attain a solid position on a decision agenda, a viable alternative is available for decision makers to consider"* (ibid., p. 142). What the quotations show above are the ideas of *agenda setting*, decision making and implementation being discussed together, which Kingdon particularly notes. In comparison to what other scholars like Scheufele (2000) say; *"agenda-setting is concerned with the salience of issues"* (p. 298) i.e. the process of an idea getting noticed, what Kingdon says is that it is about that process, but it is also about how an idea gets taken seriously. So, referring back to the Stages heuristic framework which I highlighted previously (Section 2.1; p. 26), what is interesting about Kingdon's work is that he tries to span the gap between *agenda setting*, decision making and implementation. In this thesis, this approach to thinking about *agenda setting* helps us understand not only how an idea comes about on the government agenda, but also how the idea gets enacted in government. Moreover, his ideas can also tell us why certain issues do not get onto the agenda or why issues that are on the agenda do not always result in 'action'.

Kingdon's MSF has been widely applied to different contexts and policy domains. As Jones *et al.*'s (2016) study revealed, between 2000 and 2013, 311 articles drew upon his ideas (see also Rawat and Morris, 2016). Weible and Sabatier (2018) also argued that, *"the Multiple Streams Framework (MSF) is becoming a major tool with which to analyse the policy process"* (p. 17). In general, Kingdon's MSF has been applied across different disciplines to studies of health policy (Exworthy *et al.*, 2003; Sharp, 1994; Tantivess and Walt, 2008), education (Mills, 2007; Young *et al.*, 2010), public administration (Borrás and Radaelli, 2011), foreign policy (Travis and Zahariadis, 2002; Wood and Peake, 1998; Zahariadis, 2015), environmental policy (Lober, 1997; Pralle, 2009; Storch and Winkel, 2013) and comparative analysis (Béland and Howlett, 2016) (amongst many others). Jones *et al.* (2016) report that the MSF has been applied to 22 policy domains, with applications in health, environment, education, welfare, and governance constituting about 80% of all MSF applications. Despite these applications, Kingdon's MSF has not

yet been applied to CCS or to develop policy recommendations for those interested in promoting emerging environmental technologies. By applying Kingdon's MSF to the context of CCS, this work would be of value as it seeks to outline the factors of *agenda setting* that may appear influential for driving policy change, from which lessons may be drawn for proponents of emerging technologies for addressing climate change.

So far, I have aimed to provide an introduction and overview of Kingdon's MSF and applications, to include a discussion about its origins and development. I have also sought to justify why his ideas are particularly valuable for the kind of analysis I adopt in this thesis. Given the centrality of the MSF for the analysis pursued in this thesis, I will now discuss in greater depth the different components of the MSF to highlight what, precisely, is of interest within this approach.

2.2 KINGDON'S MSF STRUCTURAL COMPONENTS EXPLAINED

2.2.1 Problem stream

This section discusses key concepts in relation to how Kingdon's *'problem stream'* is conceived. It first seeks to distinguish between what is (or not) in the '*problem stream*', discussed in the light of *'conditions'* and *'problems'* and discusses the factors which affect how policy actors frame *'conditions'* as *'problems'*. It also considers the various mechanisms - indicators, focusing events and feedback – that prompt policy maker attention to a *'problem'*. In addition, this section seeks to explain how issues come to be framed and understood by policy makers. It will also seek to explain why some *'problems'* tend to fade from view on the government agenda. It will then consider the issue of *'budgets'* as this represents a special kind of *'problem'*, as conceived by Kingdon (2014). This knowledge will be used in subsequent analysis to analyse the *agenda setting* process in the CCS case.

Kingdon's *'problem stream'* provides insights into developments in *agenda setting.* The *'problem stream'* describes how certain problems come to gain the attention of policy makers at the expense of others (Kingdon, 2014). Kingdon recognises that there is a multiplicity of things policy makers could look at, but he focuses on the *'problems'* policy makers seek to solve (ibid.). Scholars like Knill and Tosun (2012) reiterate that, *"policy-making generally occurs in the presence of multiple constraints, e.g. shortage of time and resources"* (p. 106). As such, *"there are always more public problems warranting action than there is space on the so-called agenda"* (p. 106). The *'problem stream'* therefore focuses on the processes through which a particular phenomenon comes to be seen as a pressing *'problem'* that demands the attention of policy makers; a process critical to *agenda setting*.

Kingdon (2002) uses the distinction between *'conditions'* and *'problems'* to distinguish what is and is not in the *'problem stream'*. Kingdon (2014) explains that people are faced with different kinds of *'conditions'* everyday to deal with, for instance, *"bad weather, unavoidable and untreatable illnesses, pestilence, poverty…"* (p. 109). However, *"conditions become defined as 'problems' when we come to believe that we should do something about them"* (ibid., p. 109). Kingdon's work seeks to explain how policy makers frame *'conditions'* as *'problems'* i.e. the issue of *'problem definition'*, arguing that three factors exist for policy makers to make this translation: *"values, comparisons and categories"* (ibid., p. 109). These factors are considered in turn in the following discussions.

The first factor we consider is the issue of values. Kingdon (2014) suggests that the values an individual holds play a key role in determining how that individual defines the *'problem'*, suggesting that *"a mismatch between the observed conditions and one's conception of an ideal state becomes a problem"* (ibid., p. 110). To explain his argument, Kingdon cites an example in health policy, outlining how different policy makers can vary in their view of *"whether or not access to medical care is a right"* (ibid., p. 111). He suggests that if a particular population views medical care as a right, then that population would expect government action. When the population is denied access to this right, then that *'condition'* comes to be defined as a *'problem'*, which warrants government response. On the other hand, *"if one views medical care as something that is nice to have, but not as a right, then differences in access are defined as a condition rather than a problem"* (ibid., p. 111).

The second factor Kingdon cites in explaining *'problem definition'* is comparisons. For instance, Kingdon states that *"if one is not achieving what others are achieving, and if one believes in equality, then the relative disadvantage constitutes a problem"* (ibid., p. 111). This suggests that when comparing performances about specific issues between different countries for instance, when a large disparity is observed, then that situation can constitute a *'problem'*.

Third, Kingdon makes clear that the issue of categories can help to explain how *'conditions'* come to be defined as *'problems'*. For instance, he states that, *"people will see a problem quite differently if it is put into one category rather than another"* (ibid., p. 111). For instance, *"the lack of public transportation for handicapped people…can be classified as a transportation problem or as a civil rights problem, and the treatment of the subject is dramatically affected by the category"* (ibid., p. 198). Another example we can give is, the lack of STEM (Science, Technology, Engineering and Mathematics) careers for women can be viewed as an unemployment *'problem'* or a gender equality *'problem'*. It is important to recognise that this concept of *'framing'* or *'problem definition'* has been widely taken up by the literature (Baumgartner and Jones, 1993; Cairney, 2012; 2015; 2020; Hogwood, 1987; Rochefort and Cobb, 1994; Sabatier and Jenkins-Smith, 1993; True *et al*., 2007).

Taken together, Kingdon (2014) argues that people inside and outside government frame *'conditions'* as *'problems'* in different ways. Furthermore, Kingdon maintains that, "*sometimes, the recognition of a pressing problem is sufficient to gain a subject a prominent place on the policy agenda*" (ibid., p. 114), however, he goes on to make the point that, *"just as often, problem recognition is not sufficient by itself to place an item on the agenda"* (ibid., p. 114). This can be as a result of different reasons, independent of problem solving. For instance, policy makers are faced everyday with problems to deal with but can only aim to tackle few problems at a time. Another example he cites is, *"politicians cast about for ways to make their mark"* or interest groups may mount pressure on government by advocating for their preferred proposals (ibid., p. 114), amongst others. Kingdon emphasizes that the ways problems become recognised is critical to *agenda setting*. The likelihood of an idea rising on the agenda is enhanced when linked to a pressing problem (ibid.). Some issues may rise on an agenda because they are so compelling in their own rights, others may rise based on how they are framed to highlight a *'problem'* (ibid.).

Kingdon (2014) argues that various mechanisms, including indicators, focusing events and feedback bring problems to the attention of policy makers. In other words, policy makers can learn about *'conditions'* which come to be defined as *'problems'* through these mechanisms. First, in explaining the issue of indicators, Kingdon argues that, *"indicators are used to assess the magnitude of the condition (e.g., the incidence of a disease or the cost of a program), and to discern changes in a 'condition"* (ibid., p. 197). He explains that a change in the indicator suggests that there is a "*change in the state of a system"* which policy makers define as a *'problem'* (ibid., p. 92). Policy makers therefore use indicators in two ways: "*to assess the magnitude of a problem and to become aware of changes in the problem"* (ibid., p. 91). In this way, indicators suggest to policy makers whether or not 'action' is required on a specific issue.

Next, Kingdon (2014) explains that, *"a focusing event – a disaster, crisis, personal experience, or powerful symbol - draws attention to some conditions more than to others"* (p. 197). For instance, to explain this point, Kingdon argues that *"to make an item from a less visible arena move up on the governmental agenda, something must happen, and that something often is a real crisis – the sort of thing government decision makers cannot ignore"* (ibid., p. 95). He emphasises this point stating, *"sometimes, crises come along that simply bowl over everything standing in the way of prominence on the agenda"*, adding that, *"such events demand some sort of action so clearly that even inaction is a decision"* (ibid., p. 96).

Nevertheless, Kingdon (2014) recognises that *"crises, disasters, symbols and other focusing events only rarely carry a subject to policy agenda prominence by themselves"* (p. 98) and suggests that they do need accompaniment. He makes clear that focusing events *"reinforce some pre-existing perception of a problem, focus attention on a problem that was already 'in the back of people's minds'"* (ibid., p. 98). Focusing events therefore bring problems to the fore making them

appear 'urgent' for policy maker attention (Birkland, 1997; 2006; Kingdon, 2014). Kingdon (2014) also points attention to some variations of focusing events, for instance, the impacts of policy makers' personal experiences and powerful symbols. He suggests that *"sometimes, subjects become prominent agenda items partly because important policy makers have personal experiences that bring the subject to their attention"* (ibid., p. 96). In addition, powerful symbols can act to draw attention to a subject that is already on the minds of policy makers (ibid.). In this way, personal experiences and powerful symbols *"act as reinforcement for something already taking place and as something that rather powerfully focuses attention, rather than as a prime mover in agenda setting"* (ibid., p. 97).

Finally, policy makers also become aware about *'conditions'* from feedback from current policies or programmes, either formal (e.g. policy reviews) or informal (e.g. employee complaints) (Kingdon, 2014). Kingdon mentions that, *"feedback gives information on current performance that may not square with legislative or higher administrative intent, indicates a failure to meet stated goals, or suggests unanticipated consequences"* (ibid., p. 113). This suggest that negative feedback from ongoing policy programmes, for instance, may suggest to policy makers that an issue exists that needs government action.

So far, I have been discussing how *'problems'* are defined and brought to the attention of policy makers, reflecting on the importance of these processes for understanding *agenda setting*. I now turn to consider why certain issues are ignored on the government agenda. From Kingdon's study, he found that issues may fade away from the government agenda for various reasons. For instance, policy makers *"feel they have solved the problem"* (ibid., p. 103); others fade from view because *"attention is faddish"* (ibid., p. 113) following a period of enthusiasm heightened by the novelty of the issue.

Kingdon (2014) also makes a special mention about *'budgets'* arguing that it *"constitutes a particular kind of problem"* (p. 105). Budgetary considerations can act as a *"promoter"* or *"constraint"* to *agenda setting* (ibid., p. 105). As a promoter, they can *"sometimes force items higher on the governmental agenda"* and as a constraint, they cause items to fade from view because *"the item would cost more than decision makers are willing to contemplate"* (ibid., p. 105). Kingdon explains that the budget constraint is generally related to the *"state of the economy"*, explaining that, *"…when the economy is not growing rapidly, when government revenues fall off and various entitlement expenditure rise, the budget constraint becomes severe"* which forces items to lose their place on the agenda (ibid., p. 108). On the other hand, *"when the economy is growing…more slack resources are available to government for innovation"* (ibid., p. 108).

Taken together, it is observed that Kingdon's *'problem stream'* is incredibly diverse and he talks about a number of different things including, what distinguishes a *'condition'* from a

'problem'; factors which affect how policy makers frame *'conditions'* as *'problems'* (i.e. the role of values, comparisons and categories); how *'problems'* are brought to the attention of policy makers (mechanisms of *'problem definition'*); how *'problems'* come to be framed and understood by policy makers; why certain *'problems'* fade from view; why *'budgets'* represent a significant *'problem'*; amongst others.

As elucidated, Kingdon's work explores why the conception of *'problems'* matters to *agenda setting* and what affects this process. Kingdon's ideas in the *'problem stream'* show the dynamics of *'problem definition'*, which is central to understanding why issues become prominent on the government agenda. It highlights the importance of why people interested in *agenda setting* need to pay attention to how policy actors recognise, understand and frame issues in policy development as well as the strategies used to attract the attention of policy makers. His work also shows the importance of why we need to understand why different problems might be viewed differently by different actors and therefore why issues might come to have different degrees of urgency. Additionally, his ideas tell us that policy maker attention is fleeting, and that, *"it takes time, effort, mobilization of many actors, and the expenditure of political resources to keep an item prominent on the agenda"* (Kingdon, 2014, p. 104). His work tells us to look out for various mechanisms that help to highlight the *'problem'*. Additionally, it tells us to seek insights into the personal experiences and motivations of policy actors, which influence the *agenda setting* process. In general, Kingdon reveals there are many different things to consider when exploring the nature of the *'problem'*. In subsequent analysis. I will draw on Kingdon's ideas to discuss developments in the *'problem stream'* of CCS such as the *'problem'* of CCS and how the *'problem'* was identified, conceived, and framed by policy makers. In this way, I show in subsequent analysis how it is possible to re-construct the dynamics of the *'problem stream'* in this particular case.

I will now go on to discuss Kingdon's next stream – the *'policy stream'* in the following section to identify what he conceives of it and how it helps our understanding of *agenda setting*.

2.2.2 Policy stream

This section will bring together insights about what the *'policy stream'* is, the processes involved and how it develops our understanding of *agenda setting*. It will consider issues surrounding how *'solutions'* to *'problems'* are developed, the nature and composition of the *'policy community'*, their interaction and how ideas spread through a *'policy community'*. It will also seek to explain the criteria for the selection of policy proposals in the *'policy community'* as well as the roles and strategies adopted by *'policy specialists'* in the development and advocacy of policy proposals. In particular, it will consider the issue of *'consensus building'* as Kingdon (2014) suggests that it can play a role in determining if a particular policy will survive the *'policy community'*. It will particularly note that *'consensus building'* is advanced in the *'policy stream'*

through the process of persuasion and diffusion; a situation different from how *'consensus building'* is advanced in the *'politics stream'* (discussed later).

Kingdon explains that the *'policy stream'* is where policy proposals are generated, developed, debated and narrowed to a short list of proposals that are put forward to policy makers for serious consideration (Kingdon, 2014; see also Howlett and Ramesh, 2003). In other words, the *'policy stream'* is viewed as where the selection of policy proposals take place. Kingdon (2014) explains that in the *'policy stream'*, *'policy communities'* are found that are composed of *"specialists in a given policy area"* (p. 117). These specialists may be found both inside and outside of government and may include civil servants, academics or researchers, leaders, industry actors, amongst others. Kingdon describes this group of specialists or actors as *"hidden clusters"* (ibid., p. 68) in the *'policy community'*, arguing that they are rarely in the spotlight. Rather, they focus on a given policy *'problem'* in order to develop a range of possible alternative *'solutions'* to a *'problem'*. He cites the example of the role of researchers to explain this point: *"the work of researchers of various descriptions…might well feed into the design of alternative proposals, but would only rarely be responsible for altering officials' attention to one subject rather than another"* (ibid., p. 69). Another example is the work of civil servants: civil servants, for instance, work on behalf of government by generating different policy alternatives to a given issue and advising government on them, rather than setting the agenda. Kingdon recognises that, *"this community of specialists hums along on its own, independent of such political events as changes in administration and pressure from legislators' constituencies"* (ibid., p. 117).

Kingdon (2014) has noted that, *"from one policy area to another, the relevant communities of specialists vary tremendously in the degree of fragmentation"* stating that *"some communities are extremely closed and tightly knit"* while *"others are more diverse and fragmented"* (p. 118). He notes that this has consequences for the kind of interactions that take place. He cites an example from his case study comparing the degree of fragmentation between the health and transport fields to explain this point: he observed that the health sector was loosely knit together, adding that although people had different specialties (for instance, biomedical researchers and health insurance advocates), they all had one focus in ensuring that patients get better. So, he noted that, there was a *"fair amount of interaction"* amongst them and people generally knew each other. On the other hand, he observed that the transport sector was far more fragmented, *"partly because it is divided into the different modes"* for instance, people working in railways, highways, or aviation. As such, there was far less interaction amongst them and they generally were not familiar with each other (ibid., p. 118). Kingdon goes on to make the point that, *"among the consequences of fragmentation are disjointed policy, lack of common orientations, and agenda instability"* (ibid., p. 143). Let us now consider how ideas develop within the *'policy community'* in the following

discussions. I will also seek to explain the processes and strategies adopted by *'policy specialists'* to get people apprised to their ideas in order to gain support.

In the *'policy stream'*, specialists *"try out their ideas on others in the policy community"*; as such, *"quite a wide range of ideas is possible and is considered to some extent"* (ibid., p. 122). Describing this process metaphorically, Kingdon explains that policy solutions develop in a '*policy primeval soup*', in which *"ideas float around, combine, split and rise or sink in popularity"* (Kingdon 1984, p. 151). Kingdon (2014) explains that in a '*policy primeval soup*', specialists utilize a number of ways to introduce their policy proposals to policy makers; a process known as *'softening up'* and emphasizes that this process often takes time. In simple terms, Kingdon (2014) argues that the purpose of the *'softening up'* process is "*to ensure that the relevant public is ready for a certain type of proposal when its time does come"* (p. 128). He makes clear that, *"there is a long process of 'softening up': ideas are floated, bills introduced, speeches made; proposals are drafted, then amended in response to reaction and floated again"* (ibid., p. 117). He recognises that, *"ideas confront one another…and combine with one another in various ways"* (ibid., p. 117). The *'softening up process'* can include delivering speeches, publishing academic papers and policy briefs, drafting legislative proposals and engaging in conversations with policy makers with the aim to establish coalitions of support (Kingdon, 1984). As stated, Kingdon notes that the development of policy solutions in a '*policy primeval soup*' is often a slow and gradual process and a lot of time is required for them to reach the point of acceptability by policy makers (Kingdon, 1984).

Kingdon (2014) recognises the importance of special advocates in the *'policy community'*, who he terms *'policy entrepreneurs'*.[2] It is important to note here that *'policy entrepreneurs'* are also active in other streams and play key roles at different stages of the policy process (See Section 2.2.4, p. 51). Kingdon (2014) highlights that while *"ideas float freely through the policy primeval soup"*, their advocates *"do not allow the process to be completely free-floating"* (p. 127). He suggests that because certain issues take time to become accepted within government or policy networks, *'policy entrepreneurs' "attempt to 'soften up' both policy communities…and larger publics, getting them used to new ideas and building acceptance for their proposals"* (ibid., p. 128), then wait for an opportune time to introduce their proposals by which time the relevant stakeholders have been *'softened up'*.

Kingdon (2014) explains that, *'policy entrepreneurs'* utilise different channels to get their ideas out there, for instance, *"prominent appointees and civil servants make many speeches around the country"* (p. 129). Again *"bureaucrats and analysts constantly issue studies, reports, and other papers, some mandated by statute and some done on their own"* (p. 129) which together aims at *"preparing the policy community for some future direction"* (p. 129). This process of preparation (or *'softening up'*) may be aimed at the general public, a more specialized public inclined to a

[2] Policy specialists are different from policy entrepreneurs, however on some occasions, some policy specialists can act as policy entrepreneurs

specific policy problem, or the policy community itself (ibid). Kingdon makes a further point; *'softening up'* may sometimes consist of *"floating trial balloons"* (ibid., p. 129). Explaining this point, he mentions that sometimes an idea is simply thrown out there to test its receptivity. He cites an example as, *"a bureaucrat tries out an idea by slipping a paragraph into a secretary's speech to see what the reaction is"* (ibid., p. 129). However, he contends that though many 'floating trial balloons' *"don't survive the scrutiny"* (ibid., p. 129), some may be taken seriously and may be referred to in the future.

Kingdon contends that, various incentives prompt *'policy entrepreneurs'* to advocate their preferred solutions. First, *'policy entrepreneurs'* are driven to advocate their 'pet' solutions for reasons of promoting their personal interests. For instance, they may do so in order to protect their job, expand their agency or promote their career (ibid.). Kingdon goes on to explain different scenarios for which these may happen. For instance, He suggests that *"in the case of a lobbyist, advocacy of a proposal might be prompted by group's interest"* (ibid., p. 123). This might mean that they may not be necessarily keen about the specific proposal being advocated for; but must be engaged in discussions *"to protect the interest of its members"* (ibid., p. 123). In another example, he suggests that *"in the case of a politician, advocacy has electoral benefits"* (ibid., p. 123). He cites an example where *"Members of Congress become competitive in order to claim credit for some accomplishment or to gain publicity"* (ibid., p. 123). Second, Kingdon explains that *"people sometimes advocate proposals because they want to promote their values, or affect the shape of public policy"* (ibid., p. 123). In this case, *'policy entrepreneurs'* advocate based on their ideologies of how they feel government should be handling a specific issue. Third, *'policy entrepreneurs'* advocate because *"they simply like the game…they enjoy being part of the action"*; Kingdon describes them as *"policy groupies"* (ibid., p. 123).

Aside from the *'softening up'* strategies policy specialists deploy to get their proposals apprised in the *'policy stream'*, it is also important to think about the factors which guide this process. For instance, Kingdon (2014) asserts that the *'policy community'* has a way of *"working through problems and proposals"* (p. 125), explaining that *"as officials and those close to them encounter ideas and proposals, they evaluate them, argue with one another, marshal evidence and argument in support or opposition, persuade one another, solve intellectual puzzles, and become entrapped in intellectual dilemmas".* These, he explains contrast the concepts and processes that political scientists are preoccupied with, i.e. using *"power, influence, pressure and strategy"* to work their way through policy problems and solutions (ibid., p. 125). He emphasizes this point stating that *"some events may be governed by lobbying events…but government officials still try to reason their way through problems"* (ibid., p. 126). As such, Kingdon brings to light the importance of the *"content"* of ideas, arguing that *"both the substance of the ideas and political pressure are*

often important in moving some subjects into prominence and in keeping other subjects low on the government agenda" (ibid., p. 127).

Kingdon (2014) asserts that, *'softening up'* is an important and necessary process that must take place before proposals are taken seriously.[3] He explains this by citing the example that, *"many good proposals have fallen on deaf ears because they arrived before the general public, the specialized publics, or the policy communities were ready to listen"* (ibid., p. 130). As such, he contends that the preconditioning stage is an important step to get people well apprised to the idea prior to its policy considerations. Nevertheless, he further argues that for an idea *"to become a basis for action"*, it must *"both sweep a community and endure"* (ibid., p. 130). In other words, for a policy proposal to be accepted within a *'policy community'*, then a sufficient number of policy actors must agree to it. This leads to another discussion of how policy proposals become accepted in the *'policy stream'*. In the following sections, I seek to explain the factors that affect the receptiveness of policy proposals within the *'policy community'* i.e. the criteria for the selection of policy proposals as Kingdon (2014) conceives of it, and how this matters for our understanding of *agenda setting*. I will also point to concepts such as *'equity'* and *'efficiency'* and explain how these shape policy actors' reception of a given policy proposal.

Kingdon (2014) points out that, policy proposals are selected based on the following criteria: *"technical feasibility, congruence with the values of community members, and the anticipation of future constraints, including a budget constraint, public acceptability, and politicians' receptivity"* (p. 200). The first criterion for the selection of policy proposals considered here is technical feasibility. Kingdon suggests that *"advocates of a proposal must delve deeply into details and into technicalities, gradually eliminating inconsistencies, attending to the feasibility of implementation, and specifying the actual mechanisms by which an idea would be brought into practical use"* (ibid., p. 131). He maintains that *"without that belief in its technical feasibility, the proposal is not likely to survive to the point of serious consideration"* (ibid., p. 132). In other words, before a policy proposal is seriously considered, policy makers would want to ensure that the specific proposal is a *"worked out"* or *"ready to go"* solution (ibid., p. 142).

The second criterion for the selection of policy proposals is the issue of value acceptability. Kingdon maintains that *"proposals that survive in the policy community are compatible with the values of the specialists"* (ibid., p. 132). This suggests that policy proposals should be in line with what policy specialists believe is important, worthy, or morally acceptable to them. Any proposals that are not in line with policy specialists' values stand the chance of getting ignored. In relation to value acceptability, Kingdon recognises two other concepts that are important: *"concepts of equity and efficiency"* (ibid., p. 143). Kingdon argues that, sometimes policy makers and those close to them *"perceive an inequity so compelling that it drives the agenda"*

[3] There can be exceptions to this idea; sometimes policy can be made very fast with little *'softening up'*, for instance, the Dangerous Dogs Act 1991 came about in response to the rise in dog attacks (Hood *et al.*, 2000)

(ibid., p. 135). As such, he maintains that *"proposals sometimes come to be prominent on governmental agendas because they would serve to redress inequities, imbalances, or unfairness"* (ibid., p. 135). Another component of values which Kingdon mentions is the *"principle of efficiency"* (ibid., p. 136). In explaining this, Kingdon argues that policy makers *"increasingly concern themselves not only with the cost of a program but with the benefits that are being realized from that expenditure, whether these benefits justify the costs, and whether the benefits could be achieved at a lower cost"* (ibid., p. 136). I previously alluded to the importance of values in the *'problem stream'* and it is observed that this concept is also important in the *'policy stream'*, i.e. policy makers' values affect how they perceive policies as well as problems. Taken together, these dynamics show that *agenda setting* can be complex; often interspersed with various ideas being considered at the same time before an idea rises into prominence on the government agenda.

Next, I will go on to explain the third criterion for the selection of policy proposals – the anticipation of future constraints of policy proposals (i.e. budgetary constraint, public and political acceptability). Policy actors[4] must ensure that they anticipate future constraints on their policy proposals, for instance, in terms of a *"budget constraint"* and *"public acquiescence"* (Kingdon, 2014, p. 138). As Kingdon makes clear, *"down the line, decision makers need to be convinced that the budgetary cost of the program is acceptable, that there is a reasonable chance that politicians will approve, and that the public in its various facets – both mass and activist - will acquiesce"* (ibid., p. 138). Recognising this crucial aspect, he emphasizes that *"some ideas fail to obtain a serious hearing…because their future looks bleak, while others survive because specialists calculate that they would meet these future tests*" (ibid., p. 138). As I previously alluded to in the *'problem stream'*, budget constraint appears to be a particular problem. As such, Kingdon argues that a *"proposal must be shown to have a tolerable cost…"* (ibid., p. 138), if it is going to be considered seriously by policy makers. Another area of concern is the issue of public acceptability. Just as Kingdon highlights, *"specialists in a policy community know that ultimately their proposals must be acceptable to the public"* (ibid., p. 138). This suggests that public acceptability is important should a policy proposal see the light of day. Kingdon notes that the public can be perceived in different ways; the broad general public, specialized public, or both (ibid.). Kingdon emphasizes that it would be a mistake for policy specialists to *"ignore public reaction as they design their proposals"* (ibid., p. 138). Moreover, he adds that, policy specialists envisage political support or opposition from policy makers concerning their policy proposals, and hence they develop and evaluate them having these in mind (ibid.). Whilst Kingdon makes this point, it should be noted that there are instances in practice where this principle has not been applied and policies have been implemented that faced public opposition (suggesting that this is not a requirement for successful policy making). For instance, when Labour went to war in Iraq, they were seen to face an electoral backlash (Abbasian, 2017).

[4] People in the policy making process – visible or hidden participants

It is worth noting that, within the literature on policy making, other scholars have extended these insights to consider other criteria for the selection of policy proposals. For instance, Zohlnhöfer and Huß (2016) suggest that policy proposals that conform to constitutional laws are those that are likely to be seriously considered, for instance, policies that align with international laws or EU law. Spohr (2016) also drew upon established theories of *'path dependence'* to argue that a policy proposal perceived as tangential to a previous policy direction, which was found to be advantageous is unlikely to survive the *'policy community'* to be considered seriously.

Another important aspect which Kingdon (2014) mentions in the *'policy stream'* is the issue of 'consensus' amongst policy specialists. Kingdon explains that when an idea is formulated, goes through the *'softening up'* stage and eventually survives the selection criteria, *"consensus spreads through the policy community"* (ibid., p. 139). The idea begins to 'diffuse' through the policy community and ultimately reaches the 'take-off point' where *"many people are discussing the proposal or idea"* (ibid., p. 140). Kingdon argues that, in the *'policy stream'*, *"consensus is built largely through the process of persuasion and diffusion"* (ibid., p. 159). However, Kingdon also explains that the fact that a particular idea has been selected within a *'policy community'* does not mean there is *'consensus'*, but that a few ideas are prominent amongst a sufficient group of specialists (ibid.). In other words, this suggests that not everyone has to be behind a particular idea being selected, however, there has to be agreement among sufficient people in the *'policy community'* that a few set of proposals should be considered taking forward.

So far, I have discussed the different processes that take place in the *'policy stream'*. It is also observed here that the *'policy stream'* is incredibly diverse and encapsulates different aspects as shown in the discussion above. Taken together, the *'policy stream'* basically explains how a range of policy proposals to a *'problem'* is narrowed to a set of viable alternatives that are seriously considered by policy makers. The chances for an issue to move up on the agenda is enhanced when a *'problem'* becomes attached to a viable *'solution'*. Kingdon's (2014) work in the *'policy stream'* shows that a policy proposal must survive the *'policy community'* before it is seriously considered. Reflecting on Kingdon's work, his theory appears to be an idealised account which points to the ideal conditions for *agenda setting* – hence his analysis helps us to identify ideal conditions, but it is also possible for us to recognise exceptions to his ideas and note that ideas can rise up the agenda in ways that violate these ideas.

Kingdon's work therefore provides a number of useful insights. For instance, his work gives us reason to think about how ideas are formulated and get diffused within the *'policy community'* as well as the nature of the *'policy community'*. He also points to the roles and strategies policy specialists deploy to gain support for their policy proposals. Furthermore, his ideas give us reason to reflect on the reactions of policy makers and the factors that affect their

receptiveness to certain policy proposals. His ideas also show that consensus in the *'policy stream'* can vary, and that the degree to which there is consensus (or not) might affect the prominence of the policy solution positively or negatively. Again, Kingdon's work shows that policy specialists' values matter to the development of policy proposals. Taken together, Kingdon's work suggests that there are many different things that can be considered when exploring the nature of the *'policy stream'*. In subsequent analysis, I will draw on Kingdon's ideas in the *'policy stream'* to examine developments in the policy process of CCS such as divisions in how the *'policy'* was conceived and the roles and strategies of actors, in order to gain insights into the CCS story.

In the next section, I consider the *'politics stream'* of Kingdon's MSF to help our understanding of *agenda setting*.

2.2.3 Politics stream

This section seeks to detail what Kingdon (2014) conceives of the *'politics stream'*. The section draws together insights about developments in the *'politics stream'* comprising key aspects such as the nature of the *'stream'*, the political processes involved, important participants and the strategies deployed by them which shape the likelihood of an issue getting on the agenda. In particular, in this discussion, I seek to explain how political processes (such as government processes (i.e. turnover of key personnel), the national mood and the activities of organized political forces) affect the agenda and why this matters for our understanding of *agenda setting*. I will also discuss the concept of *'consensus building'* in the *'politics stream'*, a process that takes place through the process of *'bargaining'* amongst policy makers, rather than persuasion and diffusion (as noted in the *'policy stream'* in Section 2.2.2). Through this section, I delineate why an understanding of the *'politics stream'* matters for conceptualising *agenda setting*. These insights will be used in subsequent analysis to understand the political developments in the CCS case within this thesis.

The *'politics stream'* refers to the political processes which affect *agenda setting* (Kingdon, 2014). In the following discussion, I focus on the political processes in this *'stream'*, to seek insights into how they shape *agenda setting*. I begin by discussing the participants involved and go on to describe the nature of the *'stream'*. Kingdon (2014) explains that the *'politics stream'* constitutes *"things like swings of national mood, vagaries of public opinion, election results, changes in administration, shifts in partisan or ideological distributions in Congress, and interest group pressure campaigns"* (p. 87). Again, the *'politics stream'* is composed of important participants which Kingdon describes as *"visible clusters"* (or actors) (ibid., p. 68) (e.g. President or Prime Minister) who are capable of using their position of power to affect the agenda (ibid.). A case in point is, *"when a president and his top appointees decide to place a high priority on a given item, agendas are set all over town"* (ibid., p. 69). Kingdon explains that the nature of these participants matters to *agenda setting*. That is, who is in power determines what issues are prioritised. He

goes on to emphasize that *"developments in this political sphere are powerful agenda setters"* (ibid., p. 198). An example is when a change in government administration occurs – this brings in a new leader with a new set of agenda items which may replace the items which were already on the agenda (ibid.). I will discuss this in more detail when we look at government in the *'politics stream'* in subsequent sections.

Kingdon (2014) has noted the conditions under which an issue gains prominence in politics. He argued that, *"potential agenda items that are congruent with the current national mood, that enjoy interest group support or lack organized opposition, and that fit the orientations of the prevailing legislative coalitions or current administration are more likely to rise to agenda prominence than items that do not meet such conditions"* (ibid., p. 20). He adds that, *"the combination of perceived national mood and turnover of elected officials particularly affects agendas"* (ibid., p. 20). Thinking about these points, three different actors are seen to be significant in determining the effect of politics: Government in the political stream, national mood/public opinion and organized political forces.

The first factor is government in the *'politics stream'*. Kingdon (2014) explained the importance of government processes in the *'politics stream'* (e.g. turnovers of key personnel) and their influence in the policy process. He asserts that, *"administrations change, bringing with them marked changes in policy agendas"* (p. 153). In explaining how *agenda setting* occurs with respect to government actors, Kingdon argues that this can happen in two ways. First, policy makers can use their positions of authority to place their preferred items on the agenda. Second, new ideas may set in as a result of new personnel coming into new positions (ibid.). It is important to note here that government in the *'politics stream'* can include politicians, government departments and civil servants/technical staff.

Furthermore, Kingdon indicates another government process which affects how *agenda setting* occurs - *"jurisdictions"* (ibid., p. 155). He explains that this accounts for why certain issues may not gain attention on the agenda. For instance, he contends that, *"some items are ignored because they are 'defined away' by the drawing of jurisdictional boundaries"* (ibid., p. 155). Explaining further, he argues that an agency will have *"some enduring orientations that persist, regardless of the turnover of personnel"* (ibid., p. 155). This suggests that as a result of an agency or a government department having specified positions, practices or inclinations towards how things should be carried within that particular agency, it makes it difficult for some particular issues to emerge on the agenda, despite a change in political or administrative leadership. This also makes it important to draw the distinction between political actors (e.g. Minister) and politically neutral actors (civil servants) within government. It appears that while political actors are motivated by ideology and electoral incentives and goals, non-political actors are not driven

by these things, but can still exert pressure in the policy making process through departmental culture and jurisdictional boundaries.

Aside from jurisdictional disputes, Kingdon makes another point – *"battles over turf"* (ibid., p. 157) between government actors/agencies. He argues that *"positions taken in battles over policy directions quite commonly reflect the jurisdictions and interests of the agencies involved"* (ibid., p. 155). To cite an example to explain Kingdon's point, we can consider two UK government departments – the HM Treasury and BEIS. It is possible that each of these departments may have their own particular enduring orientations or priorities to protect. HM Treasury, for instance, may be concerned primarily about controlling public expenditure whilst BEIS may be focused on issues such as climate change, energy security and business innovation. It follows therefore that where a cross-cutting issue requires collaboration of such departments, their enduring positions may affect policy direction. As such, Kingdon maintains that "*agenda setting is affected by battles over turf*" (ibid., p. 155).

Continuing, Kingdon (2014) explains that *'battles over turf'* between government actors often lead to 'competition' which can affect *agenda setting*, causing some issues to be promoted while others may be constrained. Like he makes clear, *"a subject may become more prominent much more quickly than it would in the absence of competition"* (ibid., p. 157). Citing an example, Kingdon stated that *"congressional committee chairs, for instance, compete with one another to claim credit for some initiative that they sense will be popular. In the rush to beat each other to the punch, a subject may become prominent much more quickly than it would in the absence of this competition"* (ibid., p. 157). Therefore, Kingdon argues that competition can act in two ways – promoting issues or restraining issues. As a promoter, competition can cause an issue to rise into prominence *"if the various participants see a current or potential constituency for action out there, or if they see some electoral or publicity mileage in it"* (ibid., p. 158). On the other hand, as a restraint, Kingdon argues that, *"if the issue has no such constituency or some opposition, or if it is unpopular, then competition contributes to its downfall"* (ibid., p. 158). Taken together, it is observed that Kingdon's ideas cast light on how *agenda setting* occurs in relation to government processes. His ideas show that *'turnover of key personnel'* (in the form of politicians and 'neutral' civil servants), *'jurisdictions'*, *'battles over turf'* between government actors/agencies and *'competition'* can all affect policy outcomes.

The second factor is the national mood. Kingdon (2014) suggested that this concept has different labels; "*the climate in the country, changes in public opinion, or broad social movements*" (p. 146), explaining that *"common to all these labels is the notion that a rather large number of people out in the country are thinking along certain common lines..."* (p. 146). To Kingdon, the national mood *"has important policy consequences"* (ibid., p. 149). Kingdon has argued that people in and around government are able to sense a national mood at any given time and able to notice

changes when the mood shifts (ibid.). He explains that government officials (either politicians or civil servants) receive reactions from the public in different ways. For instance, *"they hear from interest groups' leaders...read newspaper editorials; they give talks and listen to questions and comments at meetings; they see how public events are being covered in both general and specialized media; and they talk to party activists and other politicos who presumably have their ears to the ground"*. (ibid., p. 149). Elected officials, such as MPs, are therefore able to sense the mood from their constituents through different mediums such as *"communications as mail, town meetings, smaller gatherings, and delegations of people or even individuals coming to them during their office hours in the district"* (ibid., p. 149).

Through these channels, Kingdon (2014) argues that different political signals feed into government in different ways. People in government, for instance politicians, are able to notice changes in the national mood because they receive information about what people care about. In these instances, Kingdon explains that politicians may use these opportunities to put some items before others. That is, some items which were previously on the agenda may be ignored and new items taken on board (ibid.). Another case in point is polling data: polling data may suggest to policy makers about the most prominent problem amongst the public; politicians may therefore want to prioritise government action in that regard. Policy makers therefore sense a mood which informs policy agendas. As Kingdon aptly puts it, *"changes in mood or climate have important impacts on policy agendas and policy outcomes"* (ibid., p. 146). Emphasizing this point, Kingdon argued that the national mood *"has an impact on election results, on party manifestos, and on the receptivity of governmental decision makers to interest group lobbying"* (ibid., p. 149). On this basis, Kingdon maintains that, *"perceptions of the national mood affect governmental agendas, both by promoting items that fit with that mood and by inhibiting attention to items that do not"* (ibid., p. 163). This chimes with the wider literature on responsiveness and the principles of political representation (Bengtsson and Wass, 2010; Eulau and Karps, 1977; Pitkin, 1967; Rosset *et al*., 2016).

In this section, the role of public opinion in *agenda setting* and policy making is also examined as Kingdon (2014) suggested that the national mood has different labels; one of which is *"changes in public opinion"* (p. 146). It is important to note here that this concept of public opinion has been widely taken up by the literature (Bourdieu, 1979; Converse, 1996; 1990; Shapiro, 1998; Shapiro *et al.*, 1991; Zaller, 1992). While the distinctions between the national mood and public opinion are not clear cut in Kingdon's work, he however discusses how public opinion feeds into policy making (and vice versa) (ibid.). Kingdon explains that public opinion can impact the agenda both positively or negatively. He argues that *"public opinion may sometimes direct government to do something, but it more often constrains government from doing something"* (ibid., p. 65). As a promoter, public opinion *"might thrust some items onto the governmental*

agenda because the vast number of people interested in the issue would make it popular for vote-seeking politicians" (ibid., p. 65).

It remains vague however who constitutes the public when we refer to public opinion. As alluded to in Section 2.2.2, Kingdon (2014) makes two distinctions about what we refer to when we talk about the 'public' – i.e. the generalised public or a specialized public. In relation to the general public, one distinctive argument Kingdon makes is that although the general public may sometimes influence government in bringing items on the agenda, it's rare for the public to set the agenda as this is the remit of politicians (ibid.). He explains that *"people like presidents, senators…have their own goals, their own proposals, their own agendas. These officials may attempt to mobilize the public in support of their objectives, but on many occasions they will choose not to"*. He adds that *"when they do mobilize expanded publics…it may be more in pursuit of passage than for agenda setting"* (ibid., p. 67). Citing an example, he says that *"Presidents sometimes set the agenda, for instance, then mobilize the public to pass their legislative proposals"* (ibid., p. 67). He explains that *"items on a governmental agenda never were on a public agenda, or they were on a public agenda in a form so inchoate as to have only minimal impact on governmental officials"* (ibid., p. 67). As such, he critiques that *"models of agenda setting that rely on some form of translation of public preferences into government seem incomplete"* (ibid., p. 67).

Taken together, Kingdon's ideas show that politicians can draw on the public in different ways either by shaping or driving the agenda, or be used to justify a pre-existing agenda. The much broader point gathered here is that policy makers can lead, or be led by public opinion, but that it is rare for politicians to be 'forced' to take action. Whilst pressure can often be placed on policy makers by the public promoting them to act (for instance, the Covid-19 lockdown), at other times, pressure may not work. Hence, it can be argued that policy makers can draw on public opinion in different ways, but an attentiveness to public views does not mean that action will always be taken as policy makers have ultimate power to decide whether to listen to the public.

The third and final factor considered here is the activities of organized political forces e.g. interest group pressure campaigns. Kingdon (2014) discusses that it is important to think about how people in government respond to *"organized activities"* (p. 150) and how this feeds into the *'politics stream'*. Kingdon argued that the activities of organized forces may serve as a promoter or constraint to *agenda setting* (ibid.). To understand these ideas, Kingdon draws attention to the significance of *"consensus and conflict amongst organized interests"* (ibid., p. 150). In terms of consensus, Kingdon discussed that *"if important people look around and find that all of the interest groups and other organized interests point them in the same direction, the entire environment provides them with a powerful impetus to move in that direction"* (ibid., p. 150). On the other hand, in terms of constraint, Kingdon explained that, *"if there is some conflict among the organized forces, then political leaders implicitly arrive at an image of their environment that strikes some balance*

between those for and those against a given proposal, or for and against the emergence of an item to agenda prominence" (ibid., p. 150).

Taken together, this means that, where consensus is achieved for a particular issue amongst an interest group, their activities serve to promote the item on the agenda, However, when there is conflict amongst the organized group concerning the issue, policy makers tend to determine where the *"balance of support and opposition lies"* (ibid., p. 150). He explains that *"while the determination of the balance of support and opposition is somewhat imprecise, the fact that decision makers do arrive at an assessment of the balance is not"* (ibid., p. 151). What Kingdon suggests here is that politicians do count the cost of the kinds of actions they take concerning organized groups' activities, whether in favour of support (or not) (ibid.). As Kingdon makes clear, *"decision makers do take soundings in the sea of organized interests, and they do anticipate the cost they would pay if they were to take on well-organized opposition"* (ibid., p. 153). Kingdon however pointed that, one main reason why some policies are not prioritised is because they basically lack support. He also adds that intense opposition from organized forces can sometimes prevent items from being considered seriously by policy makers. Citing an example of interest groups, he explained that interest groups *"are often concerned with protecting current benefits and prerogatives, they affect the governmental agenda more by blocking potential items than by promoting them"* (ibid., p. 67).

Finally, we consider the concept *"consensus building"* (ibid., p. 159) in the *'politics stream'* as Kingdon makes a mention of it. In Section 2.2.2, I highlighted the importance of consensus building in the *'policy stream'*. Kingdon however makes a distinction about this concept in the *'politics stream'*. Kingdon argued that, whereas consensus building in the *'policy stream'* takes place through *"the processes of persuasion and diffusion"* (ibid., p. 159), consensus building in the *'politics stream'* "*is governed by bargaining"* (ibid., p. 159). Kingdon asserts that in the *'politics stream'*, it remains important to build coalitions through the principle of bargaining, where bargaining means, *"giving people their pet provisions in return for support"* (ibid., p. 160). Explaining further, he argues that *"coalitions are being built through the granting of concessions in return for support of the coalition, or as actual or potential coalition members make bargains"* (ibid., p. 159). Kingdon explains that in the *'politics stream'*, actors join a coalition for fears of being kept out *"from the benefits of participation"* (ibid., p. 160). This means that people join a coalition for beneficial rewards; they seek to be part of the 'game', and aim *"to reach toward a winning coalition"* (ibid., p. 160).

Taken together, Kingdon's work shows that the activities of organized political forces can feed into government policy making in different ways, either serving as a promoter or constraint to agenda items. As Kingdon argues, *'consensus'* and *'conflict'* amongst organized political forces appear significant in determining the actions of politicians, for instance. In addition, Kingdon's

work shows the importance of *'bargaining'* in the *'politics stream'* and how that drives actors in joining coalitions.

So far, I have discussed the extent to which different political processes – government processes, national mood/public opinion, organized political forces – help our understanding of *agenda setting* in the *'politics stream'* as elucidated by Kingdon (2014). In this discussion, Kingdon highlights a number of things in politics. Taken together, the *'politics stream'* shows that people in power can affect the *agenda setting* process. It explains that priorities change when governments or leaders change. As such, it tells us that to understand *agenda setting*, we need to look out for the political priorities of the people in and around government (for instance, elected officials, political parties or civil servants). It tells us that it is important to consider the political context and how political conditions change and evolve over time to inform policy development. His ideas also point to pertinent issues which occur within government processes – *'jurisdictions'*, *'battles over turf'* between government actors/agencies, and *'competition'* amongst actors/agencies which can all play a role in determining the direction of policy. This therefore tells us to consider policy actors' orientations and the roles and strategies they adopt to promote an issue. Furthermore, Kingdon's ideas show that people in government (either politicians or civil servants) draw from the national mood or public opinion in different ways which serve to promote some ideas on the government agenda while others may be ignored (ibid.). As explained above, politicians can gain insights into what people care about from polling data and use election cycles to prioritise those issues to win votes. Therefore, to understand *agenda setting*, scholars can compare polling data insights to party manifestos for example, or to the issues that politicians discuss prominently to trace agenda status. Finally, Kingdon also makes clear that support or opposition from organized political forces can influence governmental *agenda setting*, making it important to consider the priorities of these groups (ibid.). In addition, Kingdon explained the importance of *'consensus building'* and how policy makers build coalitions of support through *'bargaining'* to promote their preferred issues on the agenda (ibid.). Drawing on Kingdon's ideas, in subsequent analysis, I will examine developments in the *'politics stream'* of CCS, seeking to gain insights into the political processes, including participants who appeared influential in bringing about 'change'.

So far, I have focused on the different processes that occur within the independent *'streams'* of Kingdon's MSF. I now consider how these *'streams'* described above come together to create opportunities for policy change in what Kingdon has termed as the *'window of opportunity'*.

2.2.4 Window of opportunity, the *'coupling'* process & Policy entrepreneurs

This section will discuss in-depth what Kingdon (2014) conceives of the *'window of opportunity"*, that is, what they are, why they open and how the *'streams'* come together, in a process of *'coupling'*. I will also discuss the strategies of *'policy entrepreneurs'* in these *'windows*

of opportunities', seeking to explain their role in *'coupling'* different *'streams'*. Furthermore, I will discuss key concepts surrounding the predictability, unpredictability, frequency and duration of *'policy windows'* (ibid.). In the latter part of the section, I will discuss the concept of *'spillovers'*; *"the process in which the appearance of one item on the governmental agenda sets up the subsequent prominence of conceptually adjacent items"* (ibid., p. 166) and why this matters for our understanding of *agenda setting*. These insights will be used in subsequent analysis to identify the *'policy windows'* and *'coupling process'* in the CCS case as well as *'policy entrepreneurs'* and the roles and strategies they adopted in our attempt to describe *agenda setting* developments.

I will begin by discussing what the *'window of opportunity'* is and why they open. The *'window of opportunity'*, synonymous with *'policy windows'* are *"opportunities for action on given initiatives"* (Kingdon, 1984, p. 174). As Kingdon (2014) emphasizes, the *"policy window is an opportunity for advocates of proposals to push their pet solutions, or to push attention to their special problems"* (p. 165). They are created when the various *'streams'* described above combine (or *'couple'* in Kingdon's terms), allowing an item to emerge on the agenda (Kingdon, 2002; Zahariadis, 1999) (See Figure 7 below).

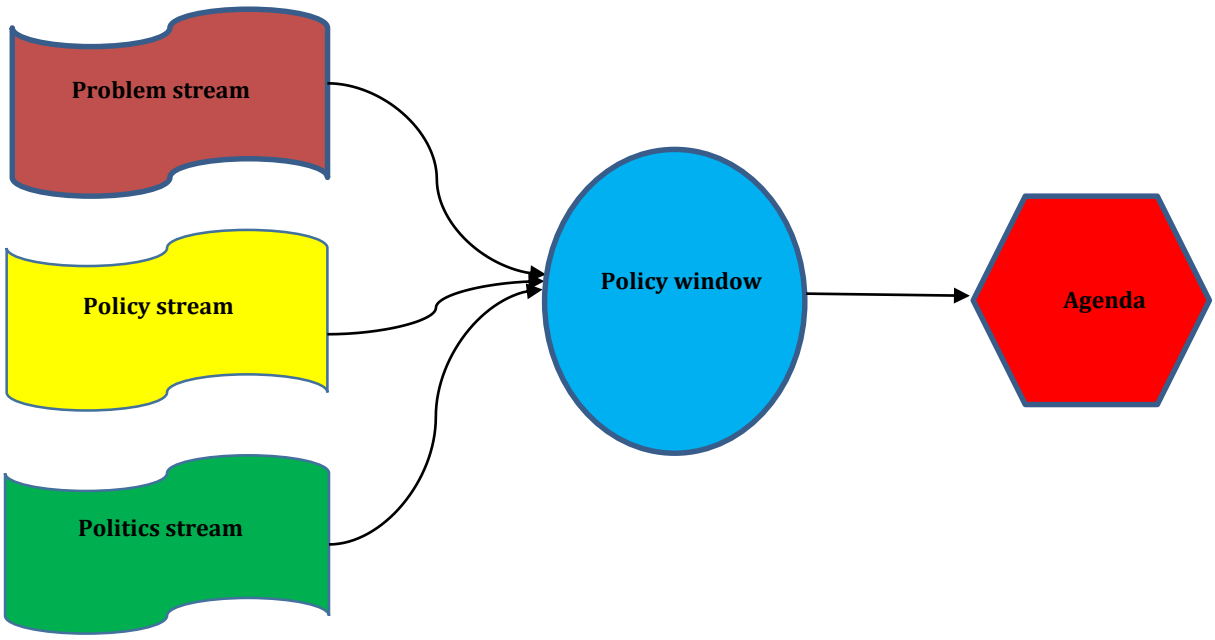

Figure 7: Kingdon's Multiple Streams Framework (MSF)

Kingdon (2014) has observed that *'policy windows' "stay open for only short periods"* (p. 166) and maintains that a window which opens affects the type of agenda – *'decision agenda'*. As indicated in Section 1.1., Kingdon recognised two types of agendas – the *'governmental agenda'* representing the list of subjects government is paying attention to and, the *'decision agenda'* representing the items that are being seriously considered for an authoritative decision by policy

makers. Scholars like Herweg *et al.* (2015) have adapted Kingdon's ideas to account for the nuances in his MSF and used terms such as *'agenda window'* and *'decision window'* to represent the types of windows that affect the *'governmental agendas'* and *'decision agendas'* respectively. However, it is important to note that this thesis does not adopt this focus but considers how the different *'streams'* generally come together to create opportunities for an issue to gain the attention of policy makers.

Kingdon (2014) explains that the position of an item on the *'decision agenda'* does not guarantee its enactment but recognises that it is *"a more active status than being on the governmental agenda"* (p. 166). Kingdon noted the opening of a *'policy window'* has implications for how different items on the decision list are prioritised by advocates or *'policy entrepreneurs'* (ibid.). He suggested that some items are prioritised *"essentially because…the proposals stand a decent chance of enactment"* (ibid., p. 166). Kingdon explains that *'policy windows'* create opportunities for advocates to push for their ready-made proposals to be considered. He recognises that, advocates only push for proposals which they consider productive and worth their time (ibid.). The roles and strategies of these advocates will be considered later in further detail (See pp. 50-52 below).

As discussed in previous sections, Kingdon maintained that *"the agenda is affected more by the problems and political streams, and the alternatives are affected more by the policy stream"* (ibid., p. 168). With that in mind, Kingdon recognises that *'policy windows'* open for two reasons: 1) the appearance of a compelling problem (such as a focusing event i.e. disaster or crisis) in the *'problem stream'* which catches policy makers' attention, or 2) a change in the *'political stream'*, for instance, a change in administration, turnover of personnel or a shift in the national mood (ibid.). A change in administration, for instance, creates opportunities for advocates to push forward some proposals which were not favoured by the previous administration (ibid.). In Kingdon's work, he used terms like *'problem windows'* and *'political windows'* to represent the types of windows that open in the *'problem stream'* and *'politics stream'* respectively (ibid.).

Kingdon maintains that, *'policy windows'* only open for short periods of time, and then close again for a number of reasons (ibid.). He observed five reasons why the window closes. First, he explains that a *'policy window'* closes because actors perceive the problem to be solved as a result of action taken. Second, the *'policy window'* may close because there was no opportunity to take action. Third, he explains that *'policy windows'* (such as turnovers) lead to people in positions being replaced by others, taking away the opportunities that were being enjoyed by virtue of their presence (ibid.). Fourth, *'policy windows'* close because *"the events that prompted the window to open may pass from the scene"* (ibid., p. 169). To cite a case in point, he explains that, focusing events do not last long and hence the *'policy window'*, brought about by its appearance may close. Finally, he explains that *'policy windows'* close because no alternative solution to the *'problem'*

that was identified was available (ibid.). Kingdon emphasizes that before a *'policy window'* opens, a proposal or alternative must already have been *"worked out"* (ibid., p. 172) to seize the opportunity to push forward the proposal when the window opens. He explains that *"missing that window results in a wait until it opens again"* (ibid., p. 172). Kingdon also discusses that *'policy windows'* can open in predicted or unpredicted ways (ibid.). In terms of predicted ways, an example to cite is election periods which represent (often) formalised routine cycles. Other examples may include the Queen's speech, spending reviews, budget periods, President's State of the Union address, amongst others. All these formalised events create opportunities for people seeking to push forward an idea. The unpredictability of windows comes about when it is difficult to determine propitious moments in the policy process. Indeed, *'policy windows'* may open by chance, for instance, in the case of disasters or accidents occurring. In this way, Kingdon explains that *"the separate development of the streams has proceeded to the point where they are each ready for coupling at the same time"* (ibid., p. 189).

Kingdon has used such terms as *"coupling"* of *'streams'* in *'policy windows'* to explain *agenda setting* (ibid., p. 172). Kingdon explains that in the *'policy stream'*, *"solutions float around in and near government, searching for problems to which to become attached or political events that increase their likelihood of adoption"* (ibid., p. 172). He goes on to explain that *"suddenly they become elevated on the governmental agenda because they can be seen as solutions to a pressing problem or because politicians find their sponsorship expedient"* (ibid., p. 172). Kingdon explains that *'coupling'* comes about when advocates act in *"propitious times"* (ibid., p. 202) to attach their pet solutions to pressing *'problems'* in the *'problem stream'* or to significant events in the *'politics stream'* that raise the likelihood of their ideas getting seriously considered. For instance, when there is a change of governance and the new leadership *"case about for ideas"* on their new agenda, a window is opened for advocates to push forward their proposals (ibid., p. 174). As he makes clear, *"when a window opens, advocates of proposals sense their opportunity and rush to take advantage of it"* (ibid., p. 175).

In Section 2.2.2, we recognised the roles of *'policy entrepreneurs'* in the *'policy community'*. But it is briefly worth expanding on who these actors are, before turning to discuss their role in relation to *'policy windows'*. Kingdon explains that *'policy entrepreneurs'* may include journalists, academics, lobbyists, political think tanks, industry stakeholders, civil servants, elected government officials, interest groups, amongst others (ibid.). Kingdon notes that, *'policy entrepreneurs'* have a defining characteristic i.e. *"their willingness to invest their resources – time, energy, reputation and sometimes money – in hope of a future return"* (ibid., p. 122). Kingdon explains that they must be knowledgeable, well-informed, well-equipped, persistent, and have the political connections and negotiation skills to push an agenda. Like Kingdon explains aptly, a *'policy entrepreneur'* possesses (3) main qualities (ibid.). First, the *"person has some claim to a*

hearing" (ibid., p. 180); this person holds an authoritative position and can speak on behalf of the people e.g. the President or the Prime Minister. Second, Kingdon explains that, "*the person is known for his political connections or negotiating skill"* (ibid., p. 181) and third, the person is *"persistent"* (ibid., p. 181). While Kingdon (2014) recognises these qualities as important for *'policy entrepreneurs'*, it is not clear whether or not every *'policy entrepreneur'* must possess all these attributes in equal measure or whether there are instances where a *'policy entrepreneur'* may not have all these attributes but can still succeed. Nevertheless, taken together, Kingdon's ideas show that *'policy entrepreneurs'* are key to the policy process and show the importance of unique qualities that are influential in enhancing the chances for an item to be considered seriously.

As Kingdon highlights, these *'policy entrepreneurs'* also play a key role in *'coupling'* Kingdon's *'streams'* in policy development (ibid.). In this section, we consider the roles of these entrepreneurs as agents in the process of *'coupling streams'*. Kingdon emphasized that, *"policy entrepreneurs play a major part in the coupling at the open policy window, attaching solutions to problems, overcoming the constraints by redrafting proposals, and taking advantage of politically propitious events"* (ibid., pp. 165, 166). They "*lie in wait in and around government with their solutions at hand, waiting for problems to float by to which they can attach their solutions, waiting for a development in the political stream they can use to their advantage"* (ibid., p. 165). Kingdon goes on to explain that *"policy entrepreneurs must be prepared, their pet proposal at the ready, their special problem well-documented, lest the opportunity pass them by"* (ibid., p. 165).

'Policy entrepreneurs' are responsible for both ensuring that their ideas gain attention and *'coupling'* solutions to problems in the right *'window of opportunity'*. Kingdon explains that *'windows of opportunity'* do not open for long, hence *'policy entrepreneurs'* must ensure to make the most critical *'couplings'* within the brief *'window of opportunity'* (ibid.). Like Kingdon puts it, *"the window is open for only a while, and then it closes"* (ibid., p. 88). Kingdon also makes another point – that coupling *"does not take place only when a window opens"*, but that, *"entrepreneurs try to make linkages far before windows open"* (ibid., p. 183). In this way, *'policy entrepreneurs'* bring a ready package into the window. Reflecting on the role of *'policy entrepreneurs'* in relation to *'policy windows'*, Kingdon's ideas suggest that *'policy entrepreneurs'* can either wait for an opportunity to float to *'couple'* different *'streams'* or create the opportunity for an issue to gain prominence (e.g. using their positions of authority to affect the agenda). The roles and strategies of *'policy entrepreneurs'* appear to be diverse and they can be found active in different locations. I introduced them in Section 2.2.2. to discuss their activities in the *'softening up'* process. Here too, they form an important part of the *'coupling'* process. Kingdon also notes that they play a role in the *'problem stream'* by causing government's attention to turn to *'problems'*; *"they highlight*

indicators, for instance, by press releases, hearing testimony, speeches, and other devices" (ibid., p. 115).

It is important to recognise here that, Kingdon's focus on the role individuals or organisations can play in advancing issues on the political agenda has been widely taken up in existing literature (Anderson *et al*., 2019; Mintrom, 1997, 2003, 2019; Mintrom and Norman, 2009; Rabe, 2004). It is notable that some scholars have adapted his ideas to look at actors' role in particular strands of the MSF. For example, Knaggård (2016, 2015) has introduced the idea of a *'problem broker'* to show how individual actors can seek to identify and address certain problems. Knaggard (2015) argues that *'problem brokers'* strategically frame issues to highlight that a *'condition'* deserves attention from policy makers. *'Problem brokers'* may sometimes act as *'policy entrepreneurs'*, by actively seeking to *'couple'* solutions to problems. Scholars such as Herweg *et al.* (2015) and Roberts and King (1991) have also used terms like *'political entrepreneur'* to denote key actors in the *'politics stream'* who use their position of authority to get issues adopted, for instance, the President or a special advisor.

Again, other scholars have adapted Kingdon's ideas to look at different types of *'couplings'* in different *'streams'* (Ackrill and Kay, 2011; Boscarino, 2009; Zahariadis, 2003) or at different stages of the policy cycle (Herweg *et al.*, 2015). For instance, Zahariadis (2003) has suggested concepts like *"consequential coupling"* (p. 72) and *"doctrinal coupling"* (p. 72) to denote *'couplings'* that occur as a result of *'policy windows'* opening in the *'problem stream'* and *'politics stream'* respectively. Within this thesis however, I do not adopt this focus on a particular strand or the different types of *'couplings'*, but instead focus on the role individuals and organisations play in creating *'windows of opportunity'* by bridging all three streams. It is worth noting that while these scholarly nuances to Kingdon's framework may appear important, I recognise that they do not depart from the core ideas of the MSF, and hence I decided to stick to the main arguments Kingdon posits.

Kingdon (2014) suggests that, *"problems or politics by themselves can structure the governmental agenda"* However, *"the probability of an item rising on the decision agenda is dramatically increased if all three streams-problems, policies, and politics-are joined"* (p. 178). This suggests that all three streams do not need to come together before agendas are set, but that opportunities for change are enhanced when all three *'streams'* are linked. Kingdon however maintains that, *"none of the streams are sufficient by themselves to place an item firmly on the decision agenda"* (ibid., p. 178). This means that the *'streams'* interact or combine with one another to create opportunities for change to occur. For instance, without the right political atmosphere e.g. change of administration to push forward an issue, a *'problem'* and its *'solution'* can linger on in the policy system for a long time. This is why Kingdon recognises the importance of *'coupling'* of *'streams'* in propitious times as they present themselves since the *'policy window'*

only opens for a short time. Like Kingdon makes clear, *"if the coupling is not made quickly, the window closes"* (ibid., p. 178).

The last concept considered is *'spillovers'*. Kingdon discusses that sometimes *agenda setting* occurs because *'policy windows'* created for a specific item can allow windows to be opened for other similar items. In this way, there is a spillover effect (ibid.). This can result in *"a principle that will guide future decisions within a policy arena"* (ibid., p. 190). For instance, when we take climate change issues as a given policy arena, the passage of the *'2008 UK Climate Change Act'* sets a precedent for any government of the day to make efforts to set legally-binding carbon budgets which places a cap on the amount of greenhouse gas emissions permissible in the country over a five-yearly period. In this way, public policy is set in a new direction. While Kingdon (2014) discussed the issue of *'spillovers'*, his arguments suggest that he referred to the concept of *'positive spillovers'* where a previous policy item on the government agenda leads positively to other adjacent items being considered on the government agenda as I have discussed. However, it is worth noting here that, there is also *'negative spillovers'* to contend with, where the presence of one item detracts from another.

Taken together, Kingdon's work suggests that being able to identify *'policy windows'* is important to policy development. His ideas tell us that people interested in *agenda setting* need to understand the process of *'coupling'* and how advocates act in favourable windows to increase the likelihood of their ideas to be taken up. So far, we can see that Kingdon (2014) discusses a number of things that explain the importance of *'policy windows'*, *'coupling'* and *'policy entrepreneurs'* to understanding *agenda setting*. In subsequent analysis, I will draw on Kingdon's ideas to determine the *'policy windows'* in the CCS case and the forms in which they appeared, including the *'policy entrepreneurs'* and the roles and strategies they adopted.

So far, I have focused on Kingdon's framework in great detail, outlining some of the key arguments he makes. I have also described how the MSF may help to explain the fortunes of CCS in subsequent analysis, to help our understanding of *agenda setting* in the CCS case. Given the centrality of Kingdon's MSF for the kind of analysis pursued in this thesis, it is also important to think about how existing scholarship in CCS resonate with the ideas of Kingdon. This is the focus for the next section.

2.3 IS KINGDON'S MSF RELEVANT TO EXISTING CCS STUDIES?

As discussed, Kingdon's MSF has been a key reference point within academic debates on *agenda setting*. I have indicated that Kingdon has been widely cited and his ideas have been applied across different policy domains but what is not yet clear is how this maps to CCS. So far, I have delineated Kingdon's MSF in detail to show how the framework can help our understanding

of *agenda setting* in the CCS case. Kingdon's work has shown the importance of three *'streams'* and how these *'streams'* come together at critical junctures to create a *'policy window'* for policy change to occur. His framework has also shown the importance of special actors – *'policy entrepreneurs'*, who aim to push forward their preferred issues or proposals on the government agenda.

However, this is an interdisciplinary piece of work and therefore it is important to think about whether this literature resonates with what we know about CCS. Therefore, in this section, I am going to reflect on current policy debates within the literature surrounding CCS to explore synergies between Kingdon's MSF framework and the focus of wider interdisciplinary literature on CCS to demonstrate the value and resonance of this approach. In seeking to operationalise Kingdon's ideas in subsequent analysis within this thesis, it is notable that on reviewing the existing literature on CCS, a number of key issues are raised which relate to Kingdon's *'problem'*, *'policy'* and *'politics' streams*. Although often not introduced with direct reference to Kingdon's three streams approach, these contributions (briefly discussed below) indicate the value of this approach in helping to understand the *agenda setting* process.

Studies of CCS from different disciplines (discussed below) have sought to highlight explanatory factors and outcomes that reflect Kingdon's ideas. Looking specifically at these studies, interdisciplinary scholarship on CCS appears to refer (often indirectly) to the components of the MSF: *'problem'*, *'policy'* and *'politics'*. For example, within the engineering discipline, Bui *et al.*'s (2018) study was focused on assessing commercial and political barriers to wide-scale CCS deployment, by reflecting on UK's commercial demonstration programme. In this study, the authors indicated that *"Carbon capture and storage (CCS) is recognised as being vital to least cost pathways for climate change mitigation…However, it has not yet been deployed on the scale understood to be required, owing to a variety of technical, economic and commercial challenges."* (p. 1063). This particular study reveals academics attempting to explain the fortunes of CCS, and in so doing, it outlines the *'problem'* CCS is addressing, but it also seeks to reflect on how non-technical factors are affecting progress. Mirroring Kingdon's ideas in relation to the *'politics stream'*, the authors noted that, *"A major role in the transition to low-carbon fuels will be played by politics"* (p. 1123). Elsewhere, they stated that, *"Governments have been, if anything, less consistent in their support of CCS technologies than non-state actors. There have been a handful of countries or jurisdictions, all of which are reliant on fossil fuels, where CCS has moved up the political agenda to the point where it emerged onto the wider political stage"* (p. 1139). Taken together, these quotes mirror Kingdon's notion of the *'politics stream'*, in particular with authors pointing to how CCS has received attention on the political agenda, and show the significance of politics in making decisions about CCS.

In a similar vein, another study by Budinis *et al.* (2018) within the social science literature surrounding CCS aimed at explaining the fortunes of CCS, by examining the barriers to CCS deployment. In this study, Budinis *et al.* (2018) referred to the *'problem'* of CCS stating; *"CCS is often argued to be a key technology for the decarbonisation of the global energy system and can be applied to both power generation and industrial production…however, few large scale CCS plants are operating worldwide"* (p. 61). As the quotations show, the authors point to the challenges or *'problem'* of CCS, arguing that while the technology has been recognised, it has not yet been deployed at a reasonable scale worldwide. Here again, it is observed that academics from beyond political science who are studying CCS often refer to Kingdon's ideas, although not directly. It is worth stating here that similar work in the communication studies discipline have highlighted the *'problem'* of CCS, in particular noting issues around problem definition and framing around CCS (Reiner, 2008; Brunsting *et al.*, 2011). In Budinis *et al.*'s (2018) study, the authors noted that apart from technical factors, cost represented a significant challenge to the deployment of CCS in the short to medium term. These ideas mirror Kingdon's notion of the *'policy stream'* by referring to the factors that affect policy makers' receptivity to a policy proposal. Similar studies originating from the social science literature around CCS have also shown the importance of economics in relation to CCS which mirror Kingdon's ideas in the *'policy stream'* (Bergstrom *et al.*, 2017; Rubin and Zhai, 2012; van der Zwaan and Gerlagh, 2009).

Another study by Markusson *et al.* (2012) from within the social science literature around CCS focused on offering an interdisciplinary framework to aid policy relevant stakeholders in assessing the viability of CCS. The framework, which the authors described as socio-technical, included technical, economic, financial, political and societal aspects and was developed to assess the viability of CCS to inform decision making. The authors argued that, *"whilst CCS is entering a phase of demonstration of large-scale integrated systems in various locations around the world, there are still significant uncertainties in technical, economic, political and financial and other dimensions of CCS. This creates challenges for those actors who want to see CCS technology developed and deployed…This highlights the need for a framework for analysing and assessing such uncertainties for CCS"* (p. 904). In this particular study, it is also observed that scholars are speaking to Kingdon's ideas, implicitly describing the *'policy'* and *'politics'* streams by indicating how both technical and non-technical factors are affecting the fortunes of CCS. Moreover, as the authors sought to offer a framework that assesses the viability of CCS to guide policy makers, this suggests that scholars are seeking insights into factors that inform policy decisions, similar to what Kingdon discusses. Similar studies in the social science field have been conducted in this regard to assess the uncertainties around CCS and the factors considered important in decision making (Kern *et al.*, 2016; Watson *et al.*, 2014). Again, a growing body of literature within the social sciences have focused on the social acceptance of CCS, in particular public perceptions and attitudes towards CCS (Apt and Fischhoff, 2006; Carley *et al.*, 2012; de Coninck *et al.*, 2009; Gough

et al., 2014; Krause *et al.*, 2014; L'Orange Seigo *et al.*, 2014; Oltra *et al.*, 2012; Shackley *et al.*, 2009; Terwel *et al.*, 2012; Warren *et al.*, 2014). Taken together, these studies focus on the need for engineers to appreciate the 'social' context within which technologies such as CCS are to be introduced by highlighting the importance of public acceptability for CCS. This chimes with Kingdon's ideas in the *'policy stream'* on the factors that appear influential in affecting policy makers' receptivity to a policy proposal.

Taken together, as seen in this brief overview, in the published engineering and social scientific literature pertaining to CCS, there are references to issues that map to the *'problem'*, *'policy'* and *'politics'* streams outlined in Kingdon's theory. However, to date no one has formally studied the case of CCS using Kingdon's comprehensive framework. Therefore, in this thesis, I seek to build on this existing literature by applying the MSF approach.

2.4 THE FRAMEWORK AND PROPOSED ANALYSIS: A SUMMARY

Kindgon's model provides a useful framework that can be applied to the CCS case to understand *agenda setting*, considering why certain issues get promoted and why others get ignored. The structural elements of Kingdon's model, that is, *'problem stream', 'policy stream', 'politics stream', 'window of opportunity' and 'policy entrepreneur'* are of interest in this thesis because they provide a framework that can be empirically applied to consider how *agenda setting* occurs. Specifically, the MSF indicates what to look out for when conducting *agenda setting* studies and provides a simplified model to classify the information. For instance, it tells us to look out for the mechanisms of *'problem definition'*, *'policy windows'* in *agenda setting*, roles and strategies of *'policy entrepreneurs'* and the political factors affecting *agenda setting*.

In the current thesis, Kingdon's MSF will provide a lens to explore the *agenda setting* processes for the CCS case study (outlined in Section 1.0.4). Drawing on Kingdon's analytical tool and from the range of insights from existing literature, and using the methods described in the next section, this study seeks to investigate how CCS came on the government agenda, why CCS grew in prominence on the government agenda and the variations in the levels of government investment CCS received. The current study aims to map out the UK *agenda setting* processes for CCS to identify the lessons that may be of value to proponents of emerging technologies seeking to address climate change. Taken together, and within the scope of analysis in this thesis, this study draws on Kingdon's MSF to trace and analyse important aspects such as:

(1) *Problem stream*: the *'problem stream'* as associated with the CCS case, and how the *'problem'* was identified, understood and framed by policy makers;

(2) *Policy stream*: developments in the *'policy'* process of CCS and divisions in how the *'policy'* was conceived;

(3) *Politics stream*: the *'politics'* of the period in the CCS case and how that influenced change;

(4) *Window of opportunity & the 'coupling process'*: the *'policy windows'* in the CCS case and the forms they appeared;

(5) *Policy entrepreneurs*: the *'policy entrepreneurs'* in the CCS case, their roles and the strategies they adopted.

Taken together, this thesis builds on existing literature on CCS by applying insights from policy theory, and more specifically *agenda setting*. The next chapter – methodology – explains how I will detect these insights.

CHAPTER 3: METHODOLOGY

3.0 INTRODUCTION

The purpose of this chapter is to discuss in detail the methodological processes that underpin the current investigation into how *agenda setting* for CCS in the UK can be understood and the lessons these insights offer. In previous chapters, I introduced the idea that CCS has remained inconsistently on the UK government agenda, making it interesting to analyse this case in more detail. In the last chapter, I also argued that *agenda setting* theory is valuable to help us explain the fortunes of CCS. Therefore, in this chapter, I seek to elucidate how *agenda setting* theory detailed in the last chapter has been practically applied for analysis in this research.

In beginning this chapter, I introduce the research strategy and design employed in this thesis, justifying the approaches for the form of analysis I pursue. Following this, I delineate the methods utilised, along with the way in which data in this thesis was collected and analysed to address the main research question. In presenting the research strategy and design that guides the current investigation, I begin by offering the ontological and epistemological considerations that underpin this research. Advancing these aims, I illustrate that a qualitative case study approach is suitable, explaining the value this chosen approach has for the current investigation. Following this, I present the methods deployed in this thesis and discuss how these are applied in subsequent analysis.

In presenting the methods adopted in this thesis, I highlight in-depth the document analysis procedure applied in this research. Following this, I detail how interviews were carried out. In developing insights into how the fortunes of CCS can be understood, I used data in this research to construct a *heuristic framework*, which I ascribe as the *'5-PH framework'*, developed through a systematic collection of policy documents. I will reflect on the value of this approach for attempts to understand *agenda setting* in my case study. The chapter finally ends with a detailed description of how data was analysed in this thesis.

3.1 RESEARCH STRATEGY AND DESIGN

3.1.1 Epistemological and Ontological considerations

This thesis adopts a qualitative research strategy to understand *agenda setting* and policy change in the UK government with respect to CCS technologies in the period [2000-2017]. This qualitative research is conducted in accordance with a constructivist worldview which postulates that there is no single truth and hence, research is conducted to "*rely as much as possible on the participants' views of the situation being studied"* (Creswell and Creswell, 2018, p. 8). In other words, *"the researcher's intent is to make sense of (or interpret) the meanings others have about their world"* (Creswell and Creswell, 2018, p. 18). Like Robson (2011) noted, this research approach is subjective, and *"participants are viewed as helping to construct the 'reality' with researchers"* (p. 24).

In this thesis, an interpretive epistemologist position, consistent with the constructivist ontological worldview has been adopted in that I deploy qualitative methods within a case study context to gain multiple perspectives or 'realities' on the subject of inquiry. Like Flick (2018) argued, *"qualitative research is not based on a unified theoretical or methodological concept"* (p. 8), but rather can utilise varied theoretical positions and methods such as interviews, observations, and document analysis. As the aim of the current thesis is to seek understanding into 'how' *agenda setting* occurred for CCS as well as 'why' it occurred, this research strategy offers a flexible approach to gather data by deploying complementary qualitative methods to build a rich picture of events in the CCS case. Charmaz (1995) has argued that qualitative research can make use of people's personal experiences, emotions, and motivations (amongst others), to explain how and why things happen. Similarly, Locke *et al.* (1987) contend that qualitative research seeks to gain insights into a particular circumstance, a group, an event, or interaction. Thus, in this thesis qualitative methods; document analysis and interviews have been utilised to illuminate our understanding of the *agenda setting* process in relation to (i) how CCS came on the agenda, (ii) why CCS became prominent and, (iii) why CCS was frustrated in practice, which map unto the periods examined in this thesis [2000-2017]. As such, the research design aims to uncover multiple interpretations of the *agenda setting* process for CCS by seeking actors' understandings of the *'problem'*, *'policy'* and *'politics'* to which CCS is connected, helping to explain their motivations and the meanings of their actions. Furthermore, this thesis acknowledges the position of the researcher as part of the process in constructing meaning from the data. Like Geertz (1973) noted, *"what we call data are really our constructions of other people's constructions of what they and their compatriots are up to…we are already explicating: and worse; explicating explications"* (p. 9). Akin to the words of Shweder (1991), describing this process as *"thinking through others"* (p. 109), this research accepts that interpretations of *agenda setting* in this thesis includes *"the subjectivity of the researcher and of those being studied"* (Flick, 2018, p. 8).

3.1.2 Qualitative Case Study Approach

This thesis adopts a qualitative research strategy deployed within a case study context (i.e. CCS case) to understand *agenda setting* and policy change in the UK government. Yin (2018) describes the case study as *"an empirical method that investigates a contemporary phenomenon (the 'case') in-depth and within its real-world context, especially when the boundaries between phenomenon and context may not be clearly evident"* (p. 15). In other words, Yin (2009) explains that the researcher seeks to study a real-world phenomenon within its own context. Similarly, Gerring (2004) defines a case study as *"an intensive study of a single unit with an aim to generalize across a larger set of units"* (p. 352). The 'case' in question can include *"individuals, organizations, processes, programs, neighbourhoods, institutions and events"* (Yin, 2018, p. 14). This design approach allows the researcher to collate detailed data employing different data collection methods over a period of time (Dooley, 2002; Stake, 1995; Yin, 2018; 2014). As Stake (2000) makes clear, *"case studies can prove invaluable in adding to understanding, extending experience and increasing conviction about a subject"* (Stake, cited in Gray, 2018, p. 262). Gummesson (2007) contends that case studies allow *"a holistic, systemic approach with an unlimited number of variables and links"* (p. 229). As such, case studies can be useful in producing *"thick description"* in the sense suggested by Geertz (1973, p. 6). Yin (2018) states that *"the more that your questions seek to explain some contemporary circumstance (e.g., 'how', or 'why' some social phenomenon works), the more the case study research will be relevant"* (p. 4). In this thesis, the case study approach was used to investigate 'how' CCS came on the agenda, 'why' it grew in prominence and examine the reasons behind its frustrations in practice, by aligning Kingdon's principles to the data.

Stake (2006) recognises two variations in case study designs as a research method i.e. a single case which involves the study of an individual case (such as, a person or organisation) or the study of multiple cases. Yin (2018) explains that for a multiple case study design, *"the same case study can cover multiple cases and draw a single set of cross-case conclusions"* (p. 17). In the multiple case study approach, the researcher seeks to draw out the similarities and differences between multiple cases (Baxter and Jack, 2008; Stake, 1995). Again, according to Yin (2003), data generated from multiple cases can be analysed both within and across each situation. Other scholars like Agranoff and Radin (1991) have used terms like the comparative case study approach to refer to a form of multiple case study in the field of public administration. Agranoff and Radin (1991) for instance, explain that *"a comparative case study approach differs from the traditional single case study in that it examines multiple situations within an overall framework"* (p. 204). They argue that in this approach, *"cases are built individually by careful research design through a combination of methods after which cases are researched, developed and analysed comparatively"* (p. 204). As with other methods, Agranoff and Radin (1991) maintain that the comparative case study approach is *"designed to look for unique and common experiences,*

patterning of variables and relationships" (p. 204). Yin (2009) further explains that both single and multiple case study designs can adopt a holistic approach in which there is a single unit of analysis to be studied or an embedded approach where there are multiple units of analysis. For instance, like Gray (2018) suggests, for a single case study, holistic approach, *"only a single case is examined, and at a holistic level, for example, an entire educational programme, not individual members (modules) within it"* (p. 270), whereas in a single case study, embedded approach, there are multiple units within the single case to be analysed. Yin (2018) however states that despite scholars seeking to distinguish between these two case study designs, *"single and multiple case studies are in reality but two variations of case study designs"* (Yin, 2018, p. 17).

This thesis utilises the single case study approach to uncover the *agenda setting* story of CCS. This approach is valuable in this thesis in a number of ways, for instance, it allows me to build up a multifaceted picture of the fortunes of CCS across a period of time, a form of analysis which is not possible to pursue when multiple sites are to be investigated. Having a single focus allowed me to apply multiple methods and build up a multifaceted understanding, an approach which, due to the time limits and resource constraints of the PhD, would not have been possible across multiple cases. As Baxter and Jack (2008) have argued, multiple case studies can be *"extremely time consuming and expensive to conduct"* (p. 550). Conversely, a single case study offers the opportunity for the researcher to incorporate varied methods such as observations, surveys, and interviews to obtain different analytical perspectives of the phenomenon of interest. Siggelkow (2007) argues that a single case study can provide rich description of phenomenon. Willis (2014) also notes that single case study analysis can *"provide a nuanced, empirically-rich, holistic account of specific phenomena"* (p. 4). Another benefit of a single case study in this thesis just as Dyer and Wilkins (1991) note is that, a single case study is valuable where the researcher seeks to either build or test theories which allows the researcher to gain deeper understanding into the subject of inquiry because a careful study is conducted. Additionally, Siggelkow (2007) emphasizes this point by stating, *"research involving case data can usually get much closer to theoretical constructs and provide a much more persuasive argument about causal forces than broad empirical research can"* (pp. 22, 23), adding that, *"cases can also help sharpen existing theory by pointing to gaps and beginning to fill them"* (p. 21).

In this thesis, I aim to uncover the *agenda setting* story of CCS by aligning the conceptual framework i.e. the principles in Kingdon's MSF to the data. By applying document analysis and semi-structured elite interviews as complementary data collection procedures, a more in-depth understanding of the CCS story was attained for this thesis. To ensure the findings from a case study are reliable, Eisenhardt (1989) proposes that findings from a case study should be compared with the results from published literature; this position was duly acknowledged in this research. A description of the CCS case study has been provided in Chapter 1 of this thesis. As

indicated in previous chapters, the scope of analysis of the CCS case study maps onto the period 2000 (when the subject was first mentioned in policy documents) till 2017 (a period which maps to policy change i.e. the declining prominence of CCS on the UK government agenda).

3.1.3 The Framework and Methods

As indicated in previous sections, in this thesis, I utilise both document analysis and elite interviews to study *agenda setting* in the CCS case. Kingdon (2014) primarily adopted these methods in his study of *agenda setting* in the health and transport sectors in the US, to develop the MSF, which I draw upon. He conducted *"lengthy and detailed interviews"* (ibid., p. 4) with key informants in the health and transportation sector both inside and outside of government. His respondents within government included civil servants and political representatives of government departments and bureaus while respondents outside of government included academics, lobbyists, and journalists. By asking the same questions year on year (from 1976 to 1979), Kingdon's investigation focused on inquiring into what major problems were being encountered and what policy proposals were being considered. He also sought insights into which issues were not prominent and the reasons this was the case. Kingdon also drew insights from publicly available sources such as government documents, party messages, academic literature, presidential state of the union address and public opinion data, amongst others. By so doing, Kingdon (2014) was able to *"trace the rise and fall of items"* (p. 5) and uncover why this was so. In this thesis, I draw on the same tools Kingdon used, but apply them in my own way to construct meaning into the *agenda setting* process in the CCS case. At the outset of this study, documents were used to assess the 'official story' and interviews to gain additional and 'unofficial' insights. In this way, I utilise two different (but complementary) types of sources to build up a picture of what happened to CCS. In the following sections, these methods are introduced in turn to detail their relevance in this thesis.

3.2 DOCUMENT ANALYSIS

At the outset of this study, I conducted document analysis to collate pre-existing insights of the CCS case drawing on Kingdon's framework. Bowen (2009) defines document analysis as a *"systematic procedure for reviewing or evaluating documents—both printed and electronic (computer-based and internet-transmitted) material"* (p. 27) in such a way that *"empirical knowledge is produced and understanding is developed"* (p. 34) from them. Yin (1994) points out that applying documentary analysis in case study research can provide rich description of the phenomenon in question. Again, Merriam (1998) contends that, *"documents of all types can help the researcher uncover meaning, develop understanding, and discover insights relevant to the research problem"* (p. 118). Scholars like Bowen (2009) have elucidated the benefits of using document analysis as a research method. For instance, Bowen discusses that documents can

provide background or historical insights into issues, suggest further questions to be asked, provide a means of identifying patterns in data and provide a means of triangulating data retrieved from other sources. In line with Bowen's ideas, documents were valuable in this thesis for interrogating key insights into the development of the CCS case by, (i) providing background information and historical insight in the CCS case; (ii) providing a foundation for subsequent triangulation of analysis via interviews, and; (iii) providing a means of tracking change and development in the CCS case, by revealing the decisions taken by the government across the period of time studied here. Scholars like Gray (2018) and Atkinson and Coffey (2004) warn that though documents are useful, they should not be considered as the absolute evidence of the issues they report, but instead, *"they should be examined for their place within the organizational setting, and the cultural values attached to them"* (Gray, 2018, p. 179). Like Atkinson and Coffey (2004) point out, documents are not necessarily *"transparent representations of organizational routines, decision making processes or professional diagnoses"* (p. 47). Equally, Atkinson and Coffey (1997) argue that, *"we cannot treat records—however 'official'—as firm evidence of what they report"* (p. 47). Nevertheless, Atkinson and Coffey (2004), maintain that documents should be regarded as *"data in their own right"* (p. 59). While recognising the benefits of using documents, it is acknowledged that using this method alone has limitations, hence as indicated previously, this thesis was substantiated by interviews as a means of accessing more informal insights to build a rich picture of what happened to CCS. In this way, the two methods complement each another and align with the research design's epistemological and ontological position that this thesis aims at gaining multiple interpretations of the 'realities' in explicating *agenda setting* for CCS. As such, as opposed to the positivist approach, it does not seek to acquire a single, tangible 'reality'. The section below introduces the types of documents subject to analysis, and details about how these documents were identified.

3.2.1 Types of Documents

(i) Command Papers

At the onset of documentary analysis, I set out to analyse mainly official, government public documents, specifically Command Papers for the period under study (2000 – 2017), gathered using a systematic procedure. During the course of analysis, Command Papers prompted me to analyse other official reports (later discussed) which were used to explore and verify specific points in my analysis, and therefore served as supplementary sources in the analysis. Command Papers can reveal a range of diverse insights such as the official positions presented by government actors (e.g. policy initiatives taken by them (amongst others)). Command Papers were chosen for this study because they are documents which lay out government's plans, strategies, or policies on an issue, therefore they were found to be relevant to provide insights into government actions taken towards CCS. Since this thesis involved the study of governmental *agenda setting* for CCS in the UK across the scope of analysis (2000 – 2017),

the particular importance of Command Papers in this thesis is that it provided me a single system for identifying relevant official government documentation related to government's decisions taken on CCS and the reasons for the decisions made. In addition, it allowed me to study the trends and patterns in the policy making process of CCS across the spectrum.

In Schmidt's (2008; 2002) terms, these types of official reports could be described as *'communicative'* documents. She explains that such official documents present deliberate and legitimate ideas and narratives to a public audience, but do not offer insights into *'coordinative'* discourse which rather reflect internal discourse of groups and individuals (such as civil servants, elected officials and experts) which leads to the creation, elaboration and justification of policy ideas (Schmidt, 2008). Whilst there are incentives to study internal documentation, for this study I focused on official, public documents because a) they were much easier to be located, and b) they allow me to trace the story that was publicly communicated, which is itself interesting. By analysing the 'official story' (Dommett, 2020; Webb and Keith, 2017, p. 44) using Command Papers, this allowed me to determine what the government were prepared to put in the public realm and the story they wanted to convey. It is however acknowledged that by focusing mainly on Command Papers presents in itself a limitation because it represents one specific set of documents. However, this was a conscious decision in my approach because it provided a system to locate the pertinent government policy documents in a single corpus given the time available for this work, and also provided a means of tracking decision making on CCS, which other sources did not provide. Notwithstanding, as indicated previously, Command Papers drew attention to other supplementary sources which were used in the analysis to explore and verify specific points.

The Command Papers utilised in this thesis comprised the following documents: government policy initiatives, for instance, White and Green papers; governmental departmental reports; treaties and international agreements; government responses to select committees; government consultation documents; reports of royal commissions and other committees of inquiry; government annual statistics and reports; the Queen's speech; annual energy statements; government performance reports; government strategies, energy reviews; and spending reviews. Citing specific examples of the value of Command Papers in this thesis, White and Green Papers, for instance, were used to track government's policy initiatives on CCS. The Queen's speech provided a means to track the periods where CCS featured on the government agenda. In addition, annual energy statements provided insights into the UK government's approach in implementing its energy and climate change strategy, progress made and pathways to deliver its energy policy priorities.

To identify Command Papers, I used the Public Information Online (PIO) database. The PIO database is a web-based archive of searchable UK Parliamentary and official documents which includes publications from the Westminster Parliament, Scottish Parliament, Northern

Ireland Assembly, National Assembly for Wales, Scottish Government, and also includes Key Non-Parliamentary material. As this current thesis involves tracking of government and parliamentary discussions of CCS over time, the PIO database served as a useful resource to locate and arrange documents according to the Parliamentary year session. This allowed me to observe the trends of events and how they unfolded. To understand how CCS featured on the government agenda, documents were analysed to determine the origin and prominence of this idea. In order to begin to identify the relevant documents for the study, I used a keyword search "carbon capture and storage" obtained from the research question, applying the inclusion criteria (UK Parliament Command Papers and Westminster Parliament only). It is worth noting that the keyword search "carbon capture and storage" was sufficient to identify the most pertinent sources. However, I did perform another keyword search "carbon dioxide capture and storage" to double-check that the pertinent sources were retrieved. The search was conducted for each UK Parliamentary Year Session from the current to the earliest until there was no result. These decisions reflected a desire to study national legislation (as opposed to measures adopted only in the Scottish Parliament, for example). Conducting the search, I was able to locate the year CCS was first mentioned in policy documents which formed the baseline study period [2000] in this thesis as noted in Chapter 1. The search yielded 81 results in total between the year 2000 and 2017 which were included in the study (See below).

Table 2 below shows the number of document references to CCS according to each UK Parliamentary Year Session.

Table 2: PIO database search results for CCS (1999-2017)

CCS Case	
UK Parliament Year Session	**Number of documents**
1999 - 2000	1
2000 - 2001	0
2001 - 2002	1
2002 - 2003	2
2003 - 2004	0
2004 - 2005	1
2005 - 2006	6
2006 - 2007	13
2007 - 2008	5
2008 - 2009	12
2009 - 2010	5
2010 - 2011	7
2011 - 2012	2
2012 - 2013	8
2013 - 2014	9
2014 - 2015	6
2015 - 2016	2
2016 - 2017	1
	Total = 81

(See Appendix I for further details of all 81 documents)

After retrieving these documents, I first read in detail the Forward, Background, Executive Summary, Introduction and Conclusions of each document to have a general overview and to understand the context of each Command Paper. Second, I scanned through each document, but focused my detailed read on the relevant sections that discussed issues on CCS and climate change. Third, to ensure that I was not missing any discussion on CCS, I also used the key word search - "carbon capture and storage" and its abbreviation "CCS", to identify all sections related to CCS in each document where I focused my detailed reading. Together, this led me to identifying the relevant sections which were then analysed in more detail by applying Kingdon's MSF. Drawing on Kingdon's MSF, I reviewed repeatedly the relevant sections to identify and highlight the most important themes which were used for further analysis in this thesis (discussed in more

detail in Section 3.5). While there is a possibility for certain parts to be missed by focusing on specific sections, my analysis revealed high degrees of replication, suggesting that recurring ideas were identified.

As indicated previously, Command Papers were my main focus for the study, however in the course of analysis, Command Papers drew my attention to other official reports which served as supplementary sources in the analysis. These reports also offer the 'official story' in the CCS case. These included party manifestos, government commissioned reports, government annual budgets and one report from CCS industry and intergovernmental bodies. I also used another source, public opinion data to complement these official reports and to provide specific insight into public mood which was not raised in the other sources. Together, these additional data sources were used to explore the general policy landscape with respect to CCS and to verify specific points and so were gathered through a less rigorous collection procedure. In the following discussion, I introduce these supplementary sources of data utilised in this thesis and detail how these were sourced and analysed.

(ii) Supplementary sources

Party manifestos:

First, Command Papers drew attention to party manifestos which were found relevant for the thesis. Party manifestos were located from publicly available sources. Manifestos of the three major political parties i.e. Conservative, Labour and Liberal Democrats for the period under review (2000-2017) were selected and analysed. These included election years 2001, 2005, 2010, 2015 and 2017, making a total of 15 documents. After retrieving these documents, I applied the keywords - "carbon capture and storage", "CCS" and "climate change" - to search for the relevant information within these documents. This led to the identification of the most important passages which were then analysed in greater detail. In analysing party manifestos by drawing on Kingdon's framework, I sought to build a database of relevant information which included, tracking the promises and commitments made by political parties towards CCS issues and climate change in general in an attempt to understand actors' strategies, their motivations and the issues they prioritised. In doing this, I counted the number of mentions of climate change and carbon capture and storage in each manifesto and detailed the specific promises made towards climate change and CCS projects (See Appendix II). In this way, party manifestos were valuable because they offered insights into the *'politics'* of the period in general which provided understanding into dynamics surrounding the rise and fall of CCS issues on the government agenda.

Other government reports:

Second, Command Papers drew attention to other official government reports which prompted me to seek further exploration and verification. They consisted government annual

budgets (14) and other government commissioned reports (7). These documents were located from publicly available sources i.e. UK governmental websites (www.gov.uk). I located and retrieved all government annual budgets for the period under review (Appendix III). I also targeted specific government commissioned reports which were cited in the Command Papers to explore and verify specific points (Appendix IV). In each document, I focused on specific passages that directly related to CCS identified through the keywords, "carbon capture and storage" and "CCS", seeking to extract the most relevant information by drawing on Kingdon's ideas discussed in Chapter 2. Together, these documents provided a diverse range of insights to understand *agenda setting* in this thesis. For instance, government budgets provided insights into periods where CCS featured in the budget as a means of tracking agenda status, proposed plans for CCS projects, promised funds for CCS implementation as well as proposed financial mechanisms to deliver CCS (See Appendix III). Again, government commissioned reports such as the *'2006 Stern Report'* provided insights into issues surrounding climate change and CCS and government's position on the topic.

Report from CCS industry and intergovernmental bodies:

Third, Command Papers also drew attention to one specific report published from the CCS industry and intergovernmental bodies on climate change (Appendix V). This report also offered the 'official story', but did so not from a governmental, but an industry and international perspective. This document was publicly available. In this document, I focused on the specific passages related to CCS, identified by the keywords "carbon capture and storage" and "CCS" after which I drew on Kingdon's MSF as discussed in Chapter 2 to conduct further analysis. This document provided a range of insights such as industry actors' positions regarding climate change and CCS, their roles and strategies and insights about the applications of CCS technology.

Polling data:

Lastly, Command Papers prompted me to look at public opinion data to explore and verify specific points in the study. This data was used to complement the official reports and to provide specific insight into public mood which was not raised in other document sources. The relevant polling data was identified by focusing my attention to the periods in my analysis where there were marked changes in decision making regarding CCS by the government. Only one (1) public opinion data source was used. By comparing the most prominent public issues of the time using polling data with what the Government of the day prioritised provided a means to track agenda status. In this way, public opinion data provided a means of tracking the *'policy window'* in which *agenda setting* occurred. The relevant information was searched from Ipsos MORI, a market research company that conducts surveys on public attitudes to key public services, providing freely available information on opinion polls and public attitudes on its UK website.

Together, these diverse range of documents provided insights into the *'streams'* of Kingdon's framework, helping to build a rich picture of *agenda setting* for CCS. The details of how analysis was conducted drawing on Kingdon's MSF and the indicators that were searched for is provided in Section 3.5.

3.3 HEURISTIC FRAMEWORK FOR ANALYSING AGENDA SETTING FOR CCS

An important point to note in this thesis is that Command Papers selected were used to develop a *heuristic framework* which served as a guide for investigation and analysis. This *heuristic framework* comprised '5 distinct segments or periods' that characterised the status of CCS on the UK government agenda. Further details about the development of this *heuristic framework* is outlined in Chapter 4. It is worth noting that the *heuristic framework* was valuable for three reasons: (i) it offered a broad view of how CCS appeared in government documents; (ii) it allowed me to further investigate trends and patterns in the data and provided the opportunity for me to compare different periods to account for the factors that appeared to be influential in the 'change' that was observed and, (iii) it was valuable in the interview process as it offered the respondent the opportunity to focus attention to different periods that reflected respondents' experience on the subject.

3.4 ELITE INTERVIEWS

In addition to utilising documentary analysis, this thesis was substantiated by interviews. Gray (2018) explains that, interviews can be utilised in *"exploring the stories and perspectives of informants"* (p. 380). Gray (2018) makes clear that, *"a well-conducted interview is a powerful tool for eliciting rich data on people's views, attitudes and the meanings that underpin their lives and behaviours"* (p. 378). Similarly, Robson (2011) states, interviews have the *"potential of providing rich and highly illuminating material"* (p. 281).

As Robson (2011) describes, interviews *"lend themselves well to be used in combination with other methods"* (p. 279). As such, they were found valuable in this thesis for triangulating the data from documents, seeking to reveal data which supported existing analysis and data which challenged/extended insights from existing analysis. Triangulation is *"the combination of methodologies in the study of the same phenomenon"* (Denzin, 1970, p. 291). By triangulating data, the researcher attempts to provide *"a confluence of evidence that breeds credibility"* (Eisner, 1991, p. 110). This is in part, one of the ways for checking the accuracy of findings and ensuring validity in this thesis (Creswell and Miller, 2000). Just as Creswell and Creswell (2018) recommend, "*researchers should actively incorporate validity strategies"* by using *"multiple approaches which should enhance the researcher's ability to assess the accuracy of findings as well as convince readers of that accuracy"* (p. 200); by triangulating data from different sources and examining the evidence therein, this thesis aimed at building *"a coherent justification for themes"* (p. 200). Moreover, by examining data gathered using different methods, the impact for the potential of biases by using a single method is reduced (Bowen, 2009; Patton, 1990).

In particular, utilising interviews revealed informal activity which was not found in formal policy documents. The nature of government documents utilised in this thesis meant that they were highly formalised and hence were unlikely to contain detailed insights into the rationale for decisions, making it vital to identify these insights through other means. A case in point is, government documents like legislation outline what is happening – not the reason for that action, making it vital to look at other sources to gain these insights. Therefore, it can be argued that employing interviews in this thesis provided information that was not readily available in the documents. As Mason (2018) suggests, interviews may be used because, *"the data you want may not feasibly be available in any other form"* (p. 115). As such, asking respondents to offer their accounts of the CCS story provided a means to generate this kind of data. In line with the epistemology of this thesis, interviews aimed at seeking multiple perspectives of the roles and strategies of actors in explaining how CCS came on the agenda, why it became prominent and the reasons for its frustrations in practice.

A semi-structured approach to interviewing was adopted in the studies of this thesis to allow for the *"probing of views and opinions where it is desirable for respondents to expand on their answers"* (Gray, 2018, p. 381). This approach requires that *"interviewers have their shopping list of topics and want to get responses to them, but they have considerable freedom in the sequencing of questions, in their exact wording, and in the amount of time given to different topics"* (Robson, 2011, p. 285). Questions were thus designed to draw on the themes of Kingdon's MSF; *'problem'*, *'policy'* and *'politics'* to understand how actors made meaning of these themes, in explaining *agenda setting* for CCS (See Appendix IX). Nevertheless, this thesis drew on the ideas of Wengraf (2001) to improvise when necessary; *"improvisation may be the key to success"* (Gray, 2018, p. 390). In doing this effectively, this thesis adopted Arksey and Knight's (1999) approach, by varying the question order and phrasing of questions according to the conversation's flow.

In the following sections, I offer an account of the interview process to detail the sampling and recruitment process, the interview protocols, and data collection procedures.

3.3.1 The Interview Process

(i) Recruitment of Participants

A total of 20 elite interviews representing stakeholders from four different sectors namely; government, industry, academia and CCS trade union associations were conducted (See Table 3 below).

Table 3: Number of Interviews conducted by Sector

Sector	Number of Interviews conducted
(1) Government officials and public agencies e.g. Senior Civil Servants	6
(2) CCS Industry	7
(3) Academia	4
(4) CCS Trade Union Organisations	3

In this study, the majority of interviewees were identified during the documentary analysis stage while other interviewees were identified from CCS conferences and workshops which I attended. A few other interviewees were also identified through contact with other respondents. As Ostrander (1995) notes, gaining access to elites is challenging, and hence identifying and securing access was not always possible in this study. This was particularly the case because of the long time frame of my analysis and the fact that identifying and gaining access to key informants active in 2000 was difficult. Notwithstanding, it is worth nothing that the

interviews conducted in this thesis exhibited high degrees of replication, suggesting that I am confident that key (recurring) ideas were identified, and data saturation was reached. Hence in these scenarios, I can agree with Charmaz (2006) who pointed out that, *"one stops collecting data when the categories (or themes) are saturated: when gathering fresh data no longer sparks new insights or reveals new properties"* (Charmaz, cited in Creswell and Creswell, 2018, p. 186).

Despite the challenges with access and availability of interviewees, I explored different approaches to address these. For instance, attending relevant CCS conferences and workshops was particularly beneficial in this research, giving me the opportunity to build first-hand face-to-face rapport and trust with potential interviewees. Like Gray (2018) who makes clear, *"the quality of an initial contact with potential interviewees is of vital importance"* (p. 386). This initial contact did not only make it possible to gain access to potential interviewees, but also facilitated the interview process. Again, I found it important to present available research work and the purpose of my project to different audiences, including fellow PhD colleagues, academics and industry experts, all of whom were either carrying out technical research on CCS or held significant roles in relation to CCS. Owing to the interdisciplinary nature of my PhD, on some occasions, I collaborated with traditional science and engineering PhD scholars to organise academic and technical workshops on CCS. In addition, I applied as an Early Career Researcher (ECR) member to join a community of academic researchers and experts on CCS, giving me the opportunity to identify, build and establish links with potential interviewees. Taken together, all these experiences and opportunities were aimed at building a reputation for myself on the CCS subject as well as getting across the significance of my research, in order to gain access to potential interviewees in this thesis.

In each instance, I personally approached the prospective interviewee and informally introduced the rationale for the research. Where the prospective interviewee indicated they would be willing to take part in a formal interview, contact details were exchanged. A formal email was then sent to prospective interviewees detailing key issues such as the purpose of the research, what has already been done in the research and why it will be interesting to speak with them. Attached to this email was the informed consent (Appendix VIII) specifying options with regards to confidentiality, anonymity, and data storage. In addition to this, the *heuristic framework* (*'5-PH framework'*) was attached to offer the opportunity to potential interviewees to prepare themselves ahead of the interview, if need be. Interviewees were required to provide written informed consent before participating. In general, participants were recruited based on their roles and positions held in relation to the CCS case, their knowledge of the subject as far as CCS is concerned and their interest in the issue. To ensure the consistency in the meanings of the questions posed, interviews were piloted. Interviews took place between October, 2018 and August, 2019.

(ii) Conducting the Interview

In gathering interview data, a variety of interview styles were employed; these included face-to-face interviews, telephone interviews and Skype interviews. Face-to face interviews constituted the majority (13 in total). Like Robson (2011) notes, *"face-to-face interviews offer the possibility of modifying one's line of enquiry, following up interesting responses and investigating underlying motives"* (p. 280). The majority of face-to-face interviews were conducted at venues chosen by the interviewee; these were mostly interviewees' offices and meeting rooms located within interviewees' office buildings. Only one meeting took place in a café, while yet one other took place at a CCS conference. The face-to-face interviews including telephone and Skype interviews were tape-recorded for consistency and to ensure accuracy. A risk assessment was conducted before completing physical interviews off campus.

In conducting the interviews, an interview protocol (See Appendix IX) was employed with question content focused on the research objectives of this thesis. Just as Creswell and Creswell (2018) note, it is important to *"plan to develop and use an interview protocol for asking questions and recording answers during a qualitative interview"* (p. 190). In designing the questions, I aimed to explore actors' own interpretations of the 'CCS story' to understand their own perspectives of the *'problem'*, *'policy'* and *'politics'*, in how *agenda setting* occurred. I was also interested in gaining insights into how they interpreted their roles which informed the strategies and decisions made towards CCS. By focusing on actors' interpretations of their lived experiences, I aimed to minimise the potential for any biases that may come from me which could affect their answers.

Owing to the heterogeneous nature of participants, questions were modified but with a central focus on the themes of Kingdon's strands as the guiding framework. As such, themes surrounding the *'problem'*, *'policy'*, *'politics', 'policy windows'* and *'policy entrepreneurs'* of the CCS case were topics covered in the interviews. To capture the perspectives of respondents, the *heuristic framework* was used as a discussion aid, employing both open-ended and closed questions. In this way, interviews sought to test and explore the ideas developed through the documentary analysis.

The majority of the interviews lasted on average for around 30-45 minutes while a few number of interviews exceeded this time span (for instance, over 1 hour). The sound files were encrypted, with these files stored on a password-protected computer. Interviews were transcribed verbatim; this was a paid-for service from a reputable organisation. Like Braun and Clarke (2006) make clear, should a researcher's data be transcribed on their behalf, *"it is important that you spend more time familiarising yourself with the data, and also check the transcripts back against the original audio recordings for 'accuracy'"* (p. 88); this procedure was

duly carried out. Transcripts were stored on a password-protected computer. In conducting interviews, there is some potential for distress from respondents over revealing sensitive information. Therefore, upon receipt of the transcripts, they were sent back to respondents to provide comments, make any clarifications, and confirm the accuracy of the data. This process was also carried out to ensure that quotations were accurately represented and thus they were signed-off and authorised before use in any published material. In this thesis, participants gave their consent to retain partial anonymity whilst granting permission to the researcher to use the interviewee's position or be identified in published literature. This research sought and gained approval from the University of Sheffield's Ethics Committee. Transcripts were then uploaded unto the NVivo software on a password-protected computer for coding and analysis.

3.5 DATA ANALYSIS

Just as Attride-Stirling (2001) makes clear, it is important to provide clarity on the process and detail of how analysis is conducted; a process which is often omitted by researchers or insufficiently provided in the reporting process. Without this information, *"it is difficult to evaluate their research, and to compare and/or synthesize it with other studies on that topic, and it can impede other researchers carrying out related projects in the future"* (Attride-Stirling, cited in Braun and Clarke, 2006, p. 80). This is often particularly a problem in *agenda setting* work. For instance, *agenda setting* scholars such as Exworthy *et al.* (2003), Tantivess and Walt (2008) and Compston and Madsen (2001) tell of the methods used in their work but there is missing or limited information about how data was analysed. For this reason, this section of the report seeks to delineate how data was analysed in this thesis and what assumptions informed the current analysis.

In line with the ontological and epistemological foundations of the current research, I utilised thematic analysis in eliciting meaning in the data generated. Like Braun and Clarke (2006) explain, *"thematic analysis is a flexible approach that can be used across a range of epistemologies and research questions."* (p. 97). For instance, thematic analysis *"can be a constructionist method"* (Braun and Clarke, 2006, p. 81), which in line with this thesis examines the multiple realities in explaining *agenda setting* for CCS.

Braun and Clark (2006) define thematic analysis as *"a method for identifying, analysing and reporting patterns (themes) within data"* (p. 79). Rice and Ezzy (1999) explain that the process entails identifying themes through *"careful reading and re-reading of the data"* (p. 258). The strengths offered by this approach made it suitable for application in this thesis. For instance, it is a flexible qualitative research tool that can be utilised across different methods (in my case, documents and interviews) to obtain rich detail or description of data (Boyatzis, 1998; Braun and

Clarke, 2006). Again, as Braun and Clarke (2006) note, "*it is useful in producing qualitative analyses suited to informing policy development*" (p. 97). This thesis therefore adopted Braun and Clarke's (2006) approach to thematic analysis which involves the following stages: familiarising yourself with the data; generating initial codes; searching for themes; reviewing themes; defining and naming themes; and finally, producing the report.

Two methods exist in identifying themes in thematic analysis: the inductive approach and the deductive approach (Braun and Clarke, 2006). With the inductive approach, Bryman (2016) explains that, *"theory is the outcome of research which involves generalizable inferences out of observations"* (p. 22). On the other hand, with the deductive approach, *"the researcher draws on what is known about a particular domain and on relevant theoretical ideas in order to deduce a hypothesis (or hypotheses) that must be subjected to empirical inquiry"*. (Bryman, 2016, p. 21). In this thesis, themes were generated deductively, drawing on the theoretical framework detailed in the previous chapter. This deductive approach is relevant to this thesis' aims of expanding our knowledge of what policy theory has to offer in regard to *agenda setting* for CCS and the lessons these offer, as posed in the research questions. This deductive approach is therefore consistent with the researcher's theoretical interest in the area of CCS.

In beginning the analysis, all included documents were first reviewed repeatedly, followed by highlighting the relevant sections that aligned with the themes of Kingdon's MSF – *'problem stream'*, *'policy stream'*, *'politics stream'*, *'policy window'* and *'policy entrepreneur'*. Drawing on the analytical framework and working iteratively with the data gathered, themes and patterns were developed to aid in interpreting the data. As detailed in Chapter 2 of this thesis, Kingdon (2014) explained the occurrences in the different components of his MSF and draws attention to what scholars should be looking out for when conducting policy analysis studies. To assist me in identifying the relevant data, Table 4 below provides an illustrative overview of the most prominent coding themes which I utilised. The themes that emerged from the data were thus coded under Kingdon's strands. I used the themes that emerged to establish the incidences of *agenda-setting* and explore the applicability of Kingdon's theory for the CCS case. I also identified illustrative quotations that was used in the analysis to illustrate the themes of particular importance for the thesis. It is however important to note that, and like Braun and Clarke (2006) explain, *"researcher judgement is necessary to determine what a theme is"* (p. 82) and as such admonish that it is important to *"retain some flexibility, and rigid rules really do not work"* (p. 82). Therefore, whilst Table 4 below provides a high-level appraisal of what was being looked for within the documents and interviews, the more specific detail on the themes and subthemes identified will be provided in Chapter 4 and 5 of this thesis.

Table 4: Initial indicators for coding the data generated in this research.

Strand of Kingdon's MSF	Areas of interest	Documentary/Interview Indicator (Themes)
Problem stream	- developments in the *'problem stream'* as associated with the CCS case and how the *'problem'* was identified, conceived, and framed by policy makers	*Any indicators, focusing events, feedback from policy programs identified to indicate the problem attached to CCS* For instance, evidence of disasters, crises, or indicators to highlight the *'problem'*. I targeted who, what and how these issues were mentioned.
Policy stream	- developments in the policy process of CCS such as divisions in how the *'policy'* was conceived and the roles and strategies of actors	*Any events that highlight the strategies the UK government adopted to combat the problem and locating incidences for the mentions of CCS as a potential solution to the problem* For instance, evidence of alternative policy solutions I targeted who, what and how issues were discussed. *Any occurrences for Kingdon's criteria for the selection of policy proposals: technical feasibility, budgetary constraints, public acceptability, community values, responsiveness of the policy proposal to politicians*

Politics stream	- developments in the *'politics stream'* of CCS, such as political processes and events which occurred	*Any political events surrounding the CCS case which resulted in policy change* For instance, change in administration, national or public mood, protest campaigns by interest groups, new parliament I targeted what and how these political factors unfolded.
Policy windows	- the *'policy windows'* in the CCS case and the forms in which they appeared	*Any points at which the three streams of Kingdon are discussed simultaneously which lead to policy change* For instance, evidence of when CCS featured prominently on government agenda I targeted who, what and how issues were discussed.
Policy entrepreneurs	- the *'policy entrepreneurs'* in the CCS case, including the roles and strategies they adopted	*Policy actors advocating for CCS and actors referenced in the data* For instance, visible and hidden participants I also targeted the roles and strategies that policy actors adopted in identifying *'problems'*, seeking out policy proposals and acting in *'political streams'*.

In presenting findings, the two forms of data from documentary and interview analysis are discussed in turn in Chapters 4 and 5, respectively. Chapter 4 details the 'official story' insights from documentary analysis whereas Chapter 5 offers the 'unofficial story' using interview data.

3.6 CONCLUSION

This chapter set forth to outline the methodological procedures for addressing the objectives in this thesis – understanding *agenda setting* for CCS in the period (2000-2017) to draw lessons for proponents of other technology forms. This has included a detailed description of the research strategy and design, to include the chosen methods employed in generating the data required for interpreting meaning in this thesis. It has also demonstrated that this approach is consistent with the theoretical foundations of the development of Kingdon's MSF to which this thesis draws upon. The chapter has also included a description of the data analysis procedure adopted in this thesis, where the indicators used for coding and generating themes to establish incidences of *agenda setting* have been outlined. We can now move to the next chapter to consider the findings generated by utilising the methods expanded here.

CHAPTER 4: RESULTS, ANALYSIS AND DISCUSSION FROM STUDY 1

WHAT DO OFFICIAL GOVERNMENT DOCUMENTS REVEAL ABOUT THE TRENDS AND DYNAMICS OF AGENDA SETTING FOR CARBON CAPTURE AND STORAGE TECHNOLOGIES (CCS) IN THE PERIOD (2000-2017)?

4.0 INTRODUCTION

This chapter has one specific aim – to seek insights into the 'official story' of CCS within the scope of analysis in this thesis using documentary evidence. In previous chapters, I highlighted that CCS remained inconsistently on UK government agenda and outlined how Kingdon's MSF can be used to explain what happened in the CCS case. In the last Chapter, I offered the methodological procedures deployed in this thesis to gain insights. I also indicated that I used Command Papers to develop a *heuristic framework* that was used to aid investigation in this thesis. In this chapter, I begin by describing how this *heuristic framework* was developed to illustrate how CCS featured in government discussions. Offering this *heuristic framework* which divides the period under study into '5 segments' that trace the *agenda setting* journey of CCS, this chapter discusses how CCS appeared on the agenda, why it became prominent and the reasons for the variations in the levels of government investment it received. By doing this, I seek to draw lessons from the CCS case to explore the political process, considering how issues get on the political agenda and come to be taken seriously by *policy makers*. By gaining insights in these ways, we can throw more light on the lessons that may be valuable to proponents of other emerging technology options.

As detailed in Chapter 2, Kingdon (2014) argued that for *policy change* to occur, then policy actors must recognise a problem *(problem stream)*, an acceptable solution must exist *(policy stream)* and the right political atmosphere must be present for policy actors to have the opportunity to push forward the agenda *(politics stream).* When all three streams come together, a *window of opportunity* is opened in which a policy idea can be taken up. Applying Kingdon's MSF and the methodology outlined in the last Chapter, this chapter argues that while the three streams of Kingdon's MSF came together fruitfully at certain times creating a *window of opportunity* to bring about change, (i.e. for CCS to gain active prominence), at other times a *window of opportunity* was not evident owing to events in the *politics* and *policy streams* that diverted government attention elsewhere. Moreover, the analysis suggests that while the *problems* predominantly connected to CCS - *climate change* and *energy security* - remained consistent across the period, events like the 2008 Global Financial Crisis, improvements in other renewable energy technologies and the gradual decline of coal led government priorities to change and

hampered the case for CCS implementation. Document analysis suggests that, whilst there was support for the *idea* of CCS, this solution was not a policy ready for implementation, but rather an idea needing investment – a status that affected the support given to this idea. In terms of the key argument garnered from analysis in this chapter, this empirical case offers insights that help to extend Kingdon's ideas about the *agenda setting* process. Contrary to what Kingdon (2014) suggests that a policy solution needs to be *"worked out"* (p. 172) before taken seriously by *policy makers*, my analysis of the CCS case suggests that this is not always the case and that *policy makers* can work to facilitate a *policy's* implementation.

The chapter is made up of eight sections. Using documentary analysis, Sections 1 & 2 provides a broad overview of how CCS appeared in Command Papers overtime. In Sections 3, 4, 5, 6 & 7, I introduce a heuristic that segments the time frame under examination into 5 periods in order to highlight different phases in the fortunes of CCS. This *heuristic framework,* which I ascribe as the *'5-PH framework'* is then used to explain how the subject first came on the UK government agenda, why it became prominent and why it faced challenges on the UK government agenda (i.e. the variations in the levels of government investment it received), with each of the 5 periods discussed in a separate section. The chapter concludes in Section 8 with a summary of key findings from the analysis.

4.1 BROAD OVERVIEW OF HOW CCS APPEARED IN DOCUMENTS

To begin, I briefly discuss the profile of government discussion on CCS (See Figure 8). As outlined in the previous chapter, in order to begin to understand how CCS featured on the government agenda, documents were analysed to determine the origin and prominence of this idea. Figure 8 below depicts the number of Command Papers in which the subject CCS was mentioned in each UK Parliamentary Year Session for the period examined (i.e. 2000-2017).

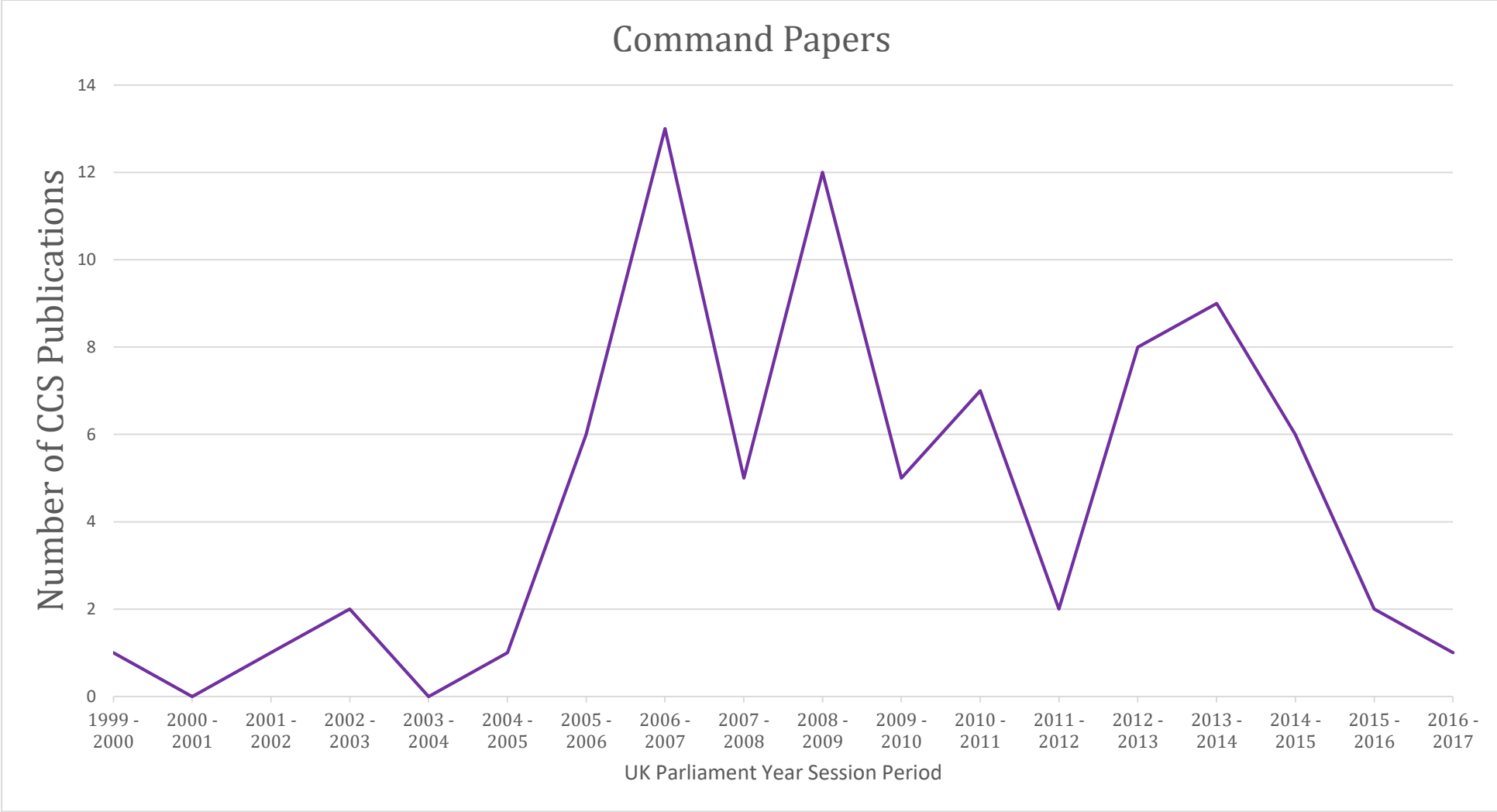

Figure 8: Number of Command Papers per UK Parliamentary Year Session

4.1.1 *Deductions from the Trend*

The graph shows that discussions around CCS started as far back the 2000s, specifically in the year 2000. This was the first reference detected in the key word search of documents. It is worth stating here that I did check for earlier documents, however, these documents yielded no results, and this is what determined my time frame. It is also important to acknowledge that this graph is a rough proxy for CCS policy's status on the agenda. Nevertheless, the graph is useful as it offers an indicator of the status of CCS policy, showing when and where the government was actively promoting this idea in public communications. Therefore, whilst it might not offer the full picture, it provides a valuable basis for my analysis.

As the graph shows, CCS has not featured uniformly on the government's agenda (as indicated by key word references). From 2005, we observe a rapid increase in publications related to CCS, keeping up at this rate until 2007 where it peaks. After 2007, it gradually decreased until 2008 and fluctuated all the way up to 2017, never reaching its peak of 2007 again. These trends correlate with the wider story that surrounds the rise and fall of CCS. As detailed in Chapter 1 of this thesis, CCS did not feature on the agenda constantly, but has had mixed fortunes – often appearing to break through, only to be frustrated in practice. Whilst these references do not tell the whole story about the fortunes of CCS, I argue that these citations and analysis of the documents themselves provide a useful source through which to explore the *agenda setting* process of CCS.

4.2 CCS PATHWAY

In order to offer greater insight into the drivers behind the differing coverage of CCS in these documents, a *heuristic framework* is offered, using Figure 8 to identify '5 distinct segments or periods' that characterise the status of CCS on UK government agenda (See Figure 9 below). In the 1st period, we find that CCS *idea* began to float on the government agenda in UK Parliamentary Year periods (1999-2000 to 2003-2004). This is evident in the small number of references to this idea i.e. 4 Command Papers. In the 2nd period (2004-2005 to 2008-2009), we observe that the issue gained significant traction and prominence on UK government agenda with an increase in the number of references from 4 to 37 on average in these two periods. In the 3rd period (2009-2010 to 2011-2012), we observe a sharp fall of its prominence on government agenda, but also observe a small rise in 2010 as the graph shows together amounting to 14 references on average made to CCS in the 3rd period. By the 4th period (2012-2013 to 2013-2014), we observe that the idea of CCS began to rejuvenate with 17 references made to this idea and finally in the 5th period (2014-2015 to 2016-2017), we observe that CCS begins to struggle again with a total number of 9 references made to CCS.

Whilst it is possible for alternative 'periods' to be identified, the value of these divisions (i.e. the 5 segments) was confirmed through interviews (discussed in the next Chapter), where participants recognised and confirmed the value of thinking about this time span in these terms. This '5-period' *heuristic framework* is used in the remainder of the chapter to highlight patterns in the data that might not otherwise be seen, specifically in relation to the differences in *problems, policy*, and *politics*. In the discussions that follow, the dynamics of the MSF is discussed beginning from the 1st Period. To avoid repetition, in discussing the latter 4 periods, I only focus on the 'changes' that occur in each element of the MSF. For instance, if an insight from the *problem stream* in period 1 remained consistent and the same insight was found in the *problem stream* of period 2, I do not discuss this, but rather focus on what changed about the *problem stream* in period 2.

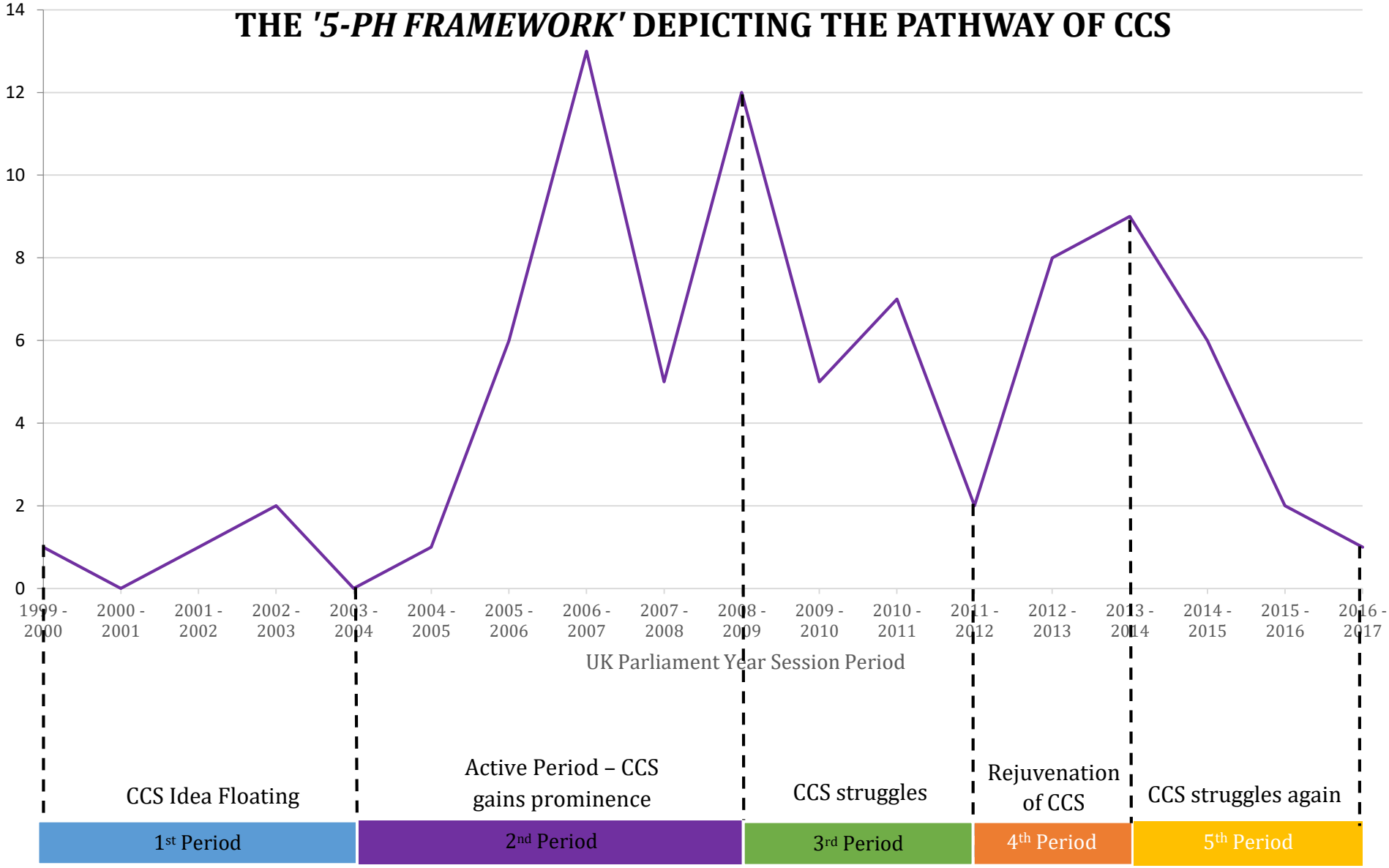

Figure 9: The *'5-PH framework'* depicting the pathway of CCS

4.3 1st PERIOD (UK Parliamentary Year Session 1999-2000 to 2003-2004)

4.3.1 *How did CCS first emerge on the UK government agenda?*

In the 1st period, the *idea* of CCS began to float on UK government agenda, having mentions in 4 Command Papers as observed in Figure 9 above. To briefly summarise key findings detailed below, documentary analysis suggests that there was a generic *problem* focused on *climate change*. In terms of the *politics stream*, there was a favourable international *political* climate that was being promoted through the use of international agreements and targets. When it came to the *policy*, there was ambiguity about what CCS was and how it could be pursued. The analysis reveals that the *policy* was still in its developmental stages and there were prevailing technological, safety, environmental, legal, and cost challenges surrounding the technology. This offers a possible explanation to why the *policy* did not gain sustained attention in this period. In offering this analysis of the 1st period, it becomes possible to draw comparisons with developments in later periods that explain why CCS policy struggled to gain ongoing attention.

(i) Problem stream

Drawing on Kingdon's ideas in the *problem stream*, in this section, I identify two aspects that appear influential in explaining how and why CCS first came on the UK government agenda. First, there was a commitment to tackling the key issues of *climate change* and *energy security*. For instance, in 2003, the Government published the '*Energy White Paper'*, a document which set out a new direction for Energy policy. In this document, CCS was linked to coal-fired power generation and thought of as a *policy* idea that could deal with the *problem* of *climate change* and *energy security.* The document indicated that:

> *"coal has been the main source of primary energy in the UK. Even now coal generation provides around a third of the UK's power output. But in a low-carbon economy the future for coal must lie in cleaner coal technologies - which can increase the efficiency of coal-fired power stations and thereby reduce the amount of carbon they produce - or carbon capture and storage"* (p. 88; see also pp. 3 and 12).

In multiple places in this document and all documents analysed within this period, it appears that coal was a primary source of electricity generation and was thought of as an energy source that would continue to widen the fuel mix to ensure energy security. However, there was a perceived need, because of an interest in climate change, to deal with the carbon associated with coal-fired power generation. This made CCS a potential *policy* solution to this *problem* and shows a connection between the idea of *climate change* and *energy security*. Therefore, in the 1st period, it appears that CCS emerged as a potential solution to a key barrier to tackling the *problem* of

climate change whilst maintaining *energy security* – offering a potential solution to two potentially incompatible *problems*. In Figure 10 below, a flowchart is provided that encapsulates the way in which the documents in this period explain the '*problems'* to which CCS was seen to be a *'solution'*.

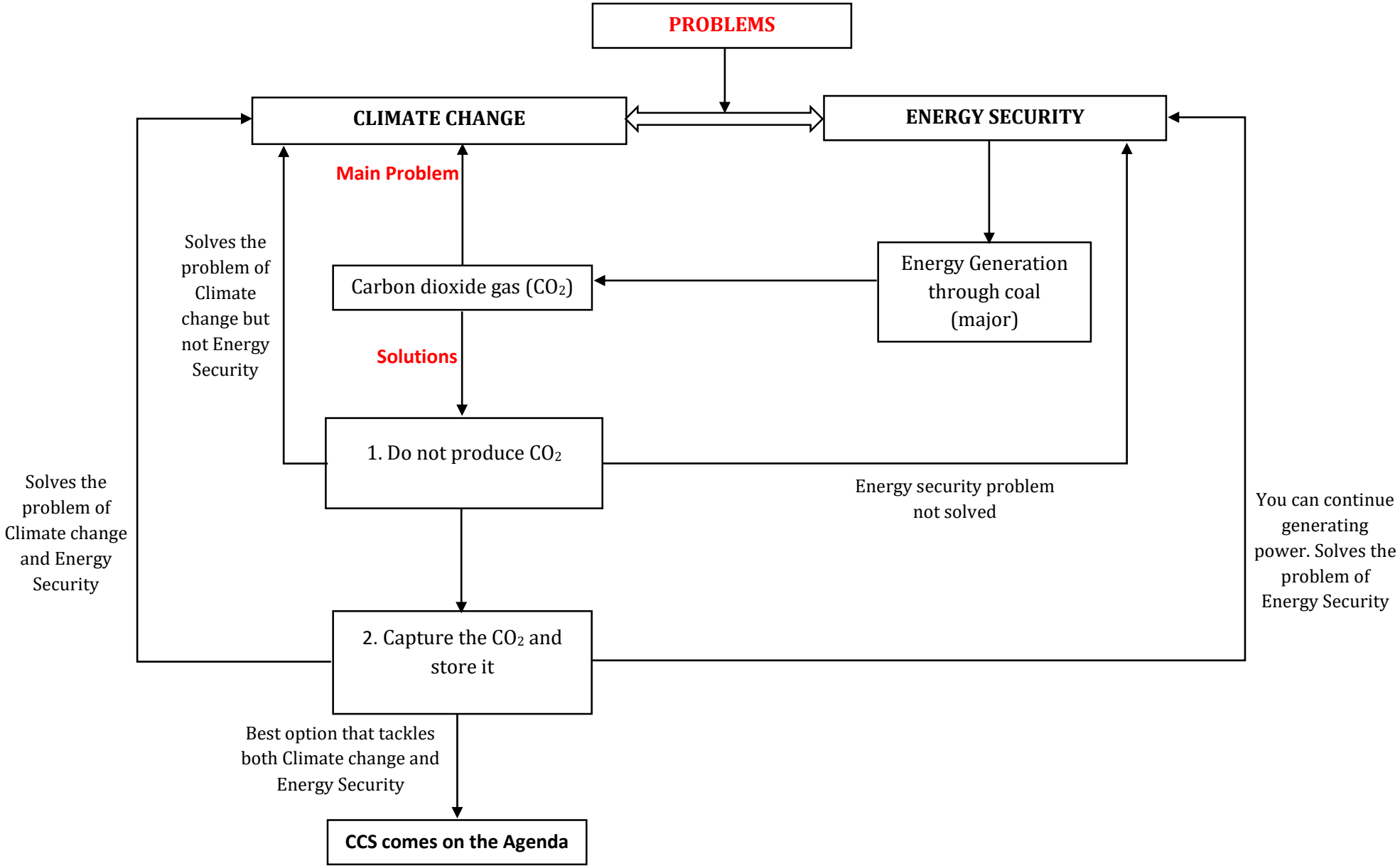

Figure 10: Flowchart of the *'problems'* as associated with CCS (the *'solution'*)

Second, there were focusing events and indicators (in Kingdon's terms) that made the issue of *climate change* appear less abstract. Together, these created a specific motivation amongst *policy makers* to pursue change. Drawing on Kingdon's ideas about how *problems* become identified by *policy makers* (See Section 2.2.1, pp. 32-33), an observation made from the documentary analysis is that certain events seemed to have heightened attention to the *problems* linked to *climate change* in the 1st period, intensifying the case for a response. In particular, increasing temperatures alongside extreme weathers such as floods and droughts, classified as *indicators* and *focusing events* respectively (in Kingdon's terms) were highlighted in the documents analysed here. For instance, the document *'Climate Change – The UK Programme'*, published in 2000, indicated the following:

> *"Climate change is beginning to affect all aspects of our society and our environment. We have already seen a significant rise in global temperatures of about 0.6°C during the last century - the 1990s included seven of the ten warmest years on record and 1998 was the warmest year in a 140-year record. We have also seen average temperatures rise in the UK. In England, four of the five warmest years in a 340-year record have been in the 1990s and 1999 was the joint warmest year ever. Latest estimates predict that in the future, unless action is taken, the world could warm by about 3°C over the next 100 years"* (p. 5; see also p. 4).

Another document, the 2003 *'Energy White Paper'* stated:

> *"There is now strong scientific evidence that climate change is happening and that it is being accelerated by human activity. The world is getting warmer. The earth's temperature rose by 0.6°C during the last century and is forecast to rise by between 1.4 and 5.8°C during this century. Globally the 1990s was the warmest decade and 2002 the second warmest year since records began"* (p. 22).

The quotations suggest that, in this period, *policy makers* viewed these issues as urgent and hence in need of response – helping to explain receptivity to the idea of CCS as a potential solution to these problems. As we will see later in the *'politics stream'*, there was evidence from international reports feeding into Government about the scale of the problem and the need for action. Explaining further, there was increased data available and also a growing international consensus that the *'problem'* needed to be tackled. Together, this desire to tackle the issue of *climate change* and *energy security*, and the more specific incentives to tackle their real-world impact led these problems to gain prominence, and led the Government to seek out solutions; one of which was CCS.

(ii) Policy stream

In relation to developments in the *policy stream*, one observation made from documentary evidence is that although there was a strong motivation shown by *policy makers* to tackle *climate change*, there was ambiguity about CCS as a policy solution to address *climate change*. Document analysis suggests that there was only vague support for the idea of CCS because there were few details about the commercial viability of this technology. The documents indicate that there were prevailing technological, safety, environmental, legal, and cost challenges surrounding the technology which needed to be addressed before CCS could be advanced. The *'2000 Climate Change – The UK Programme'* report stated:

> *"…the extent to which existing coal capacity is replaced by highly efficient, cleaner coal plant in the future will depend on both reductions in the cost of such plant and the extent to which carbon dioxide capture and storage technologies become viable and cost effective options"* (p. 60).

The same document indicated that:

> *"current evidence suggests that the cost of capture and storage of carbon dioxide from new power plants is around $40-60 per tonne of carbon dioxide, which can be expected to fall as the technology matures. This suggests that the technology may have an important long term role, provided questions about the certainty of long term storage and its environmental impacts can be answered satisfactorily"* (p. 198).

These ideas were evident across the 1st period discussed here, demonstrating persistent ambiguity about whether the policy of CCS was viable, and what precise support the Government could provide. Indeed, the uncertainty felt at this time was apparent in a document published in 2003 that picked up similar concerns. This document, *'The U.K. Government Response to the Royal Commission on Environmental Pollution's Twenty-Second Report'* published in 2003, argued that:

> *"Research and monitoring are needed to establish that disposal of carbon dioxide into deep geological strata will be effective and not give rise to any new environmental hazards"* (p. 37).

There was also evidence of ambiguity over the capacities of CCS as a policy response. The same document stated:

> *"Disposal in geological formations has the potential to deal with CO_2 emissions from fossil fuels used in electricity generation and other large centralised sources...Geological formations can contain gas for very long periods of time, but accessing them for disposal purposes would entail disturbance and hence the potential for leakage"* (p. 37).

More specifically, this document went on to highlight the degree to which the Government were aware that there were issues that needed to be resolved with this policy option. It was therefore argued that:

> *"The Government recognises that the acceptability of geological disposal depends on convincing analysis of safety and environmental risks associated with any release of CO_2 whether sudden or gradual, and the need to develop monitoring methods to detect any leakage. Disposal in submarine strata would also depend on the resolution of legal issues under the London and Ospar Conventions"* (p. 37).

These quotations therefore suggest that, in this period, the Government were aware of questions about the safety and environmental risks of CCS. This suggests why there may have been caution towards this idea as a *solution* to the *problem* identified above. This insight chimes with Kingdon (2014) who argued that *"before a subject can attain a solid position on a decision agenda, a viable alternative is available for decision makers to consider"* (p. 142). And yet, even whilst acknowledging these challenges, the Government remained positive about CCS. Indeed, in the '*Energy White Paper'* published in 2003, the Government indicated that:

> *"if ways could be found cost-effectively to handle the carbon, keeping coal-fired generation in the fuel mix would offer significant energy security and diversity benefits"* (p. 89).

In essence, it was therefore understood in this period that, as the 2003 '*Energy White Paper*' makes clear:

> *"that CCS is currently constrained by a number of significant legal and technical issues"* (p. 89).

Based on the evidence gathered here, it appears that in the 1st period the Government were aware of the potential of CCS as a *policy* option, but also appreciated the barriers to implementing the *policy* of deploying CCS at the present time. This suggests that there were barriers to enacting this idea in this period.

(iii) Politics stream

Events in the global political world are part of the political story around CCS. Conducing this document analysis, I argue that two aspects of the *politics stream* appear to be relevant in helping to explain why CCS first emerged on the UK government agenda. In the 1st period, the documents analysed demonstrate the importance of international and national political influences on the rise of CCS. Document analysis suggests that there was both a positive domestic and international context for pursuing this *policy* which helps to explain why the idea emerged

and remained apparent in the 1st period. Within the documents analysed, there were frequent references to the growing prominence of *climate change* on the international political agenda. Document analysis reveals the international political factors that informed *agenda setting* in this area. For instance, in the *'Climate Change – The UK Programme'* document published in 2000, John Prescott (Then Deputy Prime Minister) said that:

> *"The international community has started to tackle climate change, with the UK playing a leading role. The Kyoto Protocol provides a framework for action, setting binding emission reduction targets for developed countries. All countries will eventually need to be part of the solution. But we cannot expect the developing world to do more unless developed countries show leadership by taking domestic action to reduce emissions. Deeper cuts will be needed in the longer term, but the immediate priority must be to turn the commitments made at Kyoto into real emission reductions...The UK is fully committed to playing its part…The sixth Conference of the Parties to the Climate Change Convention in The Hague in November 2000 is a crucial stage in the international effort on climate change. We need an outcome which sets all the industrialised countries on the path to meeting their Kyoto commitments, with a strong emphasis on reducing emissions at home"* (p. 4).

The mentions of international factors such as the Kyoto Protocol and the Climate Change Conference of Parties (as shown in the quotations above) suggests that international events were not only being noticed by national leaders, but were driving commitments to action. Significantly, this international influence was evident throughout this period. Indeed, the *'2003 Energy White Paper'* stated:

> "*Already policy-makers around the world have begun to respond to these challenges. The UN Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol are the starting point for international efforts to cut emissions*" (p. 24).

This demonstrates that there was a favourable international political climate that was being promoted through the use of international agreements and targets. Though the international community were not explicitly promoting CCS, they were nevertheless creating incentives for governments to actively pursue solutions to *climate change* to meet international objectives. Akin to Kingdon's ideas, these insights resonate with work from other scholars who have highlighted how national policy agendas can be influenced by increasing internationalisation and political interdependence amongst nations (Braun and Gilardi, 2006; Knill and Tosun, 2012; Lovell, 2016; Majone, 2008). Majone (2008) has argued that international organisations such as the UN, WHO or the OECD can play a role in shaping the domestic agenda of their member states. The work of Fedson (2005), for instance, has shown how the WHO has been influential in bringing issues about vaccinations on the political agenda globally. Taken together, Knill and Tosun (2012)

provide an apt summary stating that, *"growing economic and political interdependence among nations help to bring new or neglected issues on to the political agenda"* (p. 119).

In addition to these international influences, documentary analysis also suggested that there was the presence of a favourable political domestic climate giving impetus for pursuing the *policy*. To understand the domestic environment, I turned to look at factors such as the political positions of the main political parties and the policies being advanced by the party in power. To do this, I looked at political party manifestos in this period. Though the analysis suggests that they do not make any particular references to CCS in this period, they do offer insights into the politics of this period. The Labour party stated in their 2001 manifesto the following:

> *"We are convinced of the science of global warming. We pledge to meet tough national targets for environmental protection, and we will work at international level to halt and reverse climate change"* (p. 36).
>
> *"We are convinced by the scientific evidence of climate change – and convinced that now is the time to act. We need action at local, national and international level if we are to preserve the stability of our natural environment over the next 50 years"* (p. 41).

Looking at the specific references made by Labour, the party in power in this period, the manifestos show that *policy makers* were convinced about the science of *climate change* and were in support for action to address the issue. Indeed, the party referenced the idea 7 times in the 2001 UK election year, making pledges such as a commitment to meeting domestic *climate change* targets. From my analysis, what also appears to be interesting is that *climate change* was evident to different degrees in the manifestos of other parties. For instance, the Conservatives referenced the idea 2 times while Liberal Democrats made 8 references to *climate change*. When looking at the prominence of *climate change* in this period, wider analysis shows a similar level of references to this idea by the Liberal Democrats, but far fewer by the Conservatives. This indicates that this issue was a distinctive component of left-wing parties' identity, suggesting that the party in power was more likely to promote this issue than the official opposition (Carter, 2009).

Moving on, other indicators also show that there was wider public pressure in this period for action to be taken on *climate change.* Findings from a survey of British attitudes to *climate change* and environmentally friendly behaviour conducted by Ipsos MORI in 2001 suggested that 69% of people from a survey population of 1,012 British adults aged 16+ *disagreed* that *'Too much fuss is made about global warming these days'.* Again, 72% of people from a survey population of 1,077 British adults aged 16+ also *disagreed* that, *'Global warming is all a load of hot air'.* These findings suggest that, in this period, there was an appetite for action on *climate change* and growing attention given by the party in power to *climate change*.

Summary of 1st Period:

Taking all of the streams together, looking at references to international political influences within the documents, and looking more broadly at the political context in the UK, it appears that in this period there was a favourable political environment for action on *climate change*. CCS was seen as a means of helping to decarbonise the UK's continuing reliance on coal. In line with Kingdon's ideas, this helps to explain why CCS began to emerge onto the agenda as a solution to *climate change*, but also helping to maintain *energy security*. However, there was not a developed policy solution ready for implementation, but rather a policy idea that needed development. Taken together, Kingdon's theory helps to explain developments in the 1st period. As Kingdon argues, it is necessary for all three streams to come together to open a *window of opportunity* for an idea to get on the agenda. However, in this period, ambiguity over policy options, and concern about the viability of CCS as a policy solution appear to have prevented a *window of opportunity* being fully opened and capitalised upon. This means that whilst it began to receive attention, in this period the *policy* did not take off.

4.4 2nd PERIOD (UK Parliamentary Year Session 2004-2005 to 2008-2009)

4.4.1 *Why did CCS grow in prominence?*

In this period, the *idea* of CCS began to gain traction and prominence on the UK government agenda, being referenced in 37 Command Papers as the graph in Figure 9 above shows. By adopting Kingdon's framework, in this section, it is argued that two factors appeared influential and led to the creation of a *policy window* for CCS to gain significant prominence on the government agenda in this period. First, many of the trends observed in the previous period intensified, with increased indicators of the *problems*, and increased political pressure. Second, we see an apparent *window of opportunity* opening when a specific proposal like CCS is *'coupled'* (in Kingdon's terms) with the compelling *problem* of *climate change*. However, despite the rapid emergence of CCS onto the government's agenda, there were prevailing policy issues that were not overcome. In the following sections, I discuss developments in Kingdon's *problem, policy*, and *politics streams* that provides insights that help explain the sustained attention given to CCS in the 2nd period.

(i) Problem stream

Conducting this document analysis, many of the trends discussed in the *problem stream* of period 1 appear in the documents covered in this time period, but there were three developments. First, new evidence was referenced that illustrated an increasing consensus that

climate change was in urgent need of response. For instance, in the document, *'The Energy Challenge: Energy Review Report 2006'*, it was mentioned that:

> *"Climate change is a global problem requiring urgent international collective effort built on a shared understanding of the scale of action needed to stabilise the climate. There must be a shared commitment to take action in response, involving national and local governments, businesses and individuals"* (p. 32).

Elsewhere, the document added:

> *"The scientific evidence for climate change, caused largely by the build-up of carbon dioxide and other greenhouse gases in the atmosphere, continues to strengthen. Without urgent action, there will be a damaging rise in temperature. Some 70% of global emissions come from the way we produce and use our energy. So energy policy has a vital part to play in tackling climate change"* (p. 10).

Particularly, there was new evidence that the *problem* was urgent provided by the *'2006 Stern Review Report on the Economics of Climate change'*, a key publication commissioned by the UK Government. The '*Stern Review Report'* was described as one of the most extensive economic analysis ever done on *climate change* which gave a whole new direction to *climate change* policy in the UK. For instance, the '*Stern Review'* pointed to the following:

> *"The scientific evidence is now overwhelming: climate change is a serious global threat, and it demands an urgent global response. This Review has assessed a wide range of evidence on the impacts of climate change and on the economic costs, and has used a number of different techniques to assess costs and risks. From all of these perspectives, the evidence gathered by the Review leads to a simple conclusion: the benefits of strong and early action far outweigh the economic costs of not acting* (p. vi).

Taken together, these developments gave impetus and increased consensus that *climate change* was in urgent need of response, intensifying the case that this was not a *'condition'* as Kingdon calls it, but rather a *'problem'* that needed to be urgently solved.

Second, CCS began to be more overtly *'coupled'* with *climate change* as a solution to this urgent *problem.* For instance, the *'IPCC Special Report on Carbon Capture and Storage'*, report, published in 2005 indicated the following:

> *"CCS has the potential to reduce overall mitigation costs and increase flexibility in achieving greenhouse gas emission reductions"* (p. 3). *"A power plant with CCS could reduce CO_2 emissions to the atmosphere by approximately 80–90% compared to a plant without CCS* (p. 4).

The *'2006 Stern Review Report'* also indicated that:

> *"Extensive carbon capture and storage will be necessary to allow the continued use of fossil fuels without damage to the atmosphere"* (p. viii).

It continued:

> *"No single technology or process will deliver the emission reductions needed to keep climate change within the targeted limits. But much attention is focused on the potential of Carbon Capture and Storage (CCS)"* (p. 222).

Another document, *'Britain meeting the global challenge: Enterprise, fairness and responsibility'* published in 2005 indicated that:

> *"Carbon abatement technologies – including carbon capture and storage (CCS) – could potentially make a significant contribution to reducing carbon emissions both domestically and globally while also promoting energy security and reliability...)* (pp. 157-158) and,

Similar arguments were made in the document, *'Meeting the aspirations of the British people: 2007 Pre-Budget Report and Comprehensive Spending Review'* (p. 118). Indeed, the above references appear to suggest that CCS was seen as a potential *solution* to the *problem* of *climate change* but was also seen to help promote *energy security* by allowing the continued use of fossil fuels. In line with Kingdon's ideas, in this period, there was *'coupling'* of *problems* (i.e. *climate change* and *energy security*) and a *policy* (CCS technology) in a way not evident in the last period.

Third, the documents show that *climate change* (and the absence of action) was given a financial cost which further gave impetus and urgency to the *problem*. Based on the evidence gathered here, the introduction of the 'cost' of unmitigated *climate change* started to make justification for expenditure on CCS technologies in this period. For instance, the *'Stern Review'* indicated the following:

> *Climate change will affect the basic elements of life for people around the world – access to water, food production, health, and the environment. Hundreds of millions of people could suffer hunger, water shortages and coastal flooding as the world warms. Using the results from formal economic models, the Review estimates that if we don't act, the overall costs and risks of climate change will be equivalent to losing at least 5% of global GDP each year, now and forever. If a wider range of risks and impacts is taken into account, the estimates of damage could rise to 20% of GDP or more. In contrast, the costs of action – reducing greenhouse gas emissions to avoid the worst impacts of climate change – can be limited to around 1% of global GDP each year* (p. vi).

Indeed, as the references show, beyond the environmental impacts of *climate change* that these quotations highlight, these references also point to the economic, human and social costs and impacts of *climate change* if no action was taken. For instance, the *Stern Review* indicated that, *"if we don't act, the overall costs and risks of climate change will be equivalent to losing at least 5% of global GDP each year, now and forever"* (p. vi). This economic framing represented a further

'problem' that CCS would be used to overcome, suggesting that the range of challenges this technology was seen to confront increased in this period. This evidence suggests that there was an expanded *'coupling'* effort in this period and that it was not just climate change and energy issues being cited, but also economic motivations were being cited. Thus, there was wider framing of the *problem*.

Taking all of the above together, it is argued that in this period, there is evidence of not only increased references to the idea of CCS, but also a wider diagnosis of the *problem* and more urgent impetus to act, suggesting that this stream exhibited the conditions Kingdon cites as conducive to *agenda setting*.

(ii) Policy stream

Turning to the *policy stream*, however, it appears that the conditions for *agenda setting* were not optimal in Kingdon's terms. Mirroring challenges around feasibility highlighted in period 1, documents analysed in this period suggested that the *policy* of deploying CCS technology was still seen to be undeveloped. However, the documents do reveal a concerted effort on the part of Government to overcome these challenges, indicating that whilst this idea could not be implemented, it remained on the agenda in this period. Like the documents below show, there were still technical, legal, environmental, and cost challenges associated with CCS. Despite this, the Government took action to overcome these challenges by investing in research and innovation. The documents show that the Government also launched the first CCS demonstration competition, committing to a capital expenditure of £1 billion in 2007. This action, reflected in the documents, suggests *policy makers* wanted to realise the potential of CCS. Indeed, as shown in a *White Paper* published in that year, it was argued that:

> *"CCS represents a major technological challenge, and there are also cost uncertainties and regulatory issues that still need to be resolved…Given the potential of this technology to meet both our security of supply and climate change policy goals, the UK and the EU are working towards commercial-scale demonstration and deployment of CCS, in order to bring down the costs and to help make the technology commercially viable"* (*'Meeting the Energy Challenge - A White Paper on Energy'*, 2007, p. 172).

This reference built on earlier indications that the Government was committed to investing in CCS. For instance, the *'Climate Change - The UK Programme 2006'* document indicated the following:

> *"Over the longer term, carbon abatement technologies could make a significant contribution to reducing the UK's carbon dioxide emissions. But as they are not commercially viable under current market conditions, the strategy announced £25m, in the form of capital grants, to support demonstration of these*

> *technologies, including capture ready plant and storage. In the 2005 Pre-Budget report the Government committed an additional £10m to the demonstration programme"* (p. 42).

Another document, *'The Energy Challenge: Energy Review Report 2006'*, reiterated similar statements:

> *"The Government believes that the next step in the development of CCS would be a commercial demonstration, if it proved to be cost effective. Following HM Treasury's recent consultation on CCS, more work will be undertaken on the costs of such demonstration projects, and a further statement will be made at the Pre-Budget Report"* (p. 18).

The above references suggest that whilst the policy problems evident in period 1 were not overcome, the Government intensified their efforts to overcome these issues in this period. Indeed, by 2009, the documents describe how:

> *"…In a consultation launched in June 2009, the Government proposed a new financial and regulatory framework to drive the development of CCS. These proposals included plans to fund up to four CCS demonstrations in the UK and a requirement for any new coal power station to demonstrate CCS. The Department of Energy and Climate Change will also establish an Office of Carbon Capture and Storage to support the delivery of this work"* (*'The UK Low Carbon Transition Plan – National Strategy for Climate and Energy',* 2009, p. 53).

This suggests a commitment to this technology that was perhaps related to some signs of progress in regard to government's efforts to deploy CCS. For instance, the document *'2006 Pre-Budget Report Investing in Britain's potential: Building our long-term future'* indicated:

> *"…The UK also pressed successfully for reform in international fora: in November 2006 the London Convention was amended to allow carbon dioxide to be stored in geological formations below the sea, a major step towards enabling the implementation of CCS"* (p. 164).

Another document, *'2008 Departmental Report of the Department for Environment, Food and Rural Affairs (DEFRA)'* indicated:

> *"Defra also played a lead role in the amendment of the Oslo and Paris Convention for the Protection of the Marine Environment of the North-east Atlantic (OSPAR) Convention to allow permitting of carbon capture and storage which will be important in mitigating climate change"* (p. 65).

This suggests that the Government were seeing some barriers to CCS being overcome, making it more attractive to continue to invest in this *policy* idea.

From the references cited above, one observation that could be made is that there was a desire to pursue change, and more attention devoted to CCS in the 2nd period relative to the 1st period. The references appear to suggest that the Government believed that CCS could play a potential role in addressing the *problems* of *climate change* and *energy security* and took steps to

address some of the concerns associated with the technology. For instance, through the Department for Environment, Food and Rural Affairs (DEFRA), they addressed regulatory and legal barriers concerned with carbon dioxide storage in geological formations through amendments of the OSPAR Convention in 2007. In addition, though CCS technology was known to be expensive and commercially not proven for power generation, they took steps to launch the first CCS demonstration competition committing to fund this project at £1 billion with the aim to address some of these concerns. Moreover, the Government also supported research and innovation to advance the technology. These actions suggest that there was a strong desire not only to identify a *'policy solution'* such as CCS, able to overcome the *'problems'* identified above, but also the Government was taking steps in addressing the concerns linked to implementing CCS technology at this time.

Kingdon argues that *policy proposals* that are perceived to be technically feasible and cost-effective are those that are likely to receive some attention from *policy makers*. However, in this empirical case, an interesting finding observed is that CCS still gained sustained attention from *policy makers* in this period even though it was not a fully worked-out *policy*. Therefore, in this way it did not meet Kingdon's criteria for the selection of *policy proposals* in relation to technical feasibility and cost-effectiveness. In a similar study in China, Zhu (2008) pointed to the importance of technical infeasibility as a factor for *policy change* to occur, an argument that contradicts one of the key aspects of Kingdon's MSF. It appears Kingdon's argument focused on the resulting policy change that could occur once a technology is seen to be technically feasible. As observed in the CCS case, it is inferred that a *policy proposal* may still be prominent on the agenda even when the technology is in its emerging phases but may not necessarily lead to *policy change*. These findings suggest a more complex picture than painted by Kingdon's analysis, suggesting that *policy makers* can play an active role in trying to overcome the barriers of feasibility that Kingdon suggests can frustrate *agenda setting*.

In addition to these specific policy developments, it is also important to note the wider policy context evident in this realm. For instance, in this period, the Government introduced radical policies such as the introduction of the *'2006 Climate Change Bill'*, which subsequently became the *'2008 Climate Change Act'*. This document introduced a set of legally binding carbon budgets which any government was required to meet (Climate Change Act, 2008, p. 3). The document, *'2008 Pre-Budget Report - Facing global challenges: Supporting people through difficult times'* highlighted this stating:

> *"To drive greater reductions in greenhouse gas emissions, the UK has put in place the Climate Change Bill. This sets the UK a long-term legally binding target to reduce greenhouse gas emissions by at least 80 per cent by 2050...The Bill*

introduces carbon budgets that set binding limits on emissions over consecutive five-year periods…" (p. 127).

These decisions intensified the need for policy solutions able to deliver these policy changes and hence rendered CCS an attractive policy solution. As the references above show, the Government introduced the Climate Change Bill. To meet carbon reduction requirements, the Government pursued radical policy strategies such as the *'2009 Low Carbon Transition Plan'* (see p. 53). By 2009, some of the policies that were introduced and linked to CCS were the following: (i) Government announced that all new fossil fuel power plants should be designed and built such that they could fit CCS in the future; (ii) Government made plans to fund up to four CCS demonstrations through a set of proposals for an ambitious financial and regulatory framework (iii) Government announced that all new coal power plants were required to demonstrate CCS; (iv) Government had plans to establish the Office of Carbon Capture and Storage (OCCS) to deliver its ambitious policies (*2009 Low Carbon Transition Plan*, p. 53). Indeed, this period shows a shift from the 1st period because it signals a move from abstract references to *policy*, to actually implementing a *policy* to support, if not to actively roll out CCS.

Taken together, this period shows that despite concerns, the government nevertheless invested and made legal commitments that incentivised change, suggesting that whilst policy viability as cited by Kingdon may frustrate the implementation process, it does not stop governments from taking the idea seriously and pursuing options to promote the idea.

(iii) Politics stream

Turning to the *politics stream*, pre-existing conditions continued to appear but were more prominent and frequently referenced and were influential in the sustained attention given to CCS by *policy makers* in this period.

Conducting this document analysis, one aspect of the *politics stream* appears important in informing *agenda setting* in this period. The document analysis suggested that the UK offered leadership on *climate change* and CCS, positioning itself as a global leader on these issues. For instance, they looked for opportunities to show leadership at forums like the *'2005 Gleneagles Summit'* and the '*2007 EU Spring Council*'. The documents suggested that *climate change* was made a priority through UK's presidencies of the G8 and EU in 2005. It was at the *Gleneagles Summit* that *climate change* and CCS issues were put on the agenda. In this context, they raised the issue of *climate change*, focusing international attention on the need for change. For instance, *'The Climate Change – The UK Programme 2006'* indicated that:

"The UK is already at the forefront of the fight against climate change. Our Presidencies of the G8 and the EU in 2005 and this made a powerful impact. At the Gleneagles Summit in July 2005, the G8 leaders agreed that climate change was a serious and long-term challenge caused by human activity, and that urgent action

> *was needed. The Gleneagles Action Plan and the commitment by G8 leaders and leaders of other countries to launch a Dialogue on "climate change, clean energy and sustainable development" were a major signal of renewed political will"* (p. 3).

Elsewhere, the same document indicated the following:

> *"It was against this background that the Prime Minister put climate change on the international political agenda in 2005 by making it a priority for the UK's Presidencies of the G8 and EU. The effect was to put a strong public and political spotlight on climate change…"* (p. 16).

Another document, *'2005 Pre-Budget Report, 'Britain meeting the global challenge: Enterprise, fairness and responsibility'* reiterated these insights:

> *"…Action to tackle climate change must be taken at the right level and national action needs to take place as part of a concerted international effort. The UN Framework Convention on Climate Change, Kyoto Protocol, and the G8 and international partnership agreements together provide a multilateral context for this action and ensure that progress towards reducing greenhouse gas emissions can be made in a cost-effective way without undermining national competitiveness. This is why the Government has championed climate change through its G8 and EU presidencies and will continue to take the lead internationally on this issue. Significant steps were taken at the Gleneagles Summit in July 2005 where G8 leaders agreed to a range of actions and principles for tackling climate change, as set out in the Gleneagles Communique and Plan of Action. The G8 leaders formally recognised that climate change is a serious and long-term challenge, caused by human activity, which demands an urgent response"* (p. 152).

In relation to the measures set out to tackle *climate change* in the '*Gleneagles Communique and Plan of Action'*, CCS was mentioned as one of the policy solutions. The document indicated that:

> *"We will work to accelerate the deployment and commercialization of Carbon Capture and Storage"* (p. 5).

The documentary analysis also revealed how the UK pushed for the policy solution – CCS – in this period. For instance, *'Budget 2007'* highlighted that:

> *"At the Spring Council in March 2007, the UK successfully pushed for a greater EU commitment to developing carbon capture and storage and EU leaders called for the Commission to develop a mechanism to stimulate the construction and operation by 2015 of up to 12 demonstration plants, and for member states and the Commission to work towards the necessary technical, economic and regulatory framework to bring environmentally safe CCS to deployment in new fossil-fuel power plants, if possible by 2020"* (p. 176).

Taken together, and from the passages above, it appears that in this period the UK was leading debates on a global stage on these issues, driving the international community to pursue change. The UK was a key world negotiator and leader championing the course of *climate change*

and CCS in the international sphere. As the documentary evidence show, it was at the *'2005 G8 Gleneagles Summit'* (an international conference), where the UK hosted the presidencies and championed *climate change* and CCS. Here again, one observation from the documents concerned '*policy coupling'* - the *problem* of *climate change* is *'coupled'* to CCS as a solution in a favourable *political* climate. In addition, documentary analysis revealed no significant changes in manifesto references or public opinion from period 1. What did change was the international political arena. So looking at the references which point to political factors such as the international events which took place in this period - within the documents, it appears that there was a strong favourable *political* environment including developments in other *streams* which created a *window of opportunity* for CCS to gain momentum. In line with Kingdon's ideas, this offers one possible explanation to why CCS radically took off in the 2nd period. It is also interesting to note that CCS was for the first time explicitly mentioned in the Queen's Speech (2009) in this period, suggesting that CCS was a prioritised issue domestically; *"Legislation will be brought forward to support carbon capture and storage and to help more of the most vulnerable households with their energy bills"* (Queen's Speech, 2009).

Summary of 2nd period:

Taking all three streams together, in the 2nd period, *climate change* and CCS appeared to have gained impetus nationally and internationally and there was global consensus for action with UK in the lead of affairs. It is observed that there was a commitment to facilitating the commercial demonstration of CCS in this phase, encouraged by the announcement of the first CCS competition and a verbal commitment to 'leading the charge' in international circles. This period saw changes that overcame some of the limiting factors of CCS evident in period 1. Legislative barriers were allayed, for example, but there still remained *policy* concerns. This suggests that there was partial action, in the form of generic targets and investment in CCS, but the *policy* itself was not developed enough to the extent that it could be implemented. There was clear commitment to trying to overcome this issue, but ultimately the challenge identified in period 1 remained. However, I argue that the rapid emergence of *climate change* as a compelling *problem* coincided with significant developments in the *politics stream* which created a *window of opportunity* for CCS to be taken up. Based on the evidence gathered here, I argue that there was *'coupling'* of *climate change* (problem) to CCS (solution) in a favourable political climate. Indeed, as Kingdon argues, all three streams must *'couple'* to create a *window of opportunity* for an idea to be taken up. An interesting observation in this analysis is that the investment in this period showed that the government were interested in this technology and – contrary to what Kingdon suggests – this shows that a *policy* that faces technical problems can be on the agenda if there is a pressing need for change and few other viable solutions. Therefore, the *window of opportunity* was open for CCS here, and whilst

there was not an option of implementation, there was a chance to raise the profile and investment in this issue.

4.5 3rd PERIOD (UK Parliamentary Year Session 2009-2010 to 2011-2012)

4.5.1 *Why did CCS first fall from prominence?*

In the 3rd period (2009-2011), it appears that CCS began to fall from prominence having mentions in 14 Command Papers (as opposed to 37 Command Papers in period 2), however a period of a short upward trajectory in 2010 is observed, followed by a downward trajectory as shown in Figure 9 above (p. 84). In line with Kingdon's ideas, it appears that in this period, other pressing *problems* emerged which shifted attention away from CCS. Documentary evidence shows that in this period, the Global Financial Crisis was seen as in urgent need of response. In addition, there were concerns about funding mechanisms with the *policy* - CCS. There was also a lack of progress in overcoming the feasibility issues associated with CCS identified in previous periods. An appreciation of Kingdon's *problem, policy*, and *politics streams* therefore helps us explain the developments in this period which appeared influential and led to CCS falling from prominence.

(i) Problem stream

One aspect appears important in explaining the developments in the *problem stream*. First, documentary analysis suggests that in the *problem stream*, the Global Financial Crisis took precedence on the UK *political* agenda and was seen as being in more urgent need of a response. In the document, *'Response to the House of Commons Environmental Audit Committee 4th Report of Session 2009-10: The role of carbon markets in preventing dangerous climate change',* the Government pointed out that:

> "*Given the current fiscal constraints, value for money is a crucial consideration. While the promotion of CCS is an important objective, the implied cost of carbon savings needs to be compared with other technological solutions for delivering reductions in carbon emissions and decarbonising generation"*

Similar comments were made in the Ministerial Forward of the document, *'Planning our electric future: A White Paper for secure, affordable and low-carbon electricity',* published in 2011 (p. 27) and *'Annual Energy Statement 2012'* document (p. 6).

From a *problem* perspective, in this period attention simply moved to other *problems* that were seen to be more urgent. This scenario agrees with Kingdon's (2014) proposition that, *"policy makers anticipate costs and revenues, and if necessary trim back initiatives to make them fiscally manageable"* (p. 109) adding that *"if they find the circumstances sufficiently compelling, policy makers simply ignore the budget"* (p. 109). Other scholars like Cairney (2015) have argued that

policy maker attention tends to lurch from one *problem* to another. For instance, he posits that, *"In the real world, policy makers struggle to make choices between competing aims, and organisations are unable to gather comprehensive levels of information. In practice, policy maker attention lurches from one aim to another, they struggle to process information, and they make decisions in the face of great uncertainty"* (p. 16). This marks a very different dynamic to that evident in period 1 and 2, suggesting that other pressing *problems* (i.e. fiscal constraints) emerged which shifted Government's focus from CCS in this period. This provides one possible explanation to why CCS fell down the government's agenda in the 3rd period.

(ii) Policy stream

Conducting document analysis, three aspects of the *policy stream* appear relevant in helping to explain why CCS struggled in the 3rd period. First, the documents showed that a range of alternative technologies emerged as competitors to CCS in this period. For example, the document, *'Planning our electric future: A White Paper for secure, affordable, and low-carbon electricity'*, published in 2011, indicated in the Ministerial Forward, the following:

> *"Traditional fossil fuels leave us open to volatile prices, deepen our dependence on imported energy and emit too much carbon. Instead, we need huge investment in renewables; a new generation of nuclear stations; and, in time, gas and coal plant that can capture harmful emissions. This will diversify supply and wean us away from imported fossil fuels"* (p. 3).

In another document, *'Annual Energy Statement 2012'*, the Government stated that:

> *"In the near term, the UK faces challenging economic circumstances, with uncertainty from the eurozone, consumers and businesses both feeling the squeeze, and a slow and cautious investment climate. In this context, there are two immediate priorities for UK energy policy: upgrading our energy infrastructure in order to rebuild our economy, and putting households back in control of their energy bills. Improving energy efficiency has a critical role to play in achieving these goals"* (p. 6).

As observed from the references above, the prominence of CCS was lessened by the relatively attractiveness of other (cheaper) options in the context of austerity. This shows the relationship between CCS and other policy options, suggesting that there was competition amongst different policy solutions for government investment and attention. To understand why CCS lost ground relative to its competitors, changes in coal production appear significant (See Figure 11 below).

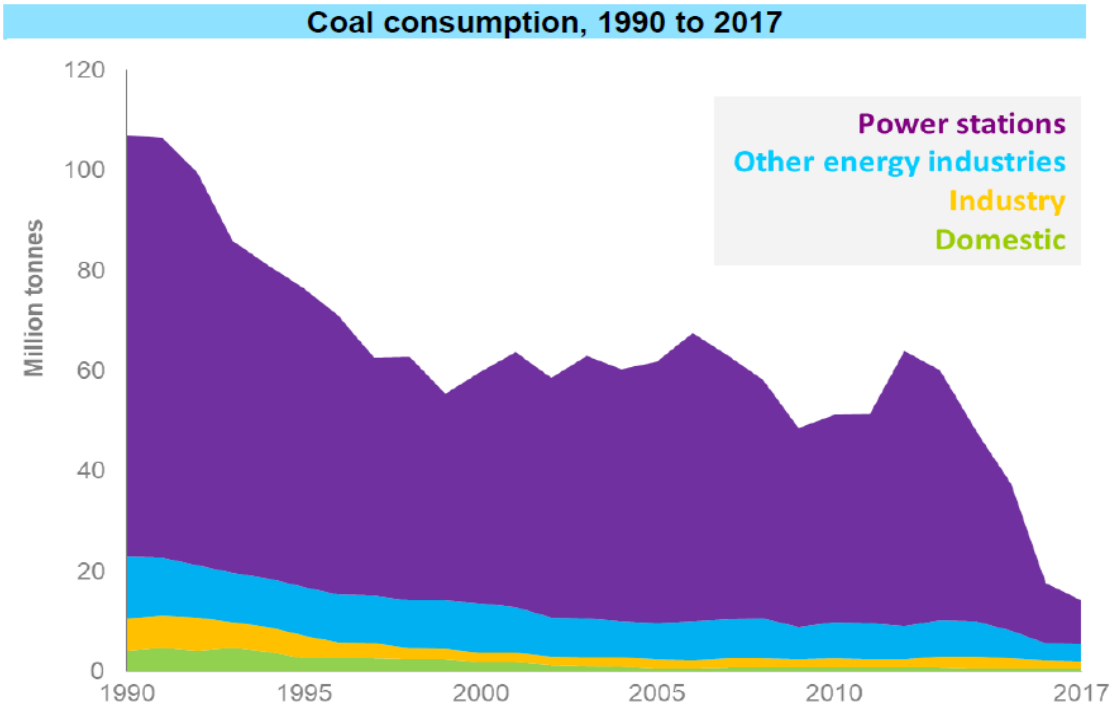

Figure 11: Coal consumption, 1990-2017
Source:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/728374/UK_Energy_in_Brief_2018.pdf (UK Energy in Brief, 2018, p. 19)

As shown in Figure 11 above, the second aspect which appeared important in this period, general coal consumption - to which CCS was linked - was declining, with much of coal-fired generation existing capacity coming to the end of its useful life. This was evident in the documents analysed here. For example, the '*2011 White Paper'* mentioned that:

> *"Around a quarter of our existing capacity – mainly coal and nuclear power stations – will close in the next decade. Keeping the lights on will mean raising a record amount of investment. However, the current market arrangements will not deliver investment at the scale and the pace that we need. That investment must build an electricity system fit for the future"* (p. 3).

Similar concerns were raised in the document *'Annual Energy Statement 2012'*:

> *"…Over the coming decades, the energy system faces additional challenges, including: the need to decarbonise; the fact that around a fifth of our 2011 generating capacity has to close over this decade; and declining domestic fossil fuel production in the context of rising energy demand"* (p. 12).

With *policy makers* alluding to concerns about the existing coal-fired generation capacity coming to the end of its useful life, there appeared minimal justification for continuing investment in CCS technology, with other policy solutions seen to be more appropriate to the *'problem'* that *policy*

makers were seeking to solve. From the quotations above, one idea inferred from the documentary analysis is that CCS became more de-coupled from *energy security* because of the diminishing use of coal and its existing coal-fired generation capacity as well as the emergence of other attractive options e.g. renewables.

Third, in this period, the documents suggest that there were issues over funding mechanisms for investing in CCS deployment. To probe further into the Government's strategies and allocation of resources with respect to CCS in this period, beyond the documents analysed here, I looked into Government's Annual Budget Reports. *'Budget 2011'* announced the following:

> *"The Government remains committed to providing public funding for CCS demonstration plants. However, consistent with its objectives for tax simplification, it will not proceed with the CCS levy. It will instead fund its commitments to CCS demonstration from general taxation"* (p. 64).

The above reference shows that there was a shift in the funding mechanisms for CCS (i.e. from a levy on energy bills to general taxation) in this period.

From a *policy* perspective, the funding issues raised show that affordability was a big concern in this period, and in the context of austerity, CCS was not a priority. Taken together, what seems to be interesting from a *problem* and *policy* perspective is that, in seeking solutions to *problems*, issues were not looked at in isolation. *Problems* were rather looked at complementarily. The above references show that politicians were not wedded to the idea of CCS but wanted to invest in the most viable solutions. In this period, I argue that other *policy solutions* seemed more suited to the *problem* of *climate change* the Government wanted to address – especially when *energy security* around coal was not such an urgent *problem*. Moreover, these policy solutions were seen to be more cost-effective and easier to pursue. Given that CCS technology was not yet proven in a period of austerity, it appears that the Government considered the comparative advantage of competing technologies in terms of cost and value for money in reaching decisions. In line with Kingdon's ideas, it appears that this scenario aligns well with his assertion that *policy proposals* likely to lead to *policy change* are those perceived to be cost-effective and technically feasible. Indeed, these scenarios also resonate with Downs' (1972) Issue attention cycle; as *policy makers* began to realise the cost of real action, the enthusiasm they had from the 2nd period declined and attention shifted elsewhere.

I will now move on to discuss the *political factors* which informed *agenda setting* in this period. To simplify this, I provide a figure below (Figure 12) which illustrates Governments in power, Prime ministers, and the General election years transposed onto the *heuristic framework* of the CCS case for reference.

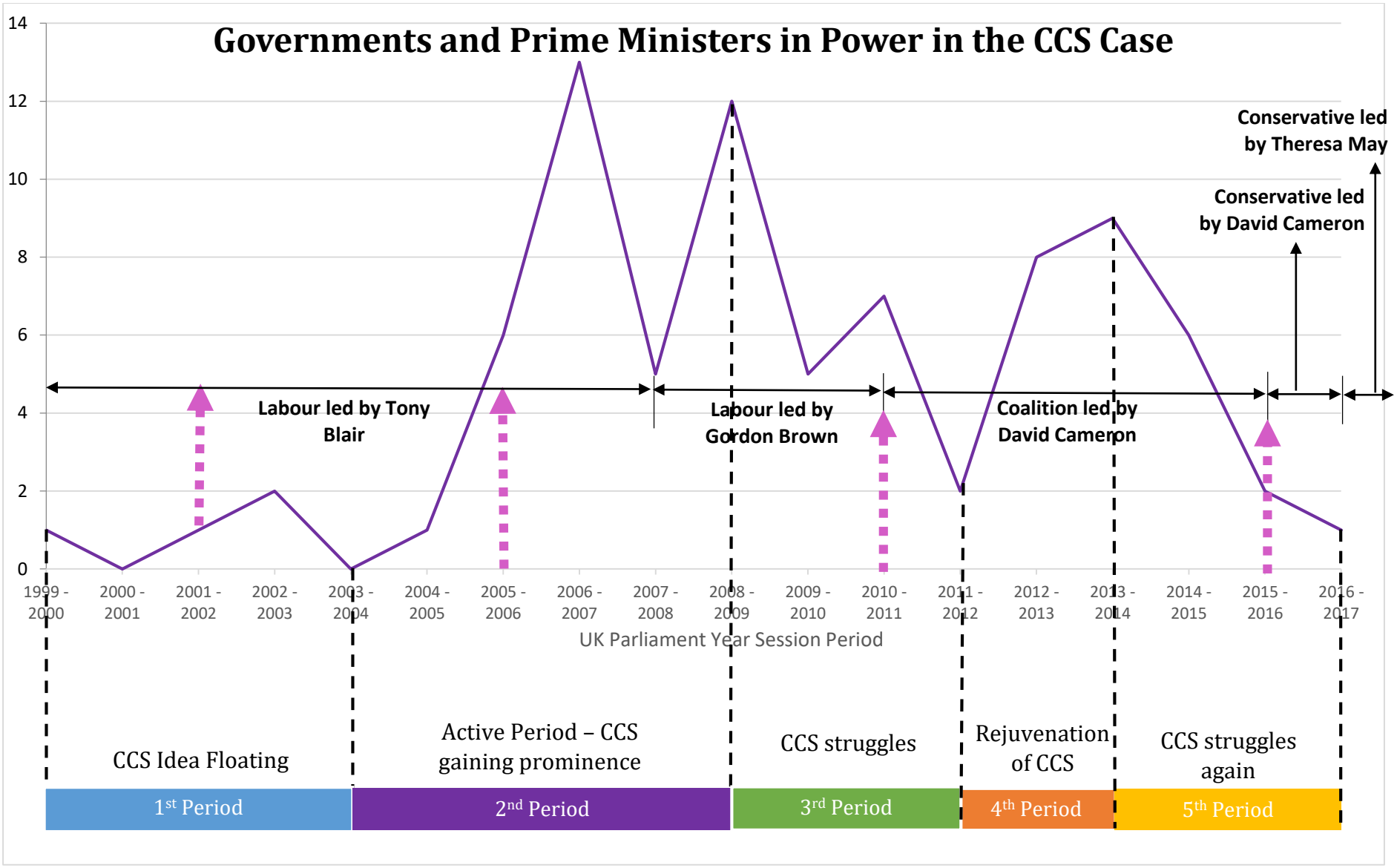

Figure 12: Governments in power, Prime ministers and the General election years in the CCS case.
(Purple dashed arrows represent election years)

(iii) Politics stream

Turning to developments in the *politics stream*, one aspect appears relevant in helping to explain why CCS fell from prominence. One insight from the documentary analysis concerned a change of government which occurred in this period. Whilst we might have expected the change of government to result in an unfavourable *political* climate for pursuing CCS, the analysis shows this was not the case as the Conservatives by this time had shifted position and actively pledged to act on CCS. Indeed, the Conservatives even made a specific pledge on CCS, committing to:

> *"creating four carbon capture and storage equipped plants, taking coal – one of the most polluting fuels of all – and transforming it into a low carbon fuel of the future"* (2010 Conservative manifesto, p. 92).

This finding may appear to suggest that there was a favourable political climate (perhaps shown by the short upward trajectory in 2010 as shown in Figure 9 above). However, the documentary analysis suggests that while this was the case, the wider political context meant that the relative importance of the environment compared to other issues (the economy) had changed. In this period, it appears that austerity overrode political priorities with respect to CCS, resulting in CCS falling from prominence. What is however interesting is that it was not until 2010 that CCS appeared in political party manifestos for the first time. Manifesto analysis show that all political parties made ambitious pledges towards supporting CCS technology. For instance, the Labour 2010 manifesto indicated that:

> *"We have taken the decisions to enable a new generation of nuclear power stations, and a programme of four clean coal plants with carbon capture and storage technology with a levy to fund them. We are the only Government in the world to have banned new unabated coal-fired power stations"* (p. 8:3).

Continuing, the Liberal Democrats 2010 manifesto highlighted the following:

> *"Block any new coal-fired power stations – the most polluting form of power generation – unless they are accompanied by the highest level of carbon capture and storage facilities"* (p. 58).

By looking at the specific number of references to *climate change* and CCS in these manifestos, I was able to assess the variations in the discussions of these subjects amongst political parties (See Tables 5 and 6 below).

Table 5: Climate change mentions in Election years in Party manifestos (N1) (Period 2 and 3)

Period	Election Year	Labour	Conservative	Lib Dem
2	2005	11	1	14
3	2010	13	18	16

Table 6: Carbon Capture and Storage mentions in Election years in Party manifestos (N2) (Period 2 and 3)

Period	Election Year	Labour	Conservative	Lib Dem
2	2005	0	0	0
3	2010	1	1	1

From Table 5, the analysis shows that references to *climate change* increased – most notably with the Conservatives changing from 1 referenced in 2005 to 18 in 2010, suggesting a form of re-branding of the party to be seen as environmentally conscious. The analysis suggests that in this period all political parties had a narrative on *climate change*. More so, manifesto analysis also reveals that CCS was explicitly mentioned by all the 3 main political parties in this period as shown in Table 6 above. Indeed, these 'events' were not evident in the 2nd period.

Furthermore, I looked into polling data to gain insights into the public mood of this period. Polling data from an analysis conducted by Ipsos MORI in November, 2012 (Economist/Ipsos MORI November Issues Index) suggested that the economy was seen as the most important issue facing Britain at the time, mentioned by over half (55%) of the public (See Figure 13 below).

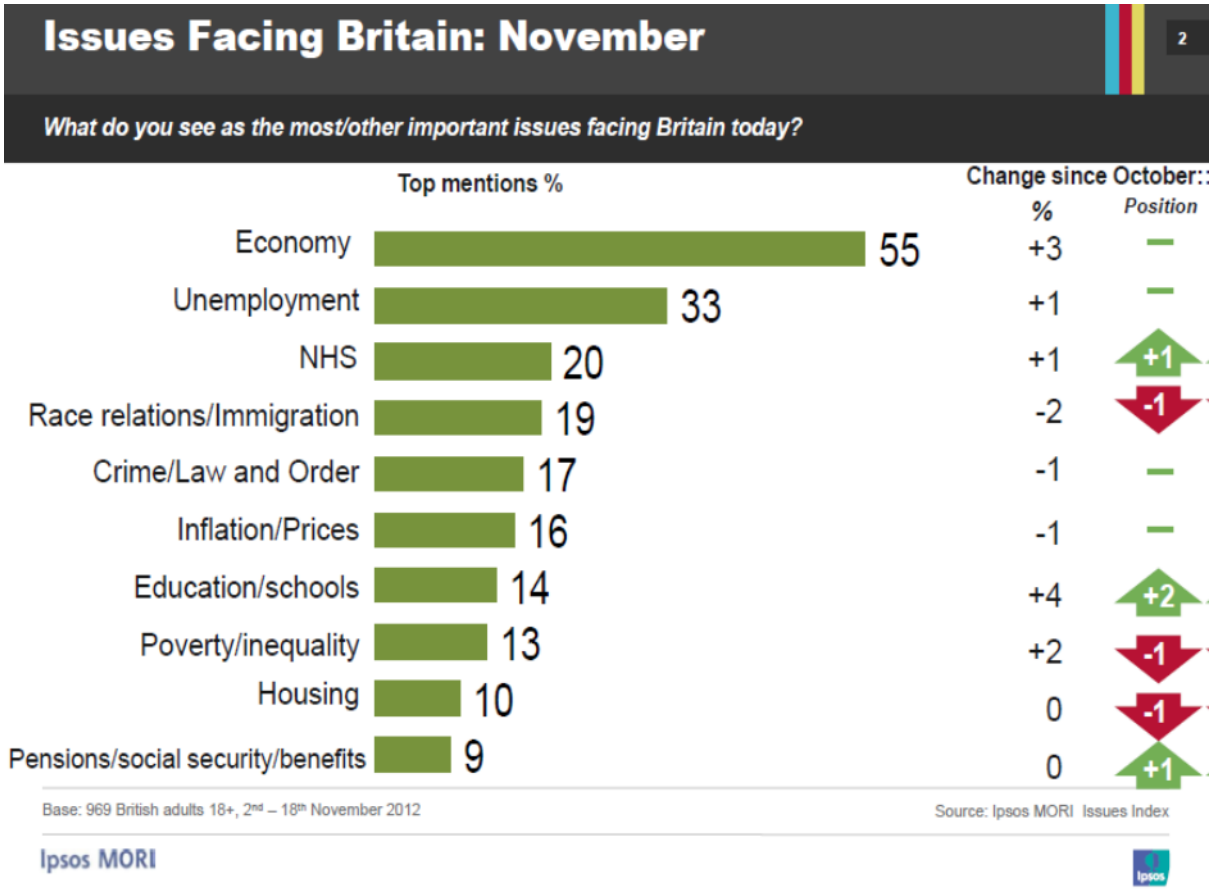

Figure 13: Economist/Ipsos MORI November Issues Index (2012)
Source: https://www.ipsos.com/ipsos-mori/en-uk/economistipsos-mori-november-2012-issues-index

As indicated, when looking at polling data in this period on the most important issues, it appears that the economy was top priority which gives an indication of the wider political context. This suggests that despite a favourable climate amongst politicians, the wider political mood and agenda had shifted elsewhere. Kingdon (2014) argues that *policy makers* are faced everyday with issues to deal with and the ones they would attend to are those they believe to be most urgent or in need of response. In line with Kingdon's ideas, documentary analysis suggests that the Global Financial Crisis raised key issues about 'value for money' in any undertaking. It appears that in the context of the economic crisis, CCS was seen to be in less need of response. The analysis suggests that CCS was considered an expensive option to pursue in this period. This finding resonates with Pralle (2009) who argued that *"economic problems often move environmental problems and solutions down the list of priorities"* (p. 788).

Taking events in the *politics stream* together, we observe an interesting tension – the political attention paid in this period to *climate change* and CCS in manifestos would suggest a favourable political environment. But political events meant that, relative to the financial crisis, there was limited political capital to focus on this issue.

Summary of 3rd Period:

As Kingdon notes, for an idea to be taken up then all three streams must come together. In this period, key developments in the *problem stream* - the Global Financial Crisis - appeared to be more urgent, making *climate change* issues appear less urgent, thus creating an unfavourable *political* climate for CCS to be taken seriously. Moreover, in the *policy stream,* the emergence of competing alternative technologies, general decline of coal consumption and its existing coal-fired generation capacity raised questions about the continued justification for CCS. Besides, concerns about funding mechanisms for CCS were not allayed. Hence, there was no *window of opportunity* created for CCS to advance. Thus, these developments undermined the continued prominence of CCS as a single solution for meeting *climate change* and *energy security* objectives. Taken together, these developments provide a possible explanation to why CCS fell from prominence in this period.

4.6 4th PERIOD (UK Parliamentary Year Session 2012-2013 to 2013-2014)

4.6.1 *Why did interest in CCS re-emerge?*

In this period, it appears that CCS began to rejuvenate, appearing in 17 Command Papers (Figure 9). Adopting Kingdon's theory, two aspects identified from the documentary analysis appear relevant in explaining why interest in CCS was rejuvenated. First, the nature of the *'problem'* CCS addressed diversified. As a result, the government believed that long-term investment in the *policy* of advancing and deploying CCS was seen as a *'solution'* that would address multiple *'problems'* (i.e. *climate change*, the economy and jobs). Second, the government believed that CCS was a potentially viable technology and had the potential to be cost-competitive with other technologies and hence were seen to be taking action to reduce cost. Thus, the three streams of Kingdon *'coupled'* to increase attention to CCS issues, but (as in period 2) issues around policy feasibility continued to prevent this idea being progressed to implementation. In the analysis that follows, I focus discussion on the *problem* and *policy streams* that help us explain why interest in CCS rejuvenated in this period, as developments in the *politics stream* remained largely consistent.

(i) Problem stream

In this period, the nature of the *'problem'* CCS addressed diversified. Rather than being aligned solely with *climate change* (as in period 3), CCS began to be framed in economic terms shown in government references to the idea. Illustrating this tendency, the document *'Annual Energy Statement 2012'* stated the following:

> *"Carbon Capture and Storage (CCS) can reduce carbon dioxide emissions from fossil fuel plants by as much as 90%, playing a crucial role in both our climate and*

> *energy security objectives. The Government is committed to working with industry to create a new cost-competitive UK CCS industry in the 2020s. The UK is poised to be a world leader in this new industry which could be worth billions of pounds a year to the UK economy by the late 2020s. We want to maximise opportunities for jobs and growth from this innovative technology"* (p. 19).

In another document, *'Electricity Market Reform: Policy Overview'* published in 2012, the following was mentioned:

> *"Energy investment also represents a major opportunity to deliver sustainable growth. Energy projects represent the largest infrastructure programme across the UK. Investing in major infrastructure projects such as offshore wind farms, new nuclear power stations, gas fired power stations and Carbon Capture and Storage (CCS) equipped generation plant will drive growth, jobs and skills for these sectors. This investment is vital to rebuilding and rebalancing the UK economy and there is an opportunity to develop the domestic supply chain to enable it to help deliver our energy needs, support jobs and stimulate economic growth"* (p. 7).

From a *problem* perspective, one interesting observation made is that the narrative or *framing* of CCS began to change. Document analysis suggests that CCS was now increasingly framed with reference to the economy. Unlike the 3rd period where CCS was being pursued for solely *climate change* reasons, in this period, CCS was being advocated for additional reasons i.e. climate change and economic reasons. From these references, it appears that the *'solution'* of investment in CCS was seen to address multiple *problems*, widening the incentive to pursue this idea. Therefore, in this period, we observe expanded *'coupling'* of *'problems'* to which CCS is framed as an attractive *'solution'*.

(ii) Policy stream

In the *policy stream,* one idea identified through documentary analysis is that the Government believed that CCS technology had the potential to be cost-competitive with other technologies, thus was a potentially viable technology. This was evident in the document, *'Gas Generation Strategy'* published in 2012 which indicated that:

> *"CCS is a technology that can remove CO_2 emissions created by the combustion of fossil fuels…It has the potential to be one of the most cost-effective technologies for the decarbonisation of the UK's power and industrial sectors, as well as those of economies worldwide"* (p. 58).

Document analysis suggests that the Government took steps to supporting the technology by launching a CCS roadmap in 2012, to set up a new programme to support the deployment of CCS. The *'Annual Energy Statement 2012'* highlighted this stating:

> *"In April 2012 DECC launched the CCS Roadmap which set out a new programme to support deployment of the technology. The new programme represents one of the most comprehensive offers for CCS anywhere in the world…"* (p. 19).

Indeed, the document analysis revealed that the roadmap – *'CCS Roadmap - Supporting deployment of Carbon Capture and Storage in the UK, 2012'*, reiterated the Government's commitment towards CCS as shown in these statements:

> *"The Government is committed to helping make CCS a viable option for reducing emissions in the UK and in doing so to accelerate the potential for CCS to be deployed in other countries. Our vision is for widespread deployment of cost-competitive CCS"* (p. 6).

As part of measures in this roadmap, the Government took further steps – the setting up of a CCS Cost Reduction Taskforce in 2012 to be responsible for seeing to the specific role of ensuring that CCS becomes cost-competitive with other technologies. This Taskforce was set up to advise government and industry on identifying cost reductions in order to realise them (*'Annual Energy Statement 2012*', p. 20). Documentary analysis suggested that the CCS task force came out with a conclusion that CCS had clear potential to be cost-competitive with other forms of technology, delivered in their final report *'CCS Cost Reduction Taskforce Final Report - The Potential for Reducing the Costs of CCS in The UK*', published in 2013. See below:

> *"UK gas and coal power stations equipped with carbon capture, transport and storage have clear potential to be cost competitive with other forms of low-carbon power generation, delivering electricity at a levelised cost approaching £100/MWh by the early 2020s, and at a cost significantly below £100/MWh soon thereafter"* (pp. i; see also *'2012 Gas Generation Strategy'*, p. 58).

In addition, the document analysis shows that the Government began to develop detailed investment plans - plans which had not been apparent in previous documents analysed. While this appears to be a radical change from period 3, perhaps it suggests that the Government wanted to be seen to be doing something about CCS, and that the idea had not been totally abandoned. One key action the Government took was to launch the second round of CCS competition. Illustrating these events, the *'2012 Gas Generation Strategy'* stated the following:

> *"The Government is committed to CCS and has one of the best offers in the world to bring forward this technology, including a £1bn commercialisation competition, £125m for research and development and ongoing support through electricity market reforms…Four projects have been shortlisted in the Government's £1bn competition. Decisions on which projects to take further will be taken in the new year"* (p. 58).

In addition to all the events discussed above, the documentary analysis suggested that there were other support mechanisms which were set up for CCS by the Government in this period. For instance, the setting up of *'The UK Carbon Capture and Storage (CCS) Research Centre (UKCCSRC)'* in 2012. This was evident in the document, *'Scotland analysis: Science and research'*, 2013, highlighting that:

> *"The UK Carbon Capture and Storage (CCS) Research Centre, launched in April 2012, brings together over 100 of the UK's top CCS academics. It was set up and funded by the EPSRC (£10 million) and DECC (£3 million) to promote and coordinate UK CCS research capability and increase academic collaboration with industry"* (p. 24).

Taken together, we can see that the approach the government took showed real specific commitment to advancing CCS technology in the UK.

Summary of 4th Period:

Taking all three streams together, it appears that a *window of opportunity* was opened for CCS to come back on the agenda in the 4th period. There was a broad *problem* of *climate change* and a precise *policy* agenda for CCS which *'coupled'* in a favourable *political* climate. In the 4th period, it is argued that the *political* climate remained consistent, as there remained support for CCS amongst *policy makers*. What appears to have changed is that in this period concerns about cost were overcome (at least, from a context of belief), and the solution to the multiple *problems* facing the government (the economy, *climate change*, jobs etc.) were seen to be addressed through investment in the technology. Hence, there seemed to have been a *'coupling'* of the three streams which allowed for the issue to rise again on the agenda. However, while CCS was on the agenda, the actions the government took in this period appear to suggest that they were working to support and facilitate the deployment of CCS.

4.7 5th PERIOD (UK Parliamentary Year Session 2014-2015 to 2016-2017)

4.7.1 *Why did CCS again fall from prominence?*

In the 5th period, it appears that CCS begins to fall from prominence again correlating with the downward trend observed in Figure 9 above. The subject appeared in 9 Command Papers. Conducting this document analysis, there was no clear link to CCS seen as a *'solution'* to the multiple *'problems'* previously identified. In addition, new *'problems'* emerged which the government prioritised, with CCS not being mentioned anymore. These issues include economic, national security and health issues, which were seen to be more pressing than *climate change* and CCS. The *policy stream* was unfavourable, with a decision to abruptly cancel the second round of CCS competition. In the *politics stream*, *policy makers*' commitments to CCS development waned. The analysis that follows discusses each of these streams of the CCS case, to help explain the falling prominence of CCS on the UK government agenda in the 5th period.

(i) Problem stream

In the *problem stream*, the document analysis suggested that there appeared to be no references made to CCS as solving *'problems'*. From the analysis gathered here, economic, national security and health issues were of topmost priority compared to *climate change* issues. To understand the priorities of the Government in this period, Government Spending Reviews were examined. See below:

> *"Mr Speaker, this Spending Review delivers on the commitment we made to the British people that we would put security first…Economic and national security provide the foundations for everything we want to support. Opportunity for all…our job is to rebuild Britain. Build our finances. Build our defences. Build our society…These reforms will support our objectives for our country. First – to develop a modern, integrated, health and social care system that supports people at every stage of their lives. Second - to spread economic power and wealth through a devolution revolution and invest in our long term infrastructure…The resources allocated by this Spending Review are driven by these four goals...The first priority of this government is the first priority of the British people – our National Health Service* (*'Spending Review and Autumn Statement 2015'*).

The above quotes are illustrative of the attention being paid to other issues. Taken together, the documentary analysis suggests a marked shift from period 4 to period 5 – that is, there appeared to be no clear link to CCS seen as a *'solution'* to the multiple *'problems'* identified previously (i.e. economy, climate change, jobs).

(ii) Policy stream

Turning to developments in the *policy stream*, I drew on an additional source - newspaper – to gain some insight because CCS did not feature in the Spending Review. On the same day the Autumn statement was delivered, an analysis of a Guardian newspaper indicated that the second CCS competition was cancelled. Since this *policy* decision did not feature in the documents

analysed here, it was not possible to analyse the Government's official justification for this move – making it hard to determine the rationale for this action. However, turning to the Guardian newspaper, the analysis suggests that the decision to withdraw the £1 billion fund for the CCS demonstration project was done with minimal justification and the announcement confined to a stock market news website. The Guardian newspaper titled, *'UK cancels pioneering £1bn carbon capture and storage competition'* indicated:

> *"The government informed the London Stock Exchange at 3pm, stating: "Following the chancellor's autumn statement, HM government confirms that the £1bn ring-fenced capital budget for the CCS competition is no longer available. We will engage closely with the bidders on the implications of this decision for them." The decision was not mentioned in Treasury documents"* (Carrington, 2015).

As the references show, the newspaper indicated that the announcement was not even mentioned in Treasury documents and there was no indication that this was about to happen. Indeed, this was evident in stakeholders' sentiments as revealed in the newspaper, for instance:

> *"Moving the goalposts just at the time when a four-year competition is about to conclude is an appalling way to do business. It is a real blow to confidence for companies investing in CCS. This technology is critical for the UK's economic, industrial and climate policies".*
>
> *"CCS could save the UK £32bn a year by 2050 and abandoning the competition was a false economy: "In choosing to save a relatively small sum of taxpayer money in 2015, the government is unnecessarily committing vast amount of future energy consumers' money*".

While the reasons for the decision to cancel the competition was not expressly stated in the documents, the lack of official communication makes it hard to make many inferences about this action, but it appears that the *policy* was no longer supported, especially in the midst of other competing interests the Government wanted to address. It is interesting to note that just months prior to the cancellation announcement, the documentary analysis suggested that the Government continued to make express statements about developing and supporting the deployment of CCS. For instance, the '*Annual Energy statement 2014'* indicated that:

> *"The Government is working with industry to create a new cost-competitive CCS industry into the 2020s…The Government's approach is contained in the CCS Commercialisation Programme which has up to £1 billion in capital funding available designed to bring forward the first commercial scale projects in the UK. Projects are expected to be under construction as soon as possible after the necessary consents and financing is in place"* (pp. 43-44).

Taken together, this period sent mixed messages around support for the *policy* of advancing and deploying CCS. The analysis suggests that there were mixed indications of what

the Government's intentions were here, but fundamentally the decision to cancel the CCS competition suggests a change in approach from the last period.

(iii) Politics stream

In the context of the wider political agenda, manifesto analysis revealed a shift away from *climate change* (as evidenced in less references) (See Table below 7), perhaps reflecting the lower public salience presented in periods 3 and 4.

Table 7: Climate change mentions in Election years in Party manifestos (N1) (Period 3 and 5)

Period	Election Year	Labour	Conservative	Lib Dem
3	2010	13	18	16
5	2015	13	4	24
5	2017	11	5	8

In relation to CCS specifically, all three political party manifestos contained mentions of CCS in the 2015 Election year for instance (See Figure 14 below), and the Conservatives (who were in power in this period) mentioned this idea, but the references made to CCS did not promise new actions in this area. For instance, the Conservative party pledged in their 2015 manifesto the following:

> *"We have been the greenest government ever, setting up the world's first Green Investment Bank, signing a deal to build the first new nuclear plant in a generation, trebling renewable energy generation to 19 per cent, bringing energy efficiency measures to over one million homes, and committing £1 billion for carbon capture and storage"* (See Appendix II).

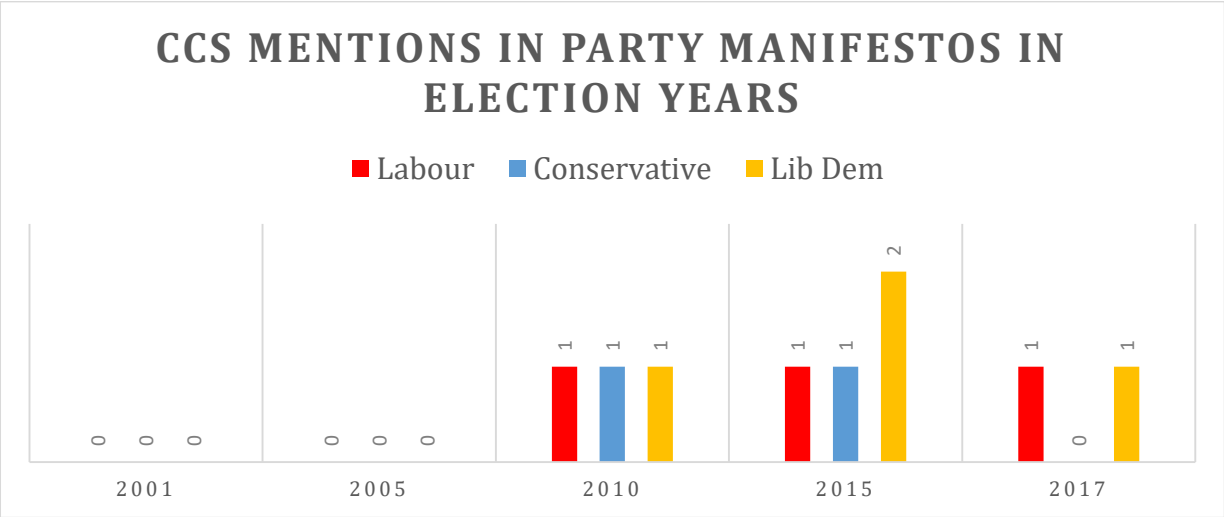

Figure 14: Graphical representation of carbon capture and storage mentions in party manifestos in election years

Taken together, there appeared to be a rather marked shift from the 2010 Election year in period 3 compared with period 5 where all political parties made specific and ambitious pledges to deploy CCS. So, whilst shown in manifestos that all parties were talking about CCS, there was a lack of specific pledges to support the *policy* of advancing and deploying CCS from the party in power, suggesting waning commitment to this idea.

Summary of 5th Period:

Taking all three streams together, this period marked a shift from the last period (period 4). The analysis suggests other issues were prioritised in the *problem stream* (e.g. economic, national security and health issues). In the *policy* and *politics stream*, there were mixed messages around support for the *policy* – but ultimately the idea was not taken forward. The *window of opportunity* therefore became closed for CCS.

4.8 CONCLUSION

This chapter has explored documentary insights using Kingdon's MSF to explain *agenda setting* in the CCS case. Particularly, we can see how Kingdon's MSF proves useful when looking for different patterns of data within the developed *'5-PH framework'*, applied in this analysis. This chapter has shown how changes in the three *'streams'* of Kingdon's MSF have affected the fortunes of CCS *policy*. Having outlined these changes in detail, it is observed that when CCS rose up the agenda there was closer confluence between the *'streams'*, with progress inhibited in the main by feasibility and cost issues. However, when CCS fell from the government agenda, other aspects of *politics*, or *problem* affected how CCS was viewed. The documentary analysis has shown that while the idea of CCS has floated around for a while, the *windows of opportunity* were most apparent in periods 2 and 4, but closed in 3 and 5. To illustrate a summary of the dynamics in each '*stream'* of the MSF in the *'5-PH framework'*, see Table 8 below. In each period, I show whether the *problem*, *policy* and *politics* streams were favourable (green), ambiguous (amber) or unfavourable (red) for CCS and whether, therefore, the *window of opportunity* was opened or closed (as revealed in the documentary analysis).

Table 8: Dynamics of the MSF in the *'5-PH framework'* of CCS (Documentary analysis)

Periods	Problem stream	Policy stream	Politics stream	Window of Opportunity
1st Period				Open but less apparent
2nd Period				Open and more apparent
3rd Period				Closed
4th Period				Open and more apparent
5th Period				Closed

Furthermore, one interesting insight this documentary analysis has shown to be important is around *policy* feasibility and the finding that an idea can get on the agenda even when it is not yet ready for implementation. While Kingdon (2014) argues that a policy solution needs to be *"worked out"* or *"ready to go"* (p. 142) before being seriously considered by *policy makers*, this analysis has shown that this is not always the case, and that an idea can be considered seriously even when not yet *'worked out'*.

Having reviewed official documents, I now turn to verify this analysis by presenting new interview data. This 'unofficial' source of data has the capacity to test the resonance of this analysis and explore whether factors not evident in these documents help to account for the fortunes of CCS. Equipped with both these insights, the next chapter will enhance understanding of CCS and draw insights from this case for those interested in promoting similar technologies.

CHAPTER 5: RESULTS, ANALYSIS AND DISCUSSION FROM STUDY 2

WHAT DO INTERVIEWS WITH ELITES REVEAL ABOUT THE TRENDS AND DYNAMICS OF AGENDA SETTING FOR CARBON CAPTURE AND STORAGE TECHNOLOGIES (CCS) IN THE PERIOD (2000-2017)?

5.0 INTRODUCTION

In the last chapter, I developed a 5-period *heuristic framework* (*'5-PH framework'*) that characterised the status of CCS on the UK government's agenda using documentary evidence.

In developing insights to address the main research question - *'How can agenda setting for CCS technologies be currently understood?'*, in this chapter, I extend the analysis to consider the 'unofficial story' of CCS, using interviews with elites to gain additional insights. The interviews were conducted to the point of saturation, attaining a number of 20 respondents in total (Refer to Table 3).

This chapter particularly seeks to first, test whether or not the *5-PH framework* was relevant/accurate in the eyes of respondents and second, test whether respondents' accounts of CCS and the *5-PH framework* mirror the findings of the documentary analysis in the last chapter (or extend or challenge these ideas). By doing this, the chapter aims to test the robustness of findings so far and develop additional insights that can be of value to those promoting other emerging technology options. The chapter argues that while there were some areas in which the *5-PH framework* was not seen to hold, the majority of respondents generally accepted the model and agreed that it was broadly a good representation of what happened to CCS. For respondents who raised some concerns about the *5-PH framework*, these related to the specifics of the idea, rather than the notion of different periods itself. A particular strength of the *5-PH framework* was seen to be that the divisions in the model gave respondents the opportunity to highlight key changes the analysis has shown to be important in the different periods based on Kingdon's Multiple Streams Framework (MSF) – *problem*, *policy* and *politics* streams. Thus, respondents were able to focus their experiences on the different periods to provide useful insights. So, in this chapter, I argue that the *5-PH framework* provided a useful approach to highlight patterns in the data that might not otherwise be seen, specifically in relation to Kingdon's three streams – *problem*, *policy* and *politics*.

In relation to specific insights that could be garnered in this chapter to understand *agenda setting* as far as CCS is concerned, interviewees revealed a number of factors that were influential. These centred around the roles and strategies of different stakeholders, the political pressure to pursue change and the dynamics of the *policy* process. The findings appeared to have supported the evidence from documentary analysis but go on to reveal new insights into the dynamics of the *agenda setting* process.

5.1 WAS THE '5-SEGMENT HEURISTIC FRAMEWORK' USEFUL?

In previous chapters, I introduced the *5-PH framework* as a way of understanding and explaining the fortunes of CCS on UK government agenda. The majority of interviewees found it useful for this purpose. Conducting the elite interviews, I showed interviewees the diagram and asked them to reflect on whether it was useful/accurate. The interview analysis reveals that the majority of respondents agreed that the *5-PH framework* was a good representation of what happened to CCS. For example, one respondent stated that:

> *"I think broadly, it's quite a good representation"* (Male, Industry Rep 1).

Another respondent with experience working in both industry and government said that:

> "*if Step 1 in what you're doing is to try to identify the periods of discussion, or the periods of action by government, then I think, the chart that you've got identifies it fairly well…"* (Male, Industry & Government Rep 2).

Moreover, another respondent from a CCS Trade Union Organisation said that:

> "*I think your first period's pretty reasonable, because I think not only is that true of the UK, it's true pretty much throughout the developed world. There's a couple of exceptions, but they don't matter here, focused on the UK. So, I think that's reasonable"* (Male, CCS Trade Union Organisation Rep 1).

Another respondent argued:

> "*I think that in terms of the level of interest or as a measure of the level of interest and optimism about the prospects for CCS development in the UK, I think it does reflect the recent experience"* (Male, Industry Rep 3).

The thrust of the quotations above show that the majority of respondents confirmed the model was *'broadly right'* or '*pretty reasonable'*. In particular, they supported the dates accompanying these periods and found the idea of different periods to correlate with their experience of the fortunes of the *policy*. In some instances, however, agreement was caveated, suggesting that there may be some nuances missing. In particular, some interviewees contested the precise time spans, whilst others contested the specifics of happenings in relation to the graph suggesting that the official story may not fully reflect the position of CCS on the political agenda. However, even in spite of these differences, the majority of respondents found the idea that CCS *policy* had gone through different 'phases' useful in explaining its fortunes. However, to gain more understanding into the insights this *heuristic framework* can provide, it is necessary to analyse interview data using this framework to determine how interviewees account for the fortunes of CCS. Adopting this approach, I seek to test the degree to which interview insights support the claims made in the last chapter, seeking to build a richer picture of the fortunes of CCS. In offering these insights, for each period, I discuss interview insights that (i) confirm the analysis from documentary evidence in the last chapter and (ii) which extend/challenge the analysis from the last chapter.

5.2 *How did CCS first emerge on the UK government agenda?* (1ST PERIOD; UK Parliamentary Year Session 1999-2000 to 2003-2004)

5.2.1 Data that supports existing findings

In the last chapter, I argued that Kindgon's three *'streams'* framework provided a useful way for understanding the development of the CCS case. Reviewing interview data, this analytical framework and the specific conclusions appears to be drawn, with interviewees supporting many insights drawn about this phase. Specifically, these relate to:

- *Problem stream*: Government was searching for a solution to twin problems.
- *Policy stream*: CCS represented one *policy* response that was being looked at amongst many others, but was not yet viable for implementation.
- *Politics stream*: There was emerging political interest in tackling *climate change*.

Offering an overview of interview data, evidence to support these three ideas for the 1st period was readily found. These are discussed under three headings namely; *problem stream, policy stream*, and *politics stream*.

(i) Problem stream

In relation to Kingdon's *problem stream*, many interviewees echoed documentary analysis in pointing to the Government's attempt to solve the dual problems of *climate change* and *energy security*. Interviewees made comments such as:

> *"the factors were that we needed to build new energy power stations. The UK energy fleet, the power fleet was, was on a long-term decline, old power stations which needed to be closed down, and so we needed to build new capacity, but doing so in the context of much higher private interest in climate change and political kind of pressure on climate change"* (Male, Government Rep 1).

Furthermore, other interviewees pointed to the nature of problem framing at this time. Echoing the previous chapter and in relation to Kingdon's *policy stream*, CCS was seen to emerge as a possible response to the twin problems of *climate change* and *energy security*. Indeed, a number of interviewees raised concerns about the future of coal power, but emphasized that concerns for mitigating *climate change* was beginning to come to the fore at the same time, suggesting that both problem frames were significant. This idea was evident in the quote of one respondent who stated:

> *"I think initially, when climate change started being discussed CCS was looked at very much as a technology to be able to continue to use coal in the power sector"* (Female, CCS Trade Union Organisation Rep 2).

Similar statements were picked up by an engineer from industry who stated:

> *"CCS became one of the technologies we were looking at as a response to a recognition that we were going to need to do something about greenhouse gas emissions"* (Male, Industry Rep 4).

Besides, the quotations above also indicate the complexity of the *'problem'* – the need to address both *climate change* and *energy security*. Indeed, as one interviewee stated:

> *"…we were struggling at that time trying to introduce a new energy policy…At the same time, climate change had begun to become a serious, political issue"* (Male, Government Rep 1).

Applying Kingdon's ideas, the interview analysis reveals how two problems – *climate change* and *energy security* - were 'coupled' *(problem coupling)* to which a solution was being sought for. This idea of *problem coupling* was evident in the quote of an interviewee who stated:

> *"…climate change became more and more and more and more important as a kind of factor of energy policy"* (Male, Government Rep 1).

(ii) Policy stream

From a *policy* perspective, interviewee statements supported the analysis in the last chapter that CCS began to be *'coupled'* up as a *policy* solution to the twin *problems*. However, this was not a simple relationship between *policy* and *problem* as CCS appeared to be one of many options being considered in this period. This idea was evident in one respondent's quote below:

> *"I think in terms of your first period…I think there's an exploration of options. And CCS starts getting talked about because it's one of the options. Renewables was already moving but people understood you needed more"* (Male, CCS Trade Union Organisation Rep 1).

Likewise, another interviewee reiterated:

> *"Nuclear, renewables and to some extent energy efficiency were the kind of primary ways of getting cleaner, low carbon energy, but given that it was felt that we ought to diversify, we ought not to be completely dependent on gas. So that was a major part of the argument…"* (Male, Government Rep 1).

From the statements above, the interviews appear to have supported the findings and analysis from documentary analysis in the last chapter in relation to the UK government's approach towards meeting energy needs. The interview analysis suggested that in dealing with the problems of decarbonising the energy system while maintaining energy security, the Government explored various technologies. This development is important as it provides insights into how *policy* proposals to problems were being developed at the time and how these *policy* proposals came to be considered seriously by *policy makers*. It appears that in this period, the concept of energy portfolios – the consideration of a variety of potential energy options to effectively manage energy solutions rather than the over-reliance on one energy source that could otherwise be fallible – was being advanced.

Additionally, a majority of interviewees echoed documentary analysis which suggested that in the 1st period, CCS technology was in its experimental stages and there was ambiguity over *policy* solutions. Indeed, as mirrored in document analysis, while the Government considered the technology as a *policy* option to address the twin *problems,* they were fully aware of the barriers to implementing this idea at that time. This idea was evident in the comments of a Male, Government Rep who stated:

> *"…this was pretty much an experimental technology that was being, um, that had been developed in kind of prototype form, largely in academic laboratories"* (Male, Government Rep 1).

From the evidence gathered here, it appears that the interviews affirmed the findings and analysis suggested from documentary evidence. Taken together and in line with Kingdon's ideas, we can infer that this period represented a climate in which *'conditions'* are seen to be *'problems'* and there is evidence of a desire to find a *policy* response (if not yet to act). This period could be described as one in which solutions to the twin *problems* of *climate change* and *energy security* were being sought for, not necessarily enacting the idea of CCS as both analyses suggest that CCS was not viable at this time.

(iii) Politics stream

In relation to Kingdon's *politics stream*, interviews supported the analysis in the last chapter about the importance of domestic and international political influences on the rise of CCS in the 1st period. Interviewees made comments such as:

> *"You had an increasing groundswell in support of CO_2 reduction over the various years from Kyoto to Paris to what their Accords was…you had a large degree of political unanimity across the major blocs. So, you had Europe, you had the US under Obama, China, under the various leaders that they had, Japan, all moving towards CO_2 reduction"* (Male, Senior Academic Rep 1).

This confirms that there was a favourable *political* climate in which *climate change* was seen to be in need of a response. From the quotations above, it appears that there was interest from Government in finding a *policy* able to tackle *climate change* and promote CO_2 reduction.

From above, we can conclude that the interviews appeared to confirm the analysis in the previous chapter. Yet, whilst interviewees' responses supported the existing analysis, discussions also revealed factors that did not emerge (or were not prominent) in the analysis conducted for the last chapter (Chapter 4). Specifically, two main additional insights were gained that relate to:

(a) controversies around potential low-carbon energy options, and

(b) the role and strategies of *'policy entrepreneurs'* who were found to be active from different sectors namely:

- in industry;
- in government;
- in civil society.

These points offer new insights into the:

- *Policy stream*:

(i) Government was looking for an appealing solution;

(ii) The roles and strategies of *'policy entrepreneurs'* who were influential in the *agenda setting* process.

- *Politics stream*:

(i) Political pressure to pursue change (i.e. protest from Environmental NGOs).

5.2.2 Data which extends/challenges existing analysis

(i) Policy stream

The interview analysis reveals two new insights about the *policy stream*. To begin, interview insights that relate to controversies around potential low-carbon energy options are discussed. Whilst previous analysis showed that CCS was one technology amongst many, seen as capable of solving the twin *problems*, interviews suggested that CCS gained prominence because of perceived deficiencies with other *policy* solutions. Indeed, interview analysis reveals that there were concerns around the use of low-carbon energy options such as nuclear power and renewables. It is important to highlight here the importance of one interviewee, who gave unprecedented insight into developments in this period because of his unique position in Government. Speaking to the respondent in question, he stated:

> *"We were struggling at that time trying to introduce a new energy policy. The big issue was nuclear at that point in 2004. And Tony Blair was very keen to restart a nuclear programme. The UK had not built a nuclear power station for many years and, that was very controversial"* (Male, Government Rep 1).

Elsewhere he added:

> *"…we had a very, very weak renewables' programme at that time, so very, very small proportion, under 2% of UK energy came from renewables. So I, looking at all of this kind of puzzling, you know, "What should we be doing?" I came across the technology of carbon capture and storage in my kind of reading and at this point this was pretty much an experimental technology that had been developed in kind of prototype form, largely in academic laboratories."*

> *"Renewables at that point were very expensive and were thought to be impractical, intermittent, not able, not able to supply power all the time, and we needed more base load. So, there was a strong pressure to build coal fired power stations, but the public pressure and the NGO pressure was against. So that was the context and that's where CCS looked like a solution. So that was kind of why there's all this interest here".* (Male, Government Rep 1).

These statements reveal political sensitivities which were not evident in documentary analysis due to the official nature of the texts analysed. *Policy makers* had concerns about nuclear power. Additionally, cleaner energy options such as renewables were expensive at this time and only contributed under 2% to UK energy. Besides, renewables' intermittency issue presented an energy challenge and there was clearly a need to find a baseload power generating solution. It is important to acknowledge that this was based on one interview and so it is difficult to verify, but suggests a possible dimension that was not evidenced in earlier analysis. In line with Kingdon's ideas, the interview analysis suggests that in this period, people in Government were actively searching for a more appealing solution to the twin problems of *climate change* and *energy security* and came across CCS, and thus shows the importance of *politics* and the desire for *policy* solutions that were not forthcoming from other *policy* options.

Continuing, the interviews offered additional insights into how CCS *policy* might have come on the Government agenda. Indeed, the same Government representative mentioned that the Government (and specifically political advisors) were actively looking for alternatives and came across CCS:

> *"I came across the technology of carbon capture and storage in my kind of reading…"* (Male, Government Rep 1).

While this interview suggests that the drive for CCS came from Government seeking a solution, wider interview analysis suggests that industry was actively promoting CCS (discussed below). This suggests that in this period, there was a programme of *policy* promotion that document analysis did not reveal, showing a supply (CCS industry) and demand (from Government) that previously was not clear. It is acknowledged that while there is a danger in inferring too much from this particular interview, the analysis helps to reveal the factors which interviewees suggested were influential.

A second insight interviews offer which relate to Kingdon's *policy stream* were the activities of *'policy entrepreneurs'* who were found to be influential in the *agenda setting* process. The interview analysis revealed three different sectors which were found to be active namely; industry, government and civil society.

To begin, the interview analysis revealed that there was a clear industrial proponent of CCS – BP (an oil industry company) – who was acting in this space and making efforts to promote CCS actively to seek the attention of the Government. This insight was evident in the quote of one interviewee from the academic community as indicated below:

> *"And then, we move 2004, onwards 2005, that's when BP put out its first project. So, again, BP did work on Grangemouth, it produced a report on the decarbonisation for Grangemouth oil refinery, which was issued about 2001 or 2002. So, that was a very significant report, because the owners of that oil refinery still use that report now. So, again, that's underrepresented in your graph of government documents, I suppose"*
>
> *"…That enabled BP to make a decision, make an offer in 2005 or so on the Peterhead DF1 project. So, that didn't come out of nowhere, that came out of five or seven years of previous work BP, with which they must have engaged with British government as well. But that's just not expressed publicly".* (Male, Senior Academic Rep 2).

The interview showed that BP had been engaging with the Government in this space for some time prior to when they put out their first proposal. In relation to Kingdon's ideas, this process could be described as a process of *'softening up'* where *policy actors* spend time to develop their ideas and present them to *policy makers*. Indeed, the Male, Senior Academic explained that there was some work on CCS already ongoing by BP before they presented their first proposal to Government from 2005. These developments mirror Kingdon's ideas which argue that ready-made solutions to *problems* develop in the *policy stream*. It appears that a network of specialists (in this case industry actors) had done some previous work on CCS and had a ready-made solution to the *problems* the Government was facing. Therefore, they took advantage of the *'window of opportunity'* to attach their *'solution'* to the *'problem'* by presenting their proposal to the Government. The interviews also reveal that they requested a subsidy from the Government to develop their proposal. And indeed, one respondent from Government stated:

> *"… the first proposal was brought to us by BP. This is possibly this earlier period, in fact. I can't remember when that happened, which is that BP wanted to do CCS on a plant in Peterhead in Scotland because they had an oil field that was finishing and they asked for subsidy, and this must have been 2003, 2004, early 2004, and the Treasury said, "No, we can't just give one company money, we've got to do this on a competitive basis," and that was where the procurement thing came from"* (Male, Government Rep 1).

This idea was evident in the quote of another respondent from industry:

> *"the first industrial project that I can remember being suggested was floated by BP. And that was to CO_2 capture in the north of Scotland and inject CO_2 into a field called Miller. And at the time, they envisaged that that would generate enhanced oil recovery and would um hence make economic sense. But would still need some significant other stakeholder investment to make it happen"* (Male, Senior Academic Rep 1).

The interview analysis shows that BP was actively seeking investment in a *policy* to develop a solution. It shows that it was industry's calls for investment which led to a process of competitive tendering as government was not prepared to simply invest in an initiative without open competition for the resource. This therefore suggests that *'policy entrepreneurs'* in industry played an important role in driving investment in CCS.

Another insight which emerged in interviews demonstrated that visible actors within Government acted as *'policy entrepreneurs'* to push forward the CCS agenda. This particular finding chimes with Kingdon (2014) who argued that individuals within government can influence what emerges on the government agenda (See Section 2.2.3, p. 42). Conducting the interview analysis, this insight was found to be evident. For instance, a Male Government Rep stated:

> *"I saw one of my roles as to help bring forward technologies that were potentially available but needed some support to bring them towards a policy position, and I persuaded Gordon Brown to start a consultation, which I think must have been in his budget in 2004 to bring forward a consultation on how carbon capture and storage might be supported…I was told by the civil servants, this is a technology which can only be, which you know, is 20 years away from being used, and I said, "I don't believe that. I've been talking to some of the scientists and I don't believe that's true. Let's see, you know, let's look at its viability." So, this consultation was about the kind of viability of CCS" "…and Gordon Brown actually said, you know, "We should be thinking about whether it would be right to incentivise this technology."* (Male, Government Rep 1).

This offers additional insights to documentary analysis as no such evidence was recorded in this time period in the official documents. The passage above suggests that technologies may rise on the agenda perhaps by persuasion from individuals within government who occupy unique positions. It shows the importance of *politics* i.e. an advisor was able to put options on the table that civil servants did not present. It is important to acknowledge that we might want to take this claim with a pinch of salt as it was not possible to verify this claim through other interview data. However, the interview analysis suggests that these figures may be influential to *agenda setting*. This finding resonates with wider academic scholarship on the importance of special advisers to the *agenda setting* process. For instance, Gains and Stoker (2011) argued that, *"special advisers alongside other actors and agents help to determine what is paid attention to and what is acted on or ignored"* (p. 496).

The final group of *'policy entrepreneurs'* who were influential in the *agenda setting* process of CCS were civil society organisations (and in particular, Environmental Non-Governmental Organisations (NGOs)). Reviewing the interview data, many respondents from different sectors stated that this period was characterised by environmental NGO protests against the building of new coal-fired power plants; an activity which persuaded the Government of the day to actively

pursue change. Given that their activities coincided with *politics*, these insights are discussed in the *politics stream* below.

(ii) Politics stream

From a *politics* perspective, interviewee statements add additional insights which relate to the role of environmental NGO groups who acted in this space in this period. These are discussed in two parts; the first part helps to explain why Government sought to actively look for solutions to the twin *problems* and the second part helps to explain to some extent why CCS did not actively progress in this period.

Interview analysis suggests that the Government wanted to build new coal-fired power plants but environmental NGOs heavily criticised this idea. Faced with political pressure of not using coal, the Government therefore started to look for alternatives and CCS appeared to be a promising solution to reconcile the challenge of meeting energy needs while reducing carbon emissions. This idea was evident in the quote of one respondent who stated:

> *"…The nongovernmental organisations were beginning to say, "We needed to do much more to reduce our emissions," and we weren't on track to meet our emissions reduction targets, and, so the alternative to nuclear, or possibly the complement to nuclear, building coal fired power stations was being very heavily criticised by the NGOs"* (Male, Government Rep 1).

These developments were reiterated by an Industry Rep who commented:

> *"One of the issues being, at E.ON [an energy company], was that we were starting to say we will build a new coal fired power station, there was a huge reaction against that from a number of pressure groups and so for a period of time at Ratcliffe, there were protests outside the station and we were actually going to work, there were a few weeks where we couldn't go in to work because of the protests" "…they were objecting to the construction of the power station at Kingsnorth which was one that was going to have CCS on it.* (Male, Industry Rep 4).

Similarly, these insights were evident in two Senior Academic Rep's comments (indicated below) which revealed the importance of the environmental NGO protests which were ongoing in this period. More importantly, their statements go on to reveal the extent to which these protests were serious, leading to chaos – disrupting work activities – and forced Government to actively pursue an acceptable solution. For instance, the first Senior Academic Rep stated that:

> *"The other thing that happened with time was that new coal fired plant without 100% CO_2 capture became unacceptable in the UK context. Um that was demonstrated particularly at the Kingsnorth new build project which was invaded by climate protesters"* (Male, Senior Academic Rep 1).

The second Senior Academic Rep appeared to have been well informed and attempted to unravel the story of the protest by describing the sequence of events in this period:

> *"Then Greenpeace organised a campaign against coal…they ran it for a number of years. And they got pretty serious protests against these new power plants which were very seriously planned. There was no doubt, the amount of trouble that went into the pre-investment and companies getting set up to do them...I don't think any were built in the end there. Greenpeace did a climate camp at Kingsnorth, maybe that was the first one - it probably was actually. Rainbow Warrior was in the Medway. There were a group of climbers who went up the chimney and painted 'Gordon Bin It,'…I was at a conference in London at that time that was run by E.ON, and there was a bicycle protest outside it, it was quite funny, in Chatham House. There were huge numbers of protests and in the end they got on, the most serious one was they got on the roof of Westminster Hall, protesting. Yeah, that really pushed CCS"* (Male, Senior Academic Rep 3).

Furthermore, the interview analysis suggests that CCS was perceived by the environmental NGOs as a way to continue the use of fossil fuels (i.e. coal) which they protested negatively against. For instance, one interviewee stated:

> *"the area where it (CCS) hasn't been supported is connected to NGO activity around the role that CCS is perceived to have in allowing the continued production and consumption of fossil fuels and bizarrely, the argument that CCS is just there to save the oil and gas companies* (Male, Industry Rep 1).

This suggests that there was opposition from environmental NGOs to continued investment in fossil fuel technologies, creating an unfavourable political environment in which to pursue this *policy* - CCS. The significance of external views of different policy solutions did not, however, appear to concern public views, as interviews suggested that there was no evidence of significant public opposition to CCS projects. Indeed, it was suggested that in places public opinion towards this technology was favourable, CCS was seen to create jobs for the people and secure the future of established industries. The same interviewee reiterated:

> *"…I think generally in the regions where projects have been proposed, it's generally been supported, primarily around either the preservation of old jobs or a creation of new ones"* (Male, Industry Rep 1).

From the above, the interview analysis appears to offer an interesting paradox relating to the activities of environmental NGOs – NGO pressure to act on *climate change* appears to have inspired an interest in CCS as a possible policy response to this issue, but at the same time NGO activity slowed down progress on CCS projects linked to coal-fired power stations.

Taken together, I argue that interviewees from different sectors raised the issue of NGOs as being influential suggesting that they played a role in framing the acceptability of different

policy options. This goes to suggest that *politics* mattered in this period as the views of these pressure groups were considered seriously.

It is worth noting here that though my interviews highlighted the significance of (3) different actors or *'policy entrepreneurs'*, many interviewees emphasised their own importance. This therefore makes it difficult to determine who actually had influence. Determining precisely who put the idea on the agenda is not however my objective, rather this analysis helps to demonstrate the many different voices (whose influence was not previously apparent) who may have played a role in promoting CCS technology.

Summary of 1st Period:

Taking both *policy* and *politics streams* of Kingdon together, and from the evidence gathered here, it appears that interview analysis has offered additional insights to our understanding of *agenda setting* in the 1st period, developing our understanding from the last chapter. I argue that in this period, there was indeed political pressure to pursue change and meanwhile, the activities of actors *(policy entrepreneurs)* – industry partners, special advisers, and environmental NGOs appeared to have been influential in the *agenda setting* process of CCS.

5.3 *Why did CCS grow in prominence?* (2ND PERIOD; UK Parliamentary Year Session 2004-2005 to 2008-2009)

5.3.1 Data that supports existing findings

In the 2nd period, interviews supported the analysis from the last chapter in relation to Kingdon's *problem, policy*, and *politics stream*s.

- *Problem stream:* (i) there was increased focus on *climate change* as a compelling problem both domestically and internationally; (ii) there were publications of key reports which provided new evidence and showed that *climate change* was indeed in urgent need of response and that CCS was a promising solution for heavy carbon emissions abatement. e.g. *'2005 IPCC Special Report on CCS'*, *'2006 Stern Report'*.
- *Policy stream*: (i) CCS began to be more *'coupled'* as a solution to the *problem* of coal-fired power stations; (ii) the legalisation of policy instruments e.g. *'2008 Climate Change Act'* informed *agenda setting* for CCS.
- *Politics stream:* (i) there was strong political pressure and drive to pursue change heightened by key political events which took place on the international agenda e.g. *'2005 G8 Gleneagles Summit'*, *'2007 EU Spring Conference'* and the *'Copenhagen Summit'*; (ii) UK played a key role in stimulating international discussions on *climate change* and CCS.

Reviewing the interview data, evidence to support these findings were readily found.

(i) Problem stream

In relation to the *problem stream*, many interviewees' comments suggested the idea that *climate change* became a pressing issue. For instance, one respondent stated:

> *"I say it's probably a mixture of increased focus on climate change both in the UK and globally…"* (Male, Senior Civil Servant 2).

Likewise, a Male, Industry Rep reiterated this assertion stating:

> *"…climate change rapidly coming up the agenda, and political consensus around the need to do something about it"* (Male, Industry Rep 3).

Another respondent from Industry confirmed these findings, stating:

> *"…but as we moved towards the turn of the century, the issue of greenhouse gases and climate change came more and more to the fore. And then, became a recognition that there was likely to be legislation and a recognition that something needs to be done about it, as well"* (Male, Industry Rep 4).

Furthermore, the idea that certain key reports published in this period appeared to be influential (as suggested in the documents) was evident in interviewees' statements. For instance, one respondent stated:

> *"I think during this period, what you call the active period, the sort of five, six, seven, eighth period was the kind of heyday of you know Stern Report…The active period is when the problem, the need to do something about climate change, and the political will was high because we had the Stern Report"* (Male, Industry Rep 3).

Another respondent stated:

> *"2005, it's actually quite interesting this graph. 2005 is when you had the Intergovernmental Panel on Climate Change special report on CCS. So, that was a formal report. We actually looked at all issues associated with technology and the impact it's going to have. And so, what you see, obviously, then, is government thinking, "Well, what is it that we're going to do in this space?"* (Male, CCS Trade Union Organisation Rep 3).

The passages above therefore confirm findings in the previous chapter.

(ii) Policy stream

From a *policy* standpoint, many interviews supported the analysis in the last chapter which suggested that CCS began to be more overtly *'coupled'* as a *policy* response to the *problem*. For instance, a Male, Industry Rep stated:

> *"…and there was a sort of drive towards saying, "Right, so how do we get ourselves ready to implement the new technologies that were going to be needed to address the emissions of greenhouse gases?" And one of the technologies we started looking at was carbon capture and storage"* (Male, Industry Rep 4).

This idea was also evident in the quote of an academic who stated:

> *"there was a significant rise in interest or awareness of CO_2, climate change, and so forth. At the time, Britain's power sector was very heavily dominated by fossil fuel-based power plants. And at the time, probably most of the power came from coal...So, you had a large emission base and CO_2 capture and storage was viewed as a means to maintain the hardware, the infrastructure that you had. But in also reducing the CO_2 emission level from the country"* (Male, Senior Academic Rep 1).

Next, interviewees from different sectors echoed documentary insights which suggested that legislative/statutory instruments such as the 2008 Climate Change Act appeared influential in the *agenda setting* process for CCS in this period. For instance, a Male, Industry Rep stated:

> *"I think maybe it's helpful to kind of think about the impact of the Climate Change Act. Um, because before the Climate Change Act was passed in 2008, the targets for emissions reduction were talked about as being a 60% reduction. That was the kind of ambition, the level of ambition. So, I think at the, sort of around the build-up and the passing of the Climate Change Act in 2008, there was an increase in the ambition in terms of emissions reduction. And that, I think, is really important for CCS. because then, when people were analysing how do we achieve those level of emissions reductions, all the evidence pointed to CCS being an important part of the technical story as to how we could do that"* (Male, Industry Rep 3).

Similar statements were made by a respondent from a CCS Trade Union Organisation:

> *"I think since the Climate Change Act, which was kind of 2008, so there. That kind of is going to have a huge impact because that's the point where you start actually mapping what your carbon budget is. Um, and start to dig down into kind of how you're going to meet that. So, yeah, I think that you can kind of see that had an impact, I suppose"* (Female, CCS Trade Union Organisation Rep 2).

This idea was also evident in the quote of one respondent from the academic community:

> *"It was about that time, as well, that the government set future legally binding limits for the national CO_2 emissions. So, if you have a policy like that, you also need to enact some policies that will deliver that goal"* (Male, Senior Academic Rep 1).

The passages above show that the Government was interested in doing something about *climate change* in this period. The setting of legally binding target placed the onus on them in looking for solutions, one of which was CCS.

(iii) Politics stream

In the *politics stream,* two aspects appear important. First, many interviews supported the analysis from the previous chapter about the key political events which emerged in this period to inform *agenda setting*. For instance, a respondent who previously served in the EU Commission stated:

> *"…it started to gain traction at the turn of the century and of course the UK endorsed the recommendation of the European Council in 2007…This was the*

> *Climate Change Council really…I think under the German presidency, which included those famous words that we want up to 12 CCS demonstration projects basically across Europe by 2015"* (Male, Government Rep 3).

This idea was evident in other respondents' comments below:

> *"…there was a number of sort of international events going on at that time. So there was the G8 in Gleneagles, around 2005, which made some commitments around CCS and increasing sort of focus at the European level as well. So I think that was the major driver in that sort of initial peak really"* (Male, Senior Civil Servant Rep 2).

> *"The lead in to 2008, '09 that is completely around Copenhagen. Everybody was focused, and CCS had big prominence around then…So I think that period you've got pretty right. I think it's gaining prominence; it was also almost oversold. It was almost getting this title of the whole solution…"* (Male, CCS Trade Union Organisation Rep 1).

An interviewee from academia reiterated similar statements:

> *"So, November 2005 was the Gleneagles Conference. So, Gleneagles Communique put CCS on the map"* (Male, Senior Academic Rep 3).

Second, many interviewees from different sectors echoed the insights from previous documentary analysis in pointing to the UK taking a leading role in promoting *climate change* and CCS within the EU and globally. For instance, a Male Representative from a CCS Trade Union Organisation stated:

> *"I think your second period is pretty right, and again, I think that this all turns on two things, the first that the UK has been progressive on climate policy comparatively. Particularly in Commonwealth countries, but has been progressive even within Europe in a different way to what Germany has been. And, and it really is back that far that CCS was gaining prominence". "And it parallels in fact the discussions that were going on through the COP process and the sort of climate discussions going on at the Commission. So, I think that makes sense"* (Male, CCS Trade Union Organisation Rep 1).

Again, another respondent confirmed this stating:

> *"Um, we helped stimulate international conversations about CCS. We funded, um, we co-funded along with Australia, um, and others, a CCS institute and an international institute and so on"* (Male, Government Rep 1).

In the same vein, this idea was evident in the quote of an academic who stated:

> *"But it was Gleneagles that the UK had the chair of the G8 as it then was in the European Union and Tony Blair decided to make a big push on climate change"* (Male, Senior Academic Rep 3).

Taking all streams together, the results from the interviews affirm the findings from the last chapter. This 2nd period was informed by strong domestic and international political consensus to bring about 'change' by promoting *climate change* objectives. The UK appeared to be in the lead of *climate change* negotiations with visible actors like Tony Blair pushing forward an

agenda on *climate change*. It was a climate in which there was a commonality of approach in looking for solutions where CCS began to be more *'coupled'* as a *policy* response to the *problem* of *climate change*, helping to explain why it gained significant prominence in this period.

I now go onto illustrate three new insights that document analysis did not provide. These offer additional insights into the nature of problem framing, ongoing activities of *'policy entrepreneurs'* and the political climate of this period.

- *Problem stream*: Increased modelling studies conducted on *climate change*, with the coupling of CCS as a solution published in key reports.
- *Policy stream*: On-going BP awareness programme and the launch of a first clear strategy for CCS.
- *Politics stream*: A climate of uninterrupted economic growth.

5.3.2 Data that extends/challenges existing analysis

(i) Problem stream

In the *problem stream*, one additional insight was apparent in the interviews. While documentary analysis revealed the importance of key reports published in this period, interviews suggest the significance of modelling studies (not mentioned in official documents) that were used to understand the problem of, and solutions to, *climate change*. Significantly, the interviews demonstrated that CCS (alongside other technologies) was pivotal to the modelling studies conducted in this period. For instance, as one respondent stated:

> *"So, in terms of the problem, definitely. Um, I think the more modelling is done on climate change, the more kind of reports that come out, things like the recent IPCC report, just kind of again, I've got a nice graph somewhere with kind of the role of CCS in all the scenarios"* (Female, CCS Trade Union Organisation Rep 2).

Another respondent from industry stated:

> *"I can refer back to some of these earlier periods as well, where I know that a lot of modelling work was done in the lead up to setting the Climate Change Act in 2008. Um, and I know a lot of the people who were doing the modelling at that time and they were using models like ours, which always kind of demonstrated a clear value for CCS as part of a low carbon pathway"*
>
> *"So a lot of the work that would have been going on here and the publications in government would have been informed by that modelling. So, it makes good sense to me that in the lead up to the Climate Change Act being established with a lot of thinking being done around whether it was achievable and what sorts of technologies might contribute. It makes sense that there would be a lot of discussion of CCS happening here"* (Male, Industry Rep 5).

Similarly, a Male Government Rep commented:

> *"And if you looked at all the modelling at that point of how the world could reduce emissions, it looked essential to have CCS, because there was just so much fossil fuel"* (Male, Government Rep 1).

The interview analysis suggests that modelling studies were essentially becoming a means of validating CCS as a competitive technological option to addressing *climate change*.

Kingdon argues that *policy makers* learn about *problems* through various mechanisms, one of which is indicators. From the quotations above, one possible explanation to the growing prominence of CCS in this period is that modelling studies provided new evidence (indicators in Kingdon's terms) to highlight both the nature of the *'problem'* and the *'solution'* deemed to be favourable to addressing the *'problem'.*

(ii) Policy stream

Interviews revealed two new insights about the *policy stream* which were not evident in the documents. The statements of interviewees from different sectors suggested that there was on-going industrial lobbying by BP in this period which heightened interest in CCS from other industrial players and led to a clear Government strategy for CCS. While this was briefly alluded to as taking place in the 1st period, respondents' statements suggested that this activity continued in this period. In the passages that follow, evidence for these claims was readily found:

> *"…that spike, I think that coincides with the arrival of BP's DF1 project which was going through its feed programme during 2005/06"* (Male, Industry Rep 1).

Additionally, a Male Senior Civil Servant reiterated:

> "*I would say actually the second period, is BP pushing, so that's where you had a clear proponent of CCS, which we didn't have before, so now you have a clearer company saying, "This is what we're lobbying government," so it increases"* (Male, Senior Civil Servant Rep 4).

Moreover, another Male Representative from a CCS Trade Union Organisation indicated:

> *"I'll tell you the other thing that happened around this time was BP. So, also around 2005/2006, BP were pushing the first Peterhead project, which was, up in Aberdeen. So, they went to government and said, "We've got a brilliant project, will you please pay for it?" And government said, "But we don't have a CCS policy." And so, I think that's why you've actually seen, then, this big spike here. So, in fact, in many ways, well, it was, it was government responding to the science and then also to industry and starting to think then about what its policy was going to be. And then it launched its first competition, I guess around 2006/7… Which is when you're going to see this kind of level of interest here"* (Male, CCS Trade Union Organisation Rep 3).

It is interesting to see the active role BP played in harnessing *policy maker* attention towards CCS technologies. As the quotations above show, in this period there was growing interest in CCS and big industry players like BP were saying that they could deliver on the technology.

What the interviews particularly add is, though the Government did not consent to providing a subsidy to BP, it led to the exploration of other policy instruments to implement the technology – the Government brought forward a funding competition for CCS which brought in other industry players to bid. Indeed, as a Male Senior Civil Servant's comment suggested:

> *"I think… say 2007/2008 where the government basically said they won't back BP, but they did set out a very clear… they had for the first time, they had a very clear CCS policy saying yes, we want CCS. This is how many projects we want. This is how we'll pay for it." "There was an energy white paper, which is for the first time CCS has clearly mentioned a clear strategy so that was why maybe the spike is here…"* (Male, Senior Civil Servant Rep 4).

The interview analysis suggests that the competition created opportunities for a *policy window* to be opened for other industry players, heightening the discussions and interest surrounding CCS technologies. For instance, as one respondent from academia suggested:

> *"the next peak I guess, is the first competition…so, the government at that point went out and sought bids for commercial demonstration. There was a pre-period when they announced that they were going to seek ideas. And so, companies like my own went out and developed concepts"* (Male, Senior Academic Rep 1).

Another respondent made similar statements:

> *"So, you start seeing the emergence of genuine industry groups around here. I can't remember exactly when, but CCSA for example, would have turned up around this time. You actually saw the beginning of a bunch of people, actors within that sphere engaging with the government, showing them the option. Trying to get the policy into place…"* (Male, CCS Trade Union Organisation Rep 1).

In relation to Kingdon's ideas, the interview analysis suggests that this was a period which brought in a larger community of industry groups who began to generate different ideas in a *policy primeval soup* (in Kingdon's terms). Ideas were being floated and different industry groups were competing for *policy maker* attention. It was period of *policy* promotion where different actors were presenting their preferred solutions to Government. Taken together, these developments help to explain why CCS grew in prominence in the 2nd period.

(iii) Politics stream

In relation to the *politics stream*, the interviews revealed that this was a period characterised by uninterrupted economic growth which meant that there was a favourable political climate to invest in doing something about *climate change*. According to the interview analysis, it appears that there were no barriers to spending public money on something that was going to provide benefits to the nation. This idea was evident in the quote of a Male Representative from industry who stated:

> *"At a time when you know, this was the time when Gordon Brown was saying…that it was the end of boom and bust, that we, in 2006, 2007, the UK had experienced probably one of its longest periods of uninterrupted economic growth since the*

> *Second World War". "So it was a very kind of optimistic period, people felt you know, it was the end of boom and bust. We hadn't experienced a recession for a long time. So, from that point of view, it was easier to achieve a consensus to spend money, resources, invest in doing something about climate change*" (Male, Industry Rep 3).

The passage above suggests that a stable political climate in which slack resources are available for government spending could inform *agenda setting*. It appears that favourable political conditions existed to invest in possible solutions to the *problem* of *climate change* such as CCS, rather than having to spend on solutions that were guaranteed to deliver. The interviewee's comments appear to suggest that the 'budget' was not constrained, and hence it was possible for the Government to explore technologies such as CCS and work to facilitate its implementation. This finding resonates with Kingdon (2014) who suggested that, *"the availability of money makes possible governmental innovation that would be impossible in times of severe budgetary constraint"* (p. 109).

Summary of 2nd Period:

Taking all *streams* together, it appears that the interview analysis has offered additional insights to our understanding of *agenda setting* in the 2nd period, developing our understanding from the last chapter. From the evidence gathered above, a possible explanation to the growing prominence of CCS in this period is that it was characterised by increased evidence of the *problem* of *climate change* and a recognition of CCS as a favourable option for combatting this issue, heightened by modelling studies conducted. There was on-going policy promotion by industry actors i.e. BP was an active *'policy entrepreneur'* in this period. There appeared to have been a process of *'softening up'* going on in this space, where different groups of people were presenting different options to the Government. It was a period which generated interest and enthusiasm amongst *policy makers*. Again, one observation made from interview data is that favourable political conditions existed to pursue the policy solution. i.e. more slack resources were available. Like Kingdon (2014) puts it, *"when the economy is growing…more slack resources are available to government for innovation"* (Kingdon, 2014, p. 108). It was a period in which the Government was very optimistic about doing something about the *problems* they faced. Several important political events culminated to create a favourable *policy window* for CCS. It appears that *politics* mattered in this period, but also there was interest from Government in developing the *policy*.

5.4 *Why did CCS first fall from prominence?* (3RD PERIOD; UK Parliamentary Year Session 2009-2010 to 2011-2012)

5.4.1 Data that supports existing findings

In the analysis that follows, I introduce three ways in which the interview analysis supported the findings from documentary analysis in the last chapter in relation to the 3rd period. Specifically, these relate to the *problem*, *policy*, and *politics streams*.

- *Problem stream*:

(i) The 2008 Global Financial Crisis: 'a period of austerity' – there were constraints on public spending and *policy maker* attention shifted.

- *Policy stream*:

(i) The energy infrastructure began to change: 'big push against coal'; gas capacity increased; renewables capacity began to increase in a manner not expected because of falling prices.

- *Politics stream*:

(i) There was a change of government.

Reviewing the interview data, these offer insights into the *political climate* of this period which informed *agenda setting* for CCS.

(i) Problem stream

From a *problem* perspective, many interviewees from different sectors echoed the insights from documentary analysis in pointing to the idea that the 2008 Global Financial Crisis had an explicit link to the falling prominence of CCS on the government's agenda in the 3rd period. For instance, one interviewee from Government explained:

> *"…and then of course, as we know, the economic crisis in 2008 onwards, just the idea of spending money on these things, it just got swept off the agenda across the whole of Europe, and it was… of course, the carbon price in Europe collapsed and that was the main driver for CCS up to that time"* (Male, Government Rep 3).

Another interviewee stated:

> *"The third period of struggling I think is absolutely right. That coincides with the global financial crisis. It coincides with a time in the UK that was a little bit different to what went on elsewhere in the world"* (Male, CCS Trade Union Organisation Rep 1).

Other interviewees echoed similar statements showing the extent to which different respondents agreed the 2008 Global Financial Crisis was influential. See below:

> *"When we had the credit crunch 2008, and then the rapid decline in the public finances, so the deficit ballooning in the UK. Those are the conditions that create more contention. Because then, people say, "Oh hang on a minute, we can't just spend money on all these fancy things that aren't going to you know, that might, we don't need until 2050"* (Male, Industry Rep 3)

> *"So, austerity definitely affected the British thing, because it was an expensive programme and we had committed public spending to it. And as I say, it was kind of top of the Treasury's list of things to cut, capital expenditure to cut"* (Male, Government Rep 1)

> *"…there's an explicit link with the financial crisis, so that affected the sort of view at the European, so global level, the ability of energy utility companies to make significant investments and I think that was a significant thing."* (Male, Senior Civil Servant Rep 2).

From interviewee statements above, there appears to be evidence to support the analysis in the last chapter that austerity shifted Government's focus. This goes to emphasize Pralle's point who argues that *"in the environmental policy area, the most important 'real world' events affecting the place of environmental issues on the agenda are economic events"* (Pralle, 2009, p. 788). In relation to austerity, interviewee statements, however, go on to reveal how CCS technology was perceived in this period. For instance,

As one respondent commented:

> *"I think obviously [the] financial crash was a huge setback in terms of um, to have kind of a government that's willing to invest in things…they need to be in a stronger position in the first place. Um, and also, I guess, with CCS projects, they can have quite a long I guess quite long development time"* (Female, CCS Trade Union Organisation Rep 2).

Another interviewee stated:

> *"And when you have a financial crisis, perspectives become a lot more short-term, and people seem to solve the short-term issues before returning once to things that are more comfortable to longer-term issues"* (Male, Government Rep 5).

The quotations above suggest that interviewees viewed the development and implementation of CCS as a programme that would be delivered in the long run. This could also suggest that *policy makers* viewed the benefits of CCS as realised in the long-term. In the context of austerity, an inference that could be made is that *policy makers* felt the technology 'could wait', as other short-term pressing issues came to occupy their attention (i.e. *policy makers* were focused on getting the economy back on track). This made it easier for *policy makers* to move CCS down the list of priorities in a climate of limited economic resources. These together help to explain why the technology began to fall from prominence in this period.

(ii) Policy stream

Next, interviewees echoed documents in pointing to the changing energy infrastructure in three ways which informed *agenda setting* for CCS in this period. First, interviews suggested that there was a big push against coal, second, gas capacity increased and third, renewables capacity began to increase in a way that was unexpected because of falling prices of renewables. These ideas were evident in the quotes of three different respondents from industry. See below:

> *"The pressure was off the UK as a large pollution nation because it converted already to gas. So yeah, once coal was seen in decline, I think there was less and less, less of a need seen for CCS in the UK and the world in the future was going to look more like gas and renewables…CCS became associated with coal and that was a bit of a downer from a public perspective and an investment perspective"* (Male, Industry Rep 6).

> *"I think what became apparent is towards the end of period two and three, domestically sourced coal had dwindled to such a low proportion that most of the coal had been brought in from Russia, Columbia, Australia and elsewhere…the massively falling costs of renewables has made it more and more and more difficult for CCS on power plant to compete on a price point basis. And therefore very difficult, if not impossible to defend a policy of supporting CCS on power to voters"* (Male, Industry Rep 1).

As the quotations above show, *politics* was important in this period. It appears that CCS fitted to coal-fired power plant was becoming a less attractive *policy* option to pursue, especially amidst the falling price of renewables. These insights were also evident in the quote of a respondent from a CCS trade union organisation:

> *"…as well as the economic crisis, you had incredible developments on renewable energy nobody foresaw…Now, actually, what happened here was firstly, we suddenly realised we'd got a lot more gas so suddenly the need to use coal started to diminish really quite substantially. That's a good thing. And the impact of, um, renewable deployment had a very, very positive effect on cost there"* (Male, CCS Trade Union Organisation 2).

Similar comments were made by two government officials. See below:

> *"CCS struggles, well CCS struggles indeed. It was struggling frankly…with the exception of renewable energy, which was still being heavily subsidised, you know, it was just off the agenda"* (Male, Government Rep 3).

> *"…there is this big push against coal starting in 2012, '10, '11, '12, '13 globally, and that makes, that kind of withdraws the need for it in a way"* (Male Government Rep 1).

(iii) Politics stream

Finally, many interviewees from all 4 different sectors - government, industry, academia, and CCS trade union associations - supported the findings in the last chapter that a change of government informed *agenda setting* for CCS in this period. For instance, three different interviewees from government made comments such as:

> *"And then when the new government came in 2010, they reviewed the whole thing, which new governments always do, particularly for expensive capital programmes, and of course they were embarked on an austerity drive where capital spending was the big hit and the CCS competition, the procurement competition was top of the list to be cut. I mean, it was literally top of the Treasury's list, "What can we get rid of? Let's get rid of this thing, which we've never liked"* (Male, Government Rep 1).

> *"… so post to crash when the Conservative government got in and its policy of austerity was about cutting public expenditure and that definitely affected the CCS programme. It was really cutting public expenditure as a whole that's when the CCS budget was cancelled"* (Male, Senior Civil Servant Rep 4).

> *"In the third period, I mean, it is important to recognise clearly that there was a change of government during the third period…"* (Male, Government Rep 5).

Again, as one interviewee from industry aptly put it:

> *"…when the coalition government came in and kind of said, "You know, let's rein back on some of this, in a sense…there was much more concern about value for money. And I think that was probably right, in those conditions. But it made it more contested and then, I think that was reflected in things like the cancellation of the Longannet project* (Male, Industry Rep 3).

Similar reiterations were made by a respondent from academia who stated:

> *"…you're having a dip as you come away from 2008/2009 but it goes up again and then, suddenly your chart crashes, 2010/2011. That will be the change in government in 2010. Literally, in the days before the general election, you had all party support for a policy that had put in place significant funding for CCS to the tune of billions of pounds and there was all party agreement over that. You had an election, a different government came in. All of a sudden, that government went, no, we don't want to do that, and that programme and that funding just vanished"* (Male, Senior Academic Rep 4).

Another respondent from a CCS trade union organisation explained:

> *"…In 2010, that's when the money got pulled from Longannet. I think it's probably partly down to the legislative agenda…if you think about it, so why did you have a fall here? Well, partly because you had a new government coming in, didn't you? I mean, it kind of takes them a while to understand what their agenda is"* (Male, CCS Trade Union Organisation Rep 3).

Interviewees' statements suggest that CCS *policy* was affected by the change in government (mirroring earlier findings). Interviewees' responses also go on to reveal the focus of the new elected governmental administration. It appears that the new government were concerned about cutting public expenditure which affected the CCS programme. This helps to explain why CCS fell from prominence in this period and again confirms Kingdon's idea that agendas could be influenced by a change of government (See Section 2.2.3, p. 42).

Taken together, interviews therefore support the analysis in the previous chapter. Yet, whilst interviewees supported existing analysis, discussions also revealed factors that did not emerge in

the previous chapter. Speaking to respondents, additional insights were gained that relate to events in Kingdon's *policy* and *politics streams.*

- *Policy stream*:

(i) Affordability and cost concerns i.e. there was much more concern about establishing a business/commercial case for CCS which was not prominent in the earlier periods;

(ii) There were difficulties in reaching project contract terms between the government and industry partners;

(iii) There were concerns for allocation of risk between government and industry;

(iv) There were conflicting priorities between two government departments i.e. disbanded DECC and Treasury departments;

(v) The £1 billion fund for CCS was always only ever provisionally committed;

(vi) There was no proof of a worked example CCS project which raised fears within government from an investment perspective;

(vii) There was no strong lobby for CCS; and

(viii) There was difficulty in explaining the *policy solution* (CCS) to government.

- *Politics stream*:

(i) Austerity is leading to a reduction of carbon emissions and the perceived need to act on *climate change* within government diminishes.

Reviewing the interview data, these provide insights into the *policy* struggles and political climate which informed *agenda setting* for CCS in this period. It appears that CCS *policy* could not be justified in this period, hence its falling prominence.

5.4.2 Data that extends/challenges existing analysis

(i) Policy stream

The interviews revealed insights about the *policy stream* which were not evident within the documents relating to concerns about affordability. In particular, interviewees' statements suggested that there was much more concern for establishing a commercially viable business case for CCS, which was not an issue prominent in previous periods. For instance, one interviewee from government stated:

> *"The kind of the engagement, then, with the reality of actually trying to do it, both from a financial perspective and just, "Oh, actually, this is difficult and complicated," probably then explains most of the dip…"* (Male, Government Rep 5).

Another interviewee from industry explained:

> *"I think the challenge has been all around establishing a viable business in the absence of a decent carbon price, to establish a viable business to allow CCS to take off without government support. And you know, the failure of it to take off, with the government not quite being ready to deploy significant government support in the two competitions…"* (Male, Industry Rep 1).

As the quotations above show, not only did interviewees' statements reveal that CCS was considered expensive, but also there was not a clear timeline for return on the investment. As such, one possible explanation that could be made is that *policy makers* found it a less attractive option to invest in it, without an established business case and a clear timeline for return on the investment. Similar reiterations were made by another respondent:

> *"…I can summarise all that is to say that there was not holistic integrated policy around this. It hadn't been thought all the way through, not just how to get past FID [Final Investment Decision] to construct. But also, how to then have a long-lived project able to make a good business case for revenues and costs into the future. When clearly, it was more expensive than anything else that you might do"* (Male, CCS Trade Union Organisation Rep 1).

Next, the interview analysis revealed concerns about the funding mechanisms for CCS competitions in this period. Interviewee statements revealed that government and industry partners could not agree project contract terms to demonstrating the technology. Like a Senior Civil Servant stated:

> *"…I think at the more focused level, between say the Longannet project, there was a lack of, I think, commercial parameters agreed between government and the lead parties…"* (Male, Senior Civil Servant 2).

Another respondent from industry suggested these insights stating that:

> *"…the cancellation in 2012 was also to do with cost, but fundamentally it was to do with the consortium not being able to reach agreement on project contract terms"* (Male, Industry Rep 1).

The interview analysis suggests that the relations between industry and government were an issue. Given that the government would have been the main investor for the CCS competitions, there could be hesitancy on their part about investing in a project such as CCS, which had not been done before. Indeed, interviewees' statements suggested that there were concerns about allocation of risk between government and industry and alluded to the financial risks involved should the technology not work. Like one interviewee from industry explained:

> *"I think the problems with the competition were that the government wanted to take none of the risks and to give all of the risks to industry..."* (Male, Industry Rep 2).

Another respondent said of the competitions:

> *"…what became apparent in the competitions was the risk of using unproven technology at scale and there's something of that in a large demonstration plant that was tried out in the United States where a brand new technology was applied at scale at Kemper County and didn't work…So, there's always lessons about stretching or taking the first risk with something when you haven't done all of the development steps properly and I think the government would have been the main investor if you like, would have been quite conscious of the fact that there could be a regret and a very large regret, CCS, if the technology didn't work properly"* (Male, Industry Rep 6).

As the quotations above show, a number of interviewees, and particularly those from beyond government, felt that *policy makers* were averse to taking a risk on investing in CCS, especially in the context that CCS had never been done before and to commit to a large investment was unappealing. Yet, whilst interviewees' statements revealed concerns about the risks to government, some interviewees made comments about industry's concerns about embarking on projects when the risks were unclear to them. For instance, one female industry respondent pointed this out stating:

> *"the idea that the risk was not allocated appropriately to the different companies involved in the commercial project. And to look at how that situation's going to be improved…And I think, based on what I've seen, that sort of allocation of risk within the big organisations is really important. People don't like taking risks that they don't understand, and it creates a lot of difficulties, and I think that it's going to be put right soon, I believe, so that will make a big change"* (Female, Industry Rep 7).

When asked about the key industry challenges CCS had faced, the same interviewee explained that:

> *"…but it's a lack of a clear way of seeing how that investment's going to be paid for in the longer term and because there's no government clear policy on how to price the benefits of carbon capture and so on, then it's a big disincentive to investment"* (Female, Industry Rep 7).

As the quotations show, there were concerns about investing in CCS not only on the part of government, but also some hesitancy from industry as there was no clear government policy. In particular, industry was concerned about how CCS would operationalise in the longer term and wanted to be clear about how they were going to receive on-going support. Taken together, we can see that both parties – government and industry - expressed caution in this period because there were prevailing concerns about allocation of risks which were not allayed.

Furthermore, the interviews reveal that there were conflicting priorities between different government departments i.e. disbanded DECC (Department for Energy and Climate Change) and the Treasury departments. Interviewee statements show that the Treasury, a government department, cancelled the CCS competition because it was thought of as expensive.

This decision to cancel the CCS competition went against DECC who were advocating for a demonstration of the technology. A Government Rep explained:

> *"…and the problem is that the mechanism that we chose to do so, it was expensive. The Treasury hated it. The Treasury didn't agree with the priority to doing it. They thought this was a very expensive waste of public money. They didn't think it was an appropriate thing for government to spend money on because it was expensive. It was going to be about a billion pounds per plant and the Treasury, it ran into various kind of cost and technical problems. It was different, it was a new technology applied at scale and in the end the Treasury just withdrew support"* (Male, Government Rep 1).

From the above quotations, it appears that there is opposition from the Treasury department with regard to public spending on CCS projects. The interview analysis suggests that by about this time period, there was a fuller awareness of the realistic costs of demonstrating CCS and then conflicting priorities between different government departments around the financing, particularly bearing in mind national austerity in the wake of the Global Financial Crisis. This idea was evident in the quote of another respondent who stated:

> *"And this is the competition period of £1 billion. very, very engaged period with the government I think well, so, two different parts of the government, really. I think that the old DECC actually bought the line that big capital grants were required to make these projects a reality. I'm not sure Treasury ever bought that"* (Male, CCS Trade Union Organisation Rep 1).

The interview analysis therefore raises questions about the priority that different government departments had which adds additional insights to our understanding of *agenda setting* in this period. The interviews reveal that there were conflicting priorities between different departments within the same government administration - the result of which determined the fate of CCS on the government agenda. This suggests that the fact that an idea is supported by a particular government department does not necessarily mean that it will see the light of day. From the evidence gathered, the interview analysis appears to suggest that those seen to be setting the agenda may not be the homogenous group that is implied in Kingdon's discussions – a dynamic that, in these quotes, appears to be a sign in the *agenda setting* process as these different actors may not all have the same level of commitment to the idea.

Furthermore, the interview analysis reveals another interesting viewpoint – that the money the Treasury announced for CCS projects was always only ever provisionally committed. A Government Rep outlined:

> *"The money was always provisionally committed. If you look at the Treasury documents, it was always an intention but never an absolute commitment 'cause the treasury was so sceptical about it, and from that, that was the high point because it never happened. And it ran into technical problems, cost problems, Treasury opposition"* (Male, Government Rep 1).

The interview analysis points to the argument that, if the UK government makes a commitment to an idea, and the idea is not legally binding, it is susceptible to the *politics* of the day. Given the context of austerity and the change of party in government, it appears that this may provide an explanation for caution towards investment in CCS technology in this period.

Another insight the interviews reveal with regard to developments in this period is that, the lack of a real-world working example for CCS led to its *policy* struggles. As one respondent explained:

> *"I think one of the things that CCS has suffered with is that in terms of demonstrating it as a feasible solution, it hasn't had kind of some worked examples...It's always felt even globally that progress has been very slow. Projects that have gone ahead have encountered problems…in the UK, certainly, we haven't had that kind of a first kind of convincing worked example. So, it doesn't appear like a feasible solution. It always appears to be uh you know, a kind of claimed solution"* (Male, Industry Rep 3).

Another respondent explained saying:

> *"…I think the other side to this is that there was no model to follow". "The truth would tell you today, they had no model from somewhere else that had proven successful to follow. It's 'cause they were trying to do it in power. They, they therefore were on a voyage of discovery themselves"* (Male, CCS Trade Union Organisation Rep 1).

Interviewees' statements reveal that the absence of a working example CCS project made the Government cautious about investment.

Additionally, other interviewees raised the issue that there was no strong lobby for CCS, and owing to this, the technology was not taken seriously by *policy makers*. As one respondent from industry stated:

> *"…the support wasn't general enough and there were other people advocating rightly for a tack on climate change but not advocating strongly enough for, uh, CCS"* (Male, Industry Rep 2)

Another interviewee from government pointed this out stating:

> *"…there's no strong, clear lobby for it, so the nuclear industry is a very powerful lobby group, the renewables industry is now also a very powerful lobby group, CCS Industries doesn't have a strong voice, so here, you didn't have a very, very strong industry grouping to really lobby ministers saying, "Yes, we must have CCS. We must have CCS." You had small voices is one problem"* (Male, Senior Civil Servant 4).

Moreover, the same interviewee revealed the complexity of the issue – that the needs for CCS has been very difficult to explain to *policy makers*. He described it as a communication problem:

> *"I think the problem with CCS, as I said…it's difficult to articulate why we need CCS, so it's a communication problem and the reason why CCS keeps stumbling is because it picks the wrong argument…So initially the argument was we need CCS because then we can use coal, but then what happened is kind of the argument got*

> *stuck and then actually what happened is the argument about whether we should use coal at all moved on and then the argument was we shouldn't use coal at all. So then that's partly why the first project was killed because people were saying actually we shouldn't be using coal anyway, so why do we need coal and CCS?*" (Male, Senior Civil Servant Rep 4).

Elsewhere, he reiterated:

> *"It's quite complicated to explain why we need CCS, because CCS… because in the whole energy system, you need CCS for power and industry and what we call negative emissions. It's difficult to explain that easily and quickly, so nuclear power says we need nuclear as a baseload, baseload power. Renewables say we need clean electricity, whereas CCS isn't really any of those. It's sort of in the middle"* (Male, Senior Civil Servant 4).

The interview analysis suggests that compared to other *policy* options (e.g. renewables and nuclear), where their needs in the whole energy system was more easy to communicate to *policy makers*, there was more difficulty in explaining clearly why CCS was an important *policy* option to pursue. Specifically, the interviews reveal that CCS had picked up different arguments over time which made the *'solution'* (and specifically the ability of CCS to deliver desired outcomes) very difficult to convey to *policy makers*.

Taken together, a range of different *policy* insights from interviews appear to have provided more understanding into the apparent decline in prominence of CCS in this period. In addition to the Global Financial Crisis and change of government occurring in this period, interviews reveal that the government was generally cautious about investing in CCS. The interview analysis suggests that in this period, CCS technology was perceived to be expensive; with unsatisfactory financial agreements and returns on investment; without a proven worked example; concerns about technology readiness; no strong lobby and a general difficulty in conveying the benefits of CCS technology to *policy makers*.

(ii) Politics stream

In relation to the *politics stream*, the interviews reveal another insight: austerity at the time led to a reduction in emissions and so the perceived need to decarbonise was reduced. In this period, the interview analysis suggests that that political climate appeared to have changed as government turned their attention to other issues. This idea was evident in a respondent's comment below:

> *"…And I think that this third period really reflects that emissions were falling anyway, because economic activity had backed off. There were much bigger issues within the economy for the government to focus on"* (Male, CCS Trade Union Organisation Rep 1).

This passage demonstrates that *policy maker* attention shifted because emissions were falling in this period. There was no pressing need to decarbonise and hence, the political will to deploy CCS changed. Like one interviewee from government aptly put it:

> *"…but whether there's also, you know, a loss of political enthusiasm for decarbonisation or, at least, for the kind of decarbonisation that really helps you get to 2050 and meet the targets under the Climate Change Act…"* (Male, Government Rep 5).

Summary of 3rd Period:

Taking the *policy* and *politics streams* together, it appears that the interviews add additional insights to developments in the 3rd period which the documents did not reveal. Primarily, it appears that in this period, the *policy* of deploying CCS starts to get questioned and it gets questioned because it is an issue of 'priority' within government and what the government were willing to focus on. There was lack of political will to develop the technology and it appears that CCS is suffering because of its novelty and expense in the midst of an economic crises. The interviews reveal that about this time period, there was no established *policy* for CCS; the business case for doing CCS on power starts to get questioned; there was difficulty in agreeing commercial parameters between the government and industry partners; there were conflicting priorities between two government departments; there were concerns for technology readiness; there was no existing successful example CCS project to follow, there was no strong lobby for CCS; *policy makers* were averse to risk in regard to investing in CCS. All of these factors conspired to turn government off the idea. In line with Kingdon's ideas, it appears that CCS did not meet the criteria for *policy* acceptance. Like Kingdon argues, the most likely *policy proposals* that will receive some serious attention from *policy makers* are those that are considered to be cost-effective, technically feasible or politically receptive (Kingdon, 1984). The interview analysis however reveals that this was not the case for CCS and goes to emphasize that the *policy* mattered in this period.

5.5 *Why did interest in CCS re-emerge?* (4TH PERIOD; UK Parliamentary Year Session 2012-2013 to 2013-2014)

5.5.1 Data that supports existing findings

In the 4th period, an overview of interviewees' statements supported insights from the last chapter specifically in relation to the *politics stream*.

- *Politics stream*: The political climate was favourable because there was cross-party support for CCS.

Reviewing the interview data, evidence to support the findings from the *politics stream* were readily found.

(i) Politics stream

In relation to the *politics stream*, the interview analysis supported the insights from the last chapter that a favourable political climate existed in this period which created opportunities for the *policy* to be taken up. CCS received cross-party support and there was no public opposition to it. As one interviewee commented:

> *"We got to 2014 and here the UK by this time is still the leader in Europe on this. It's actually got cross-party support, it's got no public resistance, trade unions aren't resisting it, public aren't resisting it because we intend to put CO_2 underneath the sea, so not a problem, and theoretically the coalition government has committed £1 billion to support capital expenditure on this and we have White Rose, we have Peterhead going forward"* (Male, Government Rep 3).

It appears that there was *'coupling'* of the three streams in a favourable window. Like an interviewee described aptly:

> *"…you've then got this rejuvenation period, so this is the second competition. um, I don't recall any opposition to it, so I would have to say here that I thought there was alignment. The policy, the problem, and the politics were all aligned"* (Male, CCS Trade Union Organisation Rep 1).

In relation to new insights, four were gained and specifically relate to events in Kingdon's *policy* and *politics* streams. In the following discussions, I seek to identify other possible explanations and highlight other possible factors or dynamics that may help explain what happened in this period. Together, these provide insights into the *policy* processes as well as the political pressure to pursue change in this period.

- *Policy stream*:

(i) A recognition of the broader opportunities and benefits for pursuing CCS with more modelling done on the value of CCS and its applications to other sectors (e.g. CCS for decarbonising other industrial sectors such as steel and cement, CCS combined with bioenergy);

(ii) There was reasonable degree of consensus to pursue the *policy* and a wider approach to emission reductions; and

(iii) Electricity Market Reform (EMR) – Cost concerns associated with CCS began to get allayed through a proposed financing structure (Contracts for Difference [CfDs]).

- *Politics stream*:

(i) Politics mattered; the Government wanted to 'try' CCS again.

5.5.2 Data that extends/challenges existing analysis

(i) Policy stream

From a *policy* perspective, the interview analysis reveals three new insights about developments in the 4th period. First, the interviews reveal that *policy actors* began to recognise the broader opportunities for doing CCS and specifically, the wider range of sectors CCS could be applied to, apart from the coal-fired power generation sector. The interview analysis reveals that unlike earlier periods where CCS was focused on mitigating emissions from only the coal-fired power generation sector, in this period, the application of CCS to other sectors starts getting looked at and it was not just focused on coal. The interview analysis reveals that more modelling was done by *policy actors* on the benefits of including CCS across the whole energy system. For instance, an interviewee stated:

> *"So, a kind of recognition of the wider opportunities to do CCS, not just coal fired power generation, maybe brought it back in terms of the rejuvenation in the fourth period…it was too much of a power sector story within DECC. So, even if we in the CCC and within the wider world realised that actually CCS is not just a power sector solution, it's a solution across the energy system, really, and across, you know, a range of sources of emissions"* (Male, Government Rep 5).

The same interviewee emphasised this elsewhere stating:

> *"…we were increasingly recognising, the value of industrial CCS, of negative emissions with, CCS combined with bioenergy…as more and more work was being done by us and by DECC and now BEIS and others, to understand what, how do you meet an, an 80% target, the value of CCS across the energy system and across, across the sort of emissions, grew, grew wider across negative emissions industry, hydrogen production and so on. Um, so, there, there, there became a wider recognition of that"* (Male, Government Rep 5).

Another interviewee from industry made similar comments stating:

> *"I think my previous organisation, ETI, and the committee of climate change, did have a good look at what CCS would mean as a whole to the energy system". "Uh, meaning it would um, you get added benefit from the flexibility that CCS had, that say nuclear had and renewables certainly don't have. So it was about what it did to provide a complete energy solution, be it electricity or heat uh, or transport, uh, assistance for transportation fuels"* (Male, Industry Rep 6).

As the quotations show, this period was marked by increased evidence that CCS had wider value in its applications. *Policy actors* began to recognise and appreciate the application of CCS to other sectors (e.g. industrial CCS, CCS combined with bioenergy). They began to look into more detail at the value of CCS across to the whole energy system, by conducting further modelling studies and presenting the *'solution'* – CCS – to *policy makers*. Like one interviewee commented:

> *"But I know that we were heavily involved in advising government through that period on the value of CCS and they quoted numerous of our publications throughout that period. Um, so I guess they were becoming more and more interested again in how they would get CCS going"* (Male, Industry Rep 5).

A second insight gained is that the interview analysis suggested that *policy makers* – the Government – saw a way forward with the technology, becoming more *'softened up'* to the idea. That is, *policy makers* became more and more apprised to the *policy* of deploying CCS and were interested in taking it forward. It appears that there was reasonable degree of consensus to pursue the *policy* and a wider approach to emission reductions. The Government went forward to launch the second CCS competition in this period. Like one interviewee pointed out:

> *"I still think there was a reasonable, probably um, at the time of this period, the rejuvenation of CCS…the creation of the commercialisation programme, probably reasonable degree of consensus..."* (Male, Industry Rep 3).

Another said of this:

> *"The government saw a way forward. Uh, it was at a time when it was having much more comprehensive approach to emission reductions"* (Male, CCS Trade Union Organisation Rep 1).

The evidence above suggests that *policy actors* in this period shifted their attention from CCS in the power sector only and started to consider the applications of CCS across the whole energy system e.g. industrial CCS. In this period, the interview analysis suggests that *policy actors* – industry and researchers - conducted further modelling studies, bringing about increased evidence that showed the wider value of CCS across the whole energy system which they began to communicate to Government. Kingdon draws our attention to how issues are framed to gain political attention. Like Kingdon, Rochefort and Cobb (1994) argue, *policy actors* strategically frame issues to harness *policy maker* attention. In these instances, I agree with these authors and infer that in the 4th period, CCS began to be strategically framed as an attractive *'solution'*, hence it started to gain attention again.

A third insight that the interviews add is that, in this period, the Government launched a comprehensive strategy for dealing with emission reductions through the Electricity Market Reform (EMR). CCS was included as one of the *policy* solutions in the EMR. For instance, an interviewee explained:

> *"I mean, you have electricity market reform, which then kind of results in this peak here, because CCS would have been coming up quite a lot there"* (Male, CCS Trade Union Organisation Rep 3).

The EMR was a government *policy* developed to incentivise investment in secure, affordable, and low carbon technologies. Included in this document was a proposed *policy* known as 'Contracts for Difference' (CfD) which was meant to support different *policy* solutions, including CCS. The CfD was a key mechanism established to provide long-term revenue stabilisation for new low carbon technologies, for which CCS was included. CfD was meant to cover some of the

operational costs associated with technologies such as CCS. This idea was evident in the quote of an interviewee from a CCS Trade Union Organisation who stated:

> *"There was a proposal in your fourth period, around there would be contracts for difference that would actually cover some of the additional operating costs…"* (Male, CCS Trade Union Organisation Rep 1).

Likewise, a Male Senior Civil Servant commented:

> *"So the commercialisation programme was a billion pound plus CfD structure and then there were other documents behind that, so cost reduction, and policy scoping document…"* (Male, Senior Civil Servant 4).

The launch of the EMR proposal appears to suggest that the Government was interested in CCS and saw a way forward. It appears that cost concerns associated with CCS began to get allayed (at least, from the context of belief) through a proposed financing structure i.e. CfD.

(ii) Politics stream

From a *politics* standpoint, the interview analysis suggests that *politics* mattered in this period. It was a period where there was political motivation shown by the Government to 'try' to do CCS again. This could be one possible explanation why it emerged on the agenda again. As one interviewee stated:

> *"…and latter part of period four is really the government saying, "Well, we failed once but we need to do this so we're having another go at it." "Um, and so I think that explains most of the rejuvenation. It's just the government trying again…"* (Male, Government Rep 5).

Summary of 4th Period:

Taken together, the interview analysis suggests that in this period, *policy actors* began to recognise the broader opportunities for doing CCS and started to present a more favourable *'solution'* to the Government. It was a period where there was re-evaluation of the *'solution'* – CCS – to consider its wider value. The steps the Government took – launch of the second CCS competition, and introduction of the EMR & CfDs – suggests that they were receptive to CCS as a *policy* option. In this period, the interview analysis also reveals that *politics* mattered and the Government wanted to be seen to be doing something about CCS. There was consensus amongst political parties that CCS was a good idea. Hence, the *politics stream* appeared favourable. In line with Kingdon's ideas, the *problem*, *policy*, and *politics* streams appeared to have *'coupled'* neatly to get CCS back on the agenda.

5.6 *Why did CCS again fall from prominence?* (5TH PERIOD; UK Parliamentary Year Session 2014-2015 to 2016-2017)

5.6.1 Data that supports existing findings

In the 5th period, an overview of interviewees' statements revealed no direct quotations to support the insights from the last chapter which were;

- *Problem stream*: There were no references made to CCS as solving *'problems'*; Issues of economic, national security and health became the priority the Government wanted to focus on.
- *Policy stream*: There were mixed messages of Government's intentions.
- *Politics stream*: Political attention waned and specific commitments towards CCS deployment were not made.

In spite of this, interview statements did not appear to conflict these insights but rather expatiate on the dynamics of the above developments. In relation to new insights, the interview analysis revealed four additional insights which provide possible explanations to why CCS again fell from prominence in this period. Specifically, these relate to events in the *policy* and *politics streams* and offer insights into *policy* processes and the *political climate* of this period.

- *Policy stream*:

(i) Renewables, especially offshore renewables prove viable operationally and economically.

- *Politics stream*:

(i) The Government's attention shifted to rebuilding the nation's finances and it was easier to cut the £1 billion fund for CCS projects;
(ii) There is a worldwide campaign against coal by NGOs and interest in CCS for coal-fired power plant applications diminishes; and
(iii) International push for CCS lessened.

5.6.2 Data that extends/challenges existing analysis

(i) Policy stream

In the *policy stream*, a new insight was the significance of cost. The interviews suggested that by this period, renewables were relatively cheaper compared to their cost in earlier periods. A Male Industrial Rep commented:

> *"I think one of the things that CCS has suffered…Uh, you know, it's not ever kind of got to a period of momentum where like offshore wind has. You know…and there*

> *was that moment uh a year or was it two years ago? Whenever it was, when offshore wind achieved £57.50 per megawatt hour in the uh strike price, in the um, CFD auctions. You know, that was like wow, you know, like this technology is taking off*" (Male, Industry Rep).

Whereas in the 1st period where renewables, specifically offshore wind were thought to be expensive, by the 5th period, it had become a much more affordable source of clean energy.

Another interviewee from government stated:

> *"…renewables by this time are proving that actually they're much more viable, both operationally and economically than we had originally thought 10 years before…"* (Male, Government Rep).

From the interview analysis, one idea that could be inferred which provides a possible explanation to why the *policy* of deploying CCS was not taken forward is that it appears that in this period, CCS could not compete on cost in relation to other competitor technologies. The interview analysis suggests that as the fortunes of alternatives (particularly renewables) improved, the appeal of CCS lessened.

(ii) Politics stream

In the *politics stream*, the interview analysis suggested that the Government's attention shifted again to focus on rebuilding the economy. As such, they were mostly concerned about using resources judiciously. For instance, one interviewee from industry explained that:

> *"Yeah and the reason for that is that the cancellation of the competition 2015 was all about, government deciding where it should most cost effectively use its resources…"* (Male, Industry Rep 1).

Another interviewee from academia spoke of the government's priorities in this period stating:

> *"…Treasury viewed the country as still in austerity and didn't need to spend that billion pounds at that point. So, that had an overlying view…"* (Male, Senior Academic Rep 2).

It appears that the interviews add some additional insight to events in this period and provide a possible explanation to why government were turned off the idea of investing in the deployment of CCS. In particular, the interview analysis suggests that the decision to cancel the second CCS competition were motivated by economic priorities.

A second insight the interviews reveal is that there was, by this time, a worldwide campaign by NGOs against coal and thus the appetite to invest in CCS for coal-fired power plants diminishes. For instance, one interviewee commented:

> *"So, there is a worldwide campaign by the NGOs against coal. Whereas in 2004 to '06 it was seen as bad but probably necessary, by 2014, '15, '16, it was just seen as entirely bad, and a huge push by the NGOs globally to not build any more coal fired power stations. So the NGOs have completely gone against coal…"* (Male, Government Rep 1).

Elsewhere, he reiterated:

> *"…what happens by the end of this period, you've got 2016, 2017, is that the need for coal fired power stations and the appetite for the coal fired power station disappears completely"* (Male, Government Rep 1).

Another interviewee raised the significance of international support for CCS in this period. In particular, the interview analysis suggested that this period saw a reduction in international support for CCS. The interviewee commented:

> *"…there wasn't much strong international push for CCS in 2014/15, that probably made it easier for the UK to cancel it…"* (Male, Senior Civil Servant 4).

The interview analysis suggests that the appetite for coal-fired power stations to which CCS was initially linked declined in this period with worldwide campaign by NGOs against coal as the quotations above reveal. In contrast to the early periods (1st and 2nd) where coal was considered to be bad but a necessary part of the energy mix, by the 5th period, it appears that discussions around coal and the need for CCS in the power sector began to die out. It appears that in this period, there was new *policy* towards the phasing out of coal-fired power generation and hence, there was nothing to *'couple'* CCS to. And meanwhile, the international push for CCS waned. Yet, while the *political* atmosphere appeared to be unfavourable to CCS, the interview analysis suggests that this was not generally because *policy makers* were against CCS technology, but that CCS suffered from NGO protests and renewables' development. As one interviewee aptly summarised:

> *"I don't think there was a big move of politics against CCS. So, it not as if it's been deliberately suppressed, but it has suffered from attacks by renewable developers, and attacks from uh, green activists, let's call them environmental activists, who have been vocally anti CCS at some times"* (Male, Senior Academic Rep 2).

Summary of 5th Period:

Taken together, it appears that NGO activity and developments in renewables were significant in the 5th period, hence there appeared to be minimal justification to focus on CCS. From

the evidence gathered above, the interviewees appear to have provided more insights about events in the 5th period, helping to explain why CCS again fell from prominence. The interviews show that amidst austerity, NGO activity mattered, and renewables developed in a manner not foreseen. This made CCS a less favourable technology option during this period.

5.7 CONCLUSION

This chapter has reviewed insights from interviews which add additional insights to our understanding of CCS developments from the last chapter. Kingdon's framework has been particularly relevant in analysing the interview data. The insights gained in this chapter revealed new factors that were previously not apparent in official documents and there were new insights in all three streams. In particular, the interview analysis revealed that the roles of '*policy entrepreneurs'* in industry, in government, and in civil society were particularly influential in explaining the drives for CCS. Again, new insights revealed that the issues of *'policy'* were particularly apparent, with interviewees placing most emphasis on the significance of this *'stream'*. Furthermore, the interviews revealed that *policy actors* in industry conducted further modelling studies to show the value of CCS across the whole energy system and were presenting the *'solution'* to the Government. There was therefore a recognition of the broader opportunities and benefits for demonstrating CCS by industry. Government 'tried' to demonstrate CCS again. However, with increasing cost competitive options (i.e. renewables) emerging amidst NGO campaign against coal-fired power stations to which CCS was originally connected to, it became much more difficult to justify the need for CCS. As the country was still viewed as being in austerity, Government's priorities changed, and they were mostly concerned about where they could use its resources effectively. In Table 9 below, I summarise the 'additional insights' that the interviews have added to the story of CCS in each *'stream'* of Kingdon's MSF across the *'5-PH framework'*.

While the interviews have provided more insights about the fortunes of CCS, I do accept that there can be limitations in inferring too much from this data source and therefore there may be need for caution. Nevertheless, I am confident that the claims made here have helped to reveal different factors found to be important in explaining the fortunes of CCS. Taken together, these insights are useful for those considering other technologies and my next chapter will offer this form of analysis. But before we go onto the next chapter, it is important here to make some important inferences from both documentary and interview analyses. Taken together, we can see that the priority placed on CCS has varied, and that the government's willingness/ability to invest in this technology (or at least research into the viability of this *policy*) has altered overtime as the political context changed. This shows a sign of external factors, but has also shown that policies that potentially appear not 'ready to go' can be subject to waning fortunes as the willingness to invest money is not unwavering.

Table 9: 'Unofficial story of CCS': A summary of additional insights

Periods	Problem stream	Policy stream	Politics stream
1st Period		▪ Government was looking for an appealing solution ▪ *'Policy entrepreneurs'* from industry, government and civil society were active in the *agenda setting* process	▪ Political pressure on the Government to act as a result of environmental NGO protest against building of coal-fired power plants
2nd Period	▪ Increased modelling studies conducted on *climate change*, with stronger *'coupling'* of CCS as a *'solution'*	▪ On-going BP awareness programme and the launch of a first clear strategy for CCS	▪ A climate of uninterrupted economic growth
3rd Period		▪ Affordability and cost concerns i.e. establishing a business case for CCS became an important factor ▪ Difficulties in reaching project contract terms between the government and industry partners ▪ Concerns for allocation of risk between government and industry ▪ Infighting in government i.e. between DECC and Treasury departments ▪ The £1 billion fund for CCS was always only ever provisionally committed	▪ Austerity leads to a reduction of carbon emissions and the perceived need to act on *climate change* within government diminishes

		▪ No real-world example CCS project to follow ▪ No strong lobby for CCS ▪ Difficulty in communicating and justifying CCS to *policy makers*	
4th Period		▪ A recognition of the broader opportunities of CCS ▪ A reasonable degree of consensus to pursue CCS and a wider approach to emission reductions ▪ Cost concerns associated with CCS began to get allayed through a proposed financing structure (Contracts for Difference [CfDs])	▪ Politics mattered; the Government wanted to 'try' CCS again
5th Period		▪ Renewables, especially offshore renewables prove viable operationally and economically	▪ *Policy maker* attention shifted to rebuilding the economy ▪ Worldwide campaign against coal by NGOs ▪ A reduction in international support for CCS

CHAPTER 6: LESSONS FROM THE STUDY

WHAT LESSONS OF VALUE CAN BE DRAWN FROM THE CCS CASE BY PROPONENTS OF EMERGING TECHNOLOGIES FOR ADDRESSING CLIMATE CHANGE?

6.0 INTRODUCTION

This study set out to provide insights into *agenda setting* and policy making processes with regard to CCS technologies to draw lessons for proponents of emerging technologies as far as policy development is concerned. In previous chapters, insights were developed using documentary analysis and elite interviews to characterise the status of CCS on the UK government agenda. By developing and employing the *'5-PH framework'* and applying Kingdon's MSF, documentary analysis first provided insights, detailing how CCS came on the agenda, why CCS grew in prominence and why CCS faced challenges on the government agenda, which were outlined in Chapter 4. Following this, interviews were used to triangulate these insights as well as reveal new insights to advance understanding on the *agenda setting* and policy making processes for CCS technologies, outlined in Chapter 5.

The previous chapters have shown that a range of factors appear to be important in the *agenda setting* process. In particular, Kingdon's framework has helped to highlight factors that affected the fortunes of CCS, with moments of convergence resulting in upturns in the agenda, and times where there were problems in particular *streams* resulting in reduced attention. By applying Kingdon's MSF to the CCS case, I showed which *'streams'* at which time points came together (or *'coupled'*) to open *windows of opportunity* for CCS idea to be taken up and gain prominence on the UK government agenda. This creates questions about the kind of action proponents of a technology may be able to take to promote desirable outcomes. Thinking in this way, it is possible to isolate certain actions or events that seem to be important to the status of CCS on the government's agenda which proponents of emerging technologies may want to consider.

Building on the analyses from previous chapters, this chapter considers key lessons of value from the CCS case for those proposing other emerging technologies for addressing climate change. In the first section of this chapter, I will discuss the factors that appear to be significant for *'opening'* a *policy window*. This includes a discussion of the aspects of the '*problem'*, *'policy'* and *'politics'* streams of Kingdon's framework, highlighting the factors in the CCS case that led to increased attention on the agenda. While part of this chapter is about thinking about what was observed in previous analyses, part of this chapter is also thinking about what was not observed;

the absence of which is notable and seems to be important in *'maintaining'* a subject or an idea's position on the political agenda when the *policy window* is opened. Therefore, in the second section of the chapter, I will discuss factors that appear relevant to *'maintaining'* an idea's position on the political agenda once a *policy window* is opened. This will entail a discussion about aspects of the *'problem'*, *'policy'* and *'politics'* streams that was not observed in previous analyses but which seem to be potentially important in *'maintaining'* an idea's position on the political agenda. Given the factors that appear influential in both *'opening'* and *'maintaining'* a *policy window*, I will draw out key lessons which proponents of emerging technologies may want to consider taking forward, supporting these with scholarly insights from the broader literature. It is however important to recognise that partly, these lesson(s) offered in this thesis may require further testing to validate their impact.

6.1 OPENING OF A POLICY WINDOW: INSIGHTS FROM THE PROBLEM, POLICY AND POLITICS STREAMS

This section details aspects of the *'problem'*, *'policy'* and *'politics'* streams that previous analyses suggested were important in getting CCS idea on the government agenda. It is important to recognise and acknowledge that throughout this chapter, no one factor was the single cause for *agenda setting*, but rather there were certain factors that appeared influential in driving agenda change. This accords with Kingdon's idea of *'coupling'* between his policy streams, suggesting that single variables alone are not responsible for driving change. Whilst a single solution may not be identified, in this section, I will suggest lessons based on the insights from previous analyses and the broader literature which proponents of emerging forms of technologies may want to consider.

6.1.1 Facilitators/Ingredients of success for *'opening'* a *policy window* as shown in the analyses

This section highlights seven key factors that my previous analyses suggested were important in the *agenda setting* process of CCS. Each factor is discussed in turn with associated lessons highlighted (in *italics*).

(1) Political pressure from Civil Society Organisations

The interview analysis suggested that the actions of *'policy entrepreneurs'* e.g. protest from environmental NGOs was an important factor in the *agenda setting* process of CCS. Large-scale protests by environmental NGOs helped to raise the saliency of climate change as a pressing problem by bringing the issue into the spotlight and creating public pressure on *policy makers* for a response. The Government picked up the concerns of protesters and began to look for a workable solution, one of which was CCS (See Chapter 5, pp. 128-129). Referring back to the *'5-*

PH framework' in Chapter 4, I showed the pathway of CCS and how *policy maker* attention appeared to have varied across the period. I showed that the growing prominence of CCS took place from the 1st and 2nd periods; periods that coincide with the large-scale protests from environmental NGOs ongoing around the time. As one advances across the period, for example in the 3rd period, there was no recorded evidence of this activity in the documents or interviews and we see that CCS idea begins to decline in prominence on the UK government's agenda. This suggests that this activity seems to be important in getting *policy makers* to respond to an issue, but also suggests that sustained pressure is important for maintaining interest on a *policy* issue. It is important to recognise that pressure can come from different sectors (for instance, from industry) (discussed in the next section) and this pressure can lead to the formation of different groups. Based on the evidence from my previous analyses, this suggests that external actors, specifically from civil society can play a role in shaping government perceptions of policy solutions and can inform the political mood – this is a finding that is likely to carry beyond this specific case. In relation to the lessons these insights provide for proponents of emerging technologies and how they may be able to make a difference, it is recommended that:

(i) Proponents of emerging technologies may want to consider cultivating alliances with NGOs and other civil society actors with the primary aim of generating a shared belief about a 'problem' and its 'solution' to influence public opinion as well as policy maker views on an issue

Existing literature suggests that organized groups such as NGOs could be influential actors in policy making (Allan and Hadden, 2017; Betsill and Corell, 2008; Burstein, 1999; Dellmuth and Tallberg, 2017; Lewis, 2003; Tortajada, 2016). Scholars such as Dellmuth and Tallberg (2017) argued that NGOs adopt different strategies to win *policy maker* attention: *"whereas some NGOs primarily engage in direct lobbying of policy-makers, providing information and arguments, other NGOs mainly try to influence policy-makers indirectly, through mobilisation of public opinion"* (p. 706). Some scholars have highlighted historical cases that show the influential role that civil society organisations and specifically environmental NGOs, have played in shaping the policy agenda (Carter and Childs, 2018; Carter and Jacobs, 2014; Lorenzoni and Benson, 2014). Carter and Childs (2018), for instance, illustrated how an environmental NGO group (i.e. Friends of the Earth (FoE)) were influential in shaping UK climate policy by winning cross-party support for a Climate Change Bill and further pushing for the enactment of the UK Climate Change Act 2008. Through the launch of a campaign ('The Big Ask'), FoE contributed to pushing for climate action and getting *policy makers* to adopt a first climate legislation which included ambitious carbon emissions reduction targets. This specific case shows an example of a successful *'policy entrepreneur'* (i.e. an NGO) who contributed to policy change, suggesting that there may be

incentives for proponents of emerging technologies if they make efforts to create alliances or form 'coalitions' with them.

This argument is reinforced through the work of Sabatier (1988) in his theorization of policy change. Sabatier (1988), through his postulation of the Advocacy Coalition Framework (ACF) recognises that different actors with shared beliefs about a policy problem (e. g. air pollution) could 'coalesce' to turn their beliefs into policy programmes and pursue policy change. Sabatier's work (1988) shows the importance of policy proponents acting not in isolation, but joining forces and creating 'coalitions' that push for the same objective. Ritter *et al.* (2018) explains that coalition members could include interest groups, politicians, bureaucrats, amongst others who come together because of shared beliefs to pursue a cause of action. Previous analyses of the CCS case showed that these kinds of coalitions were not present, and this work suggests that proponents of emerging technologies may benefit from engaging NGOs in their efforts to gain support for their *policy solution*. Whilst advocacy coalitions did not appear present in the CCS case, insights from my case study and the broader literature combined suggest that building 'coalitions' to pursue a preferred *policy* could be an important driver for agenda change. Proponents of emerging technologies may benefit from making attempts to cultivate alliances with NGOs and other civil society actors in order to influence public opinion and *policy maker* views about a *'problem'* and their preferred *'solution'* to gain momentum for the issue.

(2) Industry lobbying

The interview analysis revealed that industry played a key role in CCS policy promotion by lobbying *policy makers* to support the deployment of CCS, suggesting that their activities could influence what makes it onto the agenda. As noted from previous chapters, the interview analysis revealed that an industry group – BP – presented their first CCS proposal project to the government requesting for a subsidy to develop their project at a time when issues of climate change and energy security were pressing to the government (See Chapter 5, pp. 126, 135-136). Although the government did not consent to BP's request, interview insights suggested that this intervention led the government to thinking about ways of developing CCS technology (i.e. they launched the first CCS competition), which gave prominence to the subject on the political agenda. Indeed, when we observe the *'5-PH framework'*, previous interview analysis showed that in periods where there was active industry lobbying, CCS rapidly rose on the agenda (i.e. 2nd period) but in other areas where there was no evidence that this lobby took place, the issue declined on the agenda (e.g. 3rd period).

Furthermore, while previous insights from interviews drew attention to BP's lobbying in getting CCS onto the agenda, some interviewees from government also explained that one of the challenges CCS faced was the lack of a strong industry grouping to lobby *policy makers* to support

CCS (See Chapter 5, p. 146). This suggests that there might have been a seemingly non-existent shared interest amongst industry actors that could facilitate a consistent lobbying approach to promote the *policy*. As I have shown above and in relation to insights from the advocacy coalition literature I discussed in the previous section, there are reasons to suggest more specifically the following:

(ii) Proponents of emerging technology options may want to consider making concerted efforts to build consensus around their preferred policy 'solution' by forming industry associations to lobby policy makers

The previous sections highlighted the importance of 'advocacy coalitions' and its value in generating a shared belief about a policy issue to influence policy making. In relation to industry actors, this suggests that the formation of industry groups that will seek to build consensus around a preferred policy solution to lobby *policy makers* may be an important factor for policy change. This is akin to Kingdon's ideas (2014) on consensus building in the *policy stream*. Like Kingdon (2014) suggests, for a policy idea to be considered seriously, it must *"both sweep a community and endure"* (p. 130). His ideas suggest that consensus building could be influential to *agenda setting*. Like Kingdon (2014), Higgins Joyce (2013) also argues that consensus building is critical to *agenda setting*. While this position is maintained, Kingdon (2014) further argues that consensus building does not necessarily mean uniform agreement, and hence it is possible that a uniform agreement across industry may not always exist especially when there are competing ideas. This notwithstanding, my analysis of the CCS case suggests that it may prove valuable to proponents of emerging technologies to make attempts, where possible, to align agendas and interests around a policy solution. If an industry consensus does not already exist, proponents may want to consider finding measures to build consensus around their chosen policy solution. Such measures may include organising conferences, seminars and workshops on the policy solution to invite contributions from key industrial stakeholders and professional bodies on the subject. These gatherings may be able to present a platform for wide discussion and consultation on the subject. It will also present the opportunity to address and resolve key issues pertaining to the policy solution. This way, proponents will tend to benefit from a growing industry consensus around a policy solution. In addition, proponents of emerging technologies may want to consider the following:

(iii) Proponents may want to focus on lobbying visible or mainstream actors and policy makers (for instance, MPs, ministers and opinion leaders) for their chosen policy solution

While not suggesting that lobbying *policy makers* always leads to significant action, proponents should see the value in targeting mainstream *policy makers* e.g. MPs who will see the benefits of their chosen policy solution. As these issues are continually raised and discussed, it is

likely to create a rich library of discussions on the subject that can build up for future reference on the importance of the proposed policy solution. It is interesting to reflect that this idea of lobbying visible actors chimes with Moore's work (2014) on technology adoption. While Moore (2014) focused on the uptake and adoption of technology/product, and not the political uptake of ideas and policies, his ideas bring to bear the importance of focusing on lobbying visible actors when a new technology or product is to be introduced for market acceptance. His ideas suggest that identifying a focused group (in my case, political advocates such as MPs, ministers or opinion leaders) among a wider group one wishes to influence can be an effective way to gain wider support for the product. His work suggests that by acting to gain the attention and approval of the product from visible actors, they can become the reference base of customers who can share their testimonials about the product, making the product more likely to gain acceptance within the larger community of customers. Similarly, Baumgartner *et al.* (2009) in his study of the most influential players in policy battles found out that elected-officials were often successful when they took on an advocacy role. This suggests that by targeting visible actors, proponents may be more likely to be successful.

Existing literature generally distinguishes between two types of lobbying strategies that advocates adopt – inside lobbying and outside lobbying. Inside lobbying strategies involve directly engaging *policy makers* to support a policy idea while outside lobbying strategies seek to indirectly influence *policy makers* by mobilising public opinion around support for a policy idea (Grant, 2000; Hansen, 1991; Hanegraaff *et al*., 2016; Kollman, 1998). Dellmuth and Tallberg (2017) noted that practical inside lobbying strategies include *"meeting with decision-makers, offering policy expertise to decision-makers and informing decision-makers about the views and needs of the constituencies which lobbyists represent"* while practical outside lobbying strategies include *"mobilising public opinion through news media, social media and public events such as campaigns and protests"* (p. 707). Reflecting on the importance of lobbying, the policy entrepreneurship literature provides insights into the strategies that advocates (or *'policy entrepreneurs'*) adopt in efforts to promote a policy idea on the agenda (Anderson *et al.,* 2019; Kingdon, 2014; Knaggård, 2016; Mintrom and Norman, 2009; Mintrom, 2019). Mintrom (2019), for instance, drew on the evidence from a wide range of studies and recognised that *'policy entrepreneurs*' are mostly involved with the following (7) activities: *"thinking strategically, framing problems, building teams, using and expanding networks, working with advocacy coalitions, leading by example and scaling-up advocacy efforts"* arguing that *"other things being equal, policy entrepreneurs who practice these seven actions are more likely to achieve success than those who do not"* (pp. 20-21).

The case of 'The Big Ask' campaign as previously discussed provides an example of how lobbying *policy makers* (specifically MPs) contributed to tangible outcomes. In this specific case, Carter and Childs (2018) explained that the campaign's strategy was *"to put pressure on individual*

MPs, primarily through constituency pressure, to persuade those MPs in turn to push their party leadership to adopt a Climate Change Bill" (p. 1000). Carter and Childs (2018) noted that various strategies were adopted in the lobbying process in seeking to build support for the policy idea. For instance, local FoE campaigners called on people to send post cards to their MPs requesting them to support the Climate Change Bill. By targeting MPs across political parties and applying pressure, the NGO group (FoE) were able to win cross-party support for the proposal. Other strategies were also adopted; for instance, FoE engaged celebrities to support the cause, presented parliamentary petitions, mobilised public support through opinion polls which highlighted more government action on climate change, use of cinema adverts, videos and media, organising public events/seminars to raise awareness and support for the campaign, seeking meetings with *policy makers*, collaborations with different organisations (e.g. World Wildlife Fund (WWF), Christian Aid) (amongst others) (Carter and Childs, 2018).

Taken together and based on the insights from my previous analyses of the CCS case, it may be beneficial to proponents of emerging technologies if they make efforts to actively lobby *policy makers* for support of their policy idea. Proponents should make efforts to ensure that they are consistent in their arguments, show a commitment/sacrifice for their cause, in order to be effective in persuading the government to consider their position.

(3) Growing domestic and international saliency on the *'problem'* as a political issue and the perceived need for action by policy makers

Another factor which appeared to be important in *agenda setting* for CCS (evidenced by both documentary and interview analyses) was the growing domestic and international saliency on the *'problem'* and the perceived need for action. The analyses suggested that this growing domestic and international saliency about the *'problem'* led to a political consensus for action which gave further impetus and drive to search for solutions, suggesting that it can be an important factor for influencing change (See Chapter 4, p. 91; Chapter 5, pp. 123, 132-133). The analyses suggested that there was prevailing scientific evidence of increasing carbon emissions in the atmosphere which resonated amongst *policy makers*. At high-level meetings such as the 2005 G8 Summit in Gleneagles and the 2007 EU Spring Conference, climate change and CCS were put on the political agenda (See Chapter 4, pp. 99-100; Chapter 5, p. 133).

Furthermore, I showed in previous analyses of political party manifestos that this perceived need for action was seen in the number of references made to climate change and CCS across the period. I illustrated that the Conservatives, for example, had fewer references to climate change in the 2005 election year (See Table 5, p. 108), however when the issue started getting on the national and international agenda, we did see all political parties talking explicitly about

climate change and CCS by the 2010 election year (See Tables 5 and 6, p. 108). The presence of this saliency was indicated by apparent consensus or commitment to bringing about 'change'. Based on these insights, there are reasons to suggest the following lessons for proponents of emerging technologies:

(iv) Proponents of emerging technologies should be aware of the value of increasing the saliency of a political issue both nationally and internationally (by driving more attention to it and increasing public awareness and interest in the issue)

My research findings suggest that there is an incentive for proponents of emerging technologies to get *policy makers* to recognise the salience and urgency of their concern. This shows the importance or raising the profile of an issue by getting *policy makers* in believing that an issue cannot be ignored and that action needs to be taken. The CCS case is a typical example of how a growing salience about a *'problem'* and the perceived need for action generated political consensus and helped to promote CCS as a solution amongst *policy makers*. Indeed, the times where there was significant international and domestic salience of climate change issues (i.e. 2nd period), the analyses showed that CCS gained significant recognition and the policy of facilitating the advancement of this technology received support from *policy makers* (suggesting that there was an apparent political consensus for action). The analyses showed that this feeling of 'urgency' reported became increasingly voiced by *policy makers* in the 2nd period. In contrast, the times where there appeared to be less international and domestic political salience of climate change issues (e.g. 5th period), CCS was less prominent with no specific promises made to facilitating the technology (suggesting that there appeared to be no consensus for action). This salience was not just national, but also international, suggesting that proponents of emerging technologies may need to think about promoting an issue beyond their specific national boundary. Taken together, proponents of emerging technologies may want to recognise the value in promoting their policy solution both nationally and internationally.

(4) Focusing events

In line with Kingdon's ideas, another factor that emerged from analysis in the *agenda setting* process for CCS were focusing events. In previous documentary analysis, I showed that focusing events made the issue of climate change appear 'urgent', intensifying the case for a policy response in the initial periods. There were records of increasing temperatures, extreme weathers such as floods and droughts, amongst others, mentioned in the documents analysed (See Chapter 4, p. 88).

When you move across the period as shown in the *'5-PH framework'*, we observe that the socio-political environment changed due to the financial crash and so other issues – principally

the economy – were elevated relative to the issue of climate change by the 3rd period. While climate change remained a recognised issue, indeed as highlighted in previous analyses, government's attention was shifted towards prioritising the restoration of the country's finances. Like Pralle (2009) notes, *"economic problems often move environmental problems and solutions down the list of priorities"* (p. 788). Based on the evidence gathered here, there is reason to believe that focusing events were an important factor in getting CCS on the government agenda. In these scenarios, I argue that owing to the occurrence of focusing events, a *policy window* became opened for a search of solutions to the pressing problem of climate change. In relation to what insights these offer for proponents of emerging technologies, there is reason to suggest the following:

(v) Proponents of emerging technologies may be able to cause change by acting as 'policy entrepreneurs' by linking their policy proposal to pressing problems and raising the profile of an issue

Like Kingdon (2014), scholars like Birkland (1998), Cobb and Elder (1983) and Baumgartner and Jones (1993) have shown how sudden crises like natural disasters can act to draw the attention of *policy makers* and call for a response. A case in point is a study by Tomlinson (2016), who reported that the emergence of the ash dieback (a tree disease) in the UK in 2012 was a *"successful focusing event"* which led to widespread sustained media, public and political attention and response (p. 709). Tomlinson (2016) indicated that several measures were taken within a short space of time in response to the 'focusing event'. For instance, a nation-wide survey was conducted on ash trees by the Forestry Commission in only four days, emergency meetings were called by the incumbent Secretary of State for the then Department for Environment, Farming, and Rural Affairs, there was sustained media coverage on the issue, government went into crisis mode (amongst others). From the analysis of the CCS case and this specific example, there is reason to believe that in essence, a 'focusing event' will tend to galvanise consensus and may make inaction on a particular issue unacceptable on a national or international stage.

While *policy makers* have the tendency to turn their attention to a pressing problem such as a focusing event, proponents of emerging technologies should recognise the value of acting as *'policy entrepreneurs'* to *'couple'* their specific proposals to pressing problems that resonate with *policy makers*. If proponents of emerging technologies can work as *'policy entrepreneurs'* to generate a shared belief that their policy proposal is the *'solution'* to an emerging problem, there is reason to believe that it may gain traction based on the evidence gathered here. It is also interesting to think about whether a focusing event has to be a crisis, or whether a series of events that raise the profile of an issue can have the same effect. My analyses showed that the growing international pressure and summits, coupled with pressure to act on climate change domestically, focused attention on the issue. On this basis, proponents do not just need to wait for a crisis that they can seek to capitalise upon. Rather, they can act to galvanise attention to an issue by raising

the profile of a topic in different forums and spaces. i.e. act as *'policy entrepreneurs'* not just by advancing a policy idea, but also by raising the profile of an issue. The issues proponents raise must be seen as in need of an urgent (and politically favourable) response – i.e. politicians must feel that change is needed and wanted. Proponents may want to do this by commissioning reports for instance, or building an evidence base that suggests the need for urgent action.

(5) An appreciation of increasing evidence-base for action on the *'problem'* fuelled by an extensive economic analysis

Next, both documentary and interview analyses demonstrated that there was increased evidence-base for action on the *'problem'* (i.e. 2nd period) which helped to inform *agenda setting* in the CCS case. In particular, previous analyses showed that the growing attention to climate change and CCS followed the publication of key documents which detailed an extensive economic analysis of the scale of the *'problem'*, helping to raise the profile and understanding of the *'problem'*. Such documents included the *'2006 Stern Review Report'* which assessed evidence on the impacts of climate change and analysed the associated economic costs and risks of action (or inaction).

Akin to Kingdon's ideas (2014), my previous analyses of the CCS case show that the manner in which a problem is framed can be influential to *agenda setting*. As shown in the documentary analysis, it was observed that the economic framing of the *'problem'* was an important factor in raising the saliency of climate change as an important issue (See Chapter 4, pp. 94-95). Interviews also supported the analysis from documentary insights that the Stern Review appeared to be influential in bringing about a policy response (See Chapter 5, p. 131) As shown on page 95 in Chapter 4, I demonstrated that the introduction of the 'cost' of unmitigated climate change began to create a *policy window* for the idea of demonstrating and deploying CCS in the UK to be taken seriously by *policy makers* and this remained relatively constant in the active period examined (i.e. 2nd period). Therefore, it suggests that economic framing gives an issue numeric relativity and comparability – allowing for judgements to be made about whether (or not) to pursue action and how that action can be pursued. It makes a *'problem'* more real by putting a value on it that is understandable and that can actively be modelled in budgeting scenarios. The documentary analysis showed that when an economic analysis was conducted on the *'problem'* i.e. climate change, the Government took action (for instance, they introduced the Climate Change Bill). However, where no economic analysis had been conducted, there was not evidence on which to base government action. This shows that there were key changes in framing that resulted in changes in attention. Framing appears to be a significant feature in *agenda setting* studies. The work of Kingdon (2014) highlights that the ways in which issues are framed can give prominence to an issue. Whilst previous analysis cannot be used to draw insights about the most

effective framing, what my analysis appears to suggest is that different types of framings on an issue resonate with actors to different degrees. Therefore, in relation to lessons valuable for proponents of emerging technologies, there are reasons to suggest the following:

(vi) It may be of value to proponents of emerging technologies to provide different explanations of the 'problem' to which their 'policy solution' addresses, to show the importance of the issue in different ways (one of which is economic analysis)

Based on previous insights, there are reasons to suggest that it may be important for advocates to think about how they frame and diagnose a *'problem'* they are seeking to address. They may want to potentially trial and emphasise different policy framing alternatives to see which resonates, and to build consensus by showing the virtue of the proposed *'policy'* for different reasons. As Mintrom (2019) argues, *"framing can be used to shape how people relate specific problems to their own interests"* (p. 14). One of the problem framings indicated here is economic analysis. Economic analysis weighs the costs against the benefits of policy interventions. The literature suggests that economic analysis has been applied in different sectors including health (Drummond, 1994; Antioch *et al.*, 1995), climate change and agriculture (Dittrich *et al.*, 2017), amongst others. Many scholars contend that economic analysis could be a key criterion in government decision making or investment decisions and have suggested that different mechanisms or approaches could be taken to maximise its potential. For instance, scholars such as Drummond (1994) have looked at the relationship between economic evidence and decision making and found that there is significant potential of the use of economic analysis in developing policies for health technology assessments. Drummond (1994) further argues that it is important that such economic evidence is produced in a timely manner and at relevant points during the stages of development of the technology, to inform decision making and before the wide adoption of the technology.

Antioch *et al.* (1995) also concede that the results of economic analysis should be published and disseminated in a timely manner, suggesting that this could potentially have political impact. Drawing insights from the literature, cost considerations appear to be critical to government decision making. I argue that when it comes to the *'problem'*, the associated cost and risk considerations can either give weight to the *'problem'* or otherwise. This appears to suggest that until the associated costs and risks of a *'problem'* are clearly identified, established and appreciated, the issue may not be taken seriously. Taken together, proponents may want to consider framing a *'problem'* they seek to respond to in different ways, but as my analysis suggests and from the broader literature, economic framing in terms of mitigated (or unmitigated) cost of action can be influential in driving change. Furthermore, proponents should make attempts in producing their evidence in a timely manner.

(6) The influential roles and strategies of Visible Actors (e.g. Prime Minister & Special Advisor)

The previous analyses from both documents and interviews provided evidence to demonstrate that visible actors such as the Prime Minister and Special advisors appeared to be influential in the *agenda setting* process of the CCS case in the UK. For instance, I showed how one interviewee from government commented about how he saw one of his responsibilities as bringing forward technologies that were meant to address the climate-energy challenge, one of which was CCS. The interviewee (an advisor) stated that he persuaded the incumbent Prime Minister to bring forward a consultation on how CCS could be supported (See Chapter 5, p. 127). This shows the important role of politics in the *agenda setting* process for CCS. Similarly, previous documentary analysis concurred with the interview data which suggested that Tony Blair was successful in placing climate change on the agenda, when the UK hosted the presidencies at the G8 Gleneagles Summit in 2005 (See Chapter 5, p. 133). Taken together, previous insights show that visible actors play a key role in informing *agenda setting*. Proponents of emerging technologies should therefore recognise their impact as being critical in decision making. In relation to what insights these have for proponents of emerging technologies, there is reason to suggest that:

(vii) Proponents should consider making attempts to build relationships and links with politicians to promote their policy solution

In my previous sections, I alluded to the importance of reaching out to politicians to promote the policy agenda. Their roles in the policy process give us reason to suggest that building links and relationships with politicians may have an impact. Proponents of emerging technologies should therefore consider making efforts to reach out to politicians and political influencers as they appear to be influential in policy making. Baumgartner *et al.* (2009) argued that *"when the executive-branch takes an advocacy role in a public-policy debate, either defending the status quo or promoting change, it usually succeeds"* adding that *"the most powerful groups can achieve little without the support of government allies"* (p. 238). This suggests that there are incentives for proponents of emerging technologies if they seek ways to build links and relationships with *policy makers*. One advantage Mintrom (1997, 2019) mentions of networking is that it helps *'policy entrepreneurs'* to gather the evidence needed to persuade *policy makers* of the 'change' needed. Like Mintrom (1997) argues, *'policy entrepreneurs' "who make good use of networks of contacts will be better placed to make winning arguments in support of their proposed policy innovations"* (p. 740). Again, by reaching out to *policy makers*, *'policy entrepreneurs'* "*learn the "world views" of various members of the policy-making community, and make contacts that can help build their credibility"* (Mintrom, 1997, p. 739). Kingdon (2014) speaks of different strategies

(*'softening up'* in his terms) that advocates adopt in presenting their ideas: *"giving talks, writing position papers, sending letters to important people, drafting bills…having lunch, all with the aim of pushing their ideas in whatever way and forum might further their cause"* (p. 181). Taken together, proponents of emerging technologies may want to make efforts to be persistent and explore different approaches to build relationships and links with politicians as these figures appear to be central to *agenda setting*.

(7) Party competition & issue ownership

Documentary analysis suggested that there appeared to be party competition on the subject of CCS revealed in party manifestos. In one particular election year (i.e. 2010), CCS was explicitly mentioned in all of the three main political parties and indeed action was pledged whereas this was not so in the previous election year 2005 (See Figure 15 below). This shows that CCS was an attractive issue before the 2010 election year shown by the increased enthusiasm in the 2nd period. The documentary analysis showed that parties made ambitious commitments towards facilitating CCS deployment in their manifestos (See Appendix II), suggesting that each party was seeking to 'own' the issue (See Downs, 1972). This period therefore created a *policy window* for parties to show their commitment towards CCS and wanted to be seen as doing something about it. In the latter periods, the narrative around CCS changed and parties made less ambitious commitments to CCS (See Appendix II). These insights appear to suggest that parties took advantage of 'propitious' times (in Kingdon's words) for placing their preferred items in the manifestos. Taken together, while the perceived importance of an 'issue' and consensus around a policy idea which I echoed in previous sections above is important, competition helped in bringing CCS to the spotlight. Kingdon's work (2014) has highlighted the importance of competition to *agenda setting*. He argues, *"a subject may become more prominent much more quickly than it would in the absence of competition"* (Kingdon, 2014, p. 157). For instance, if parties, feel that there is potential for action out there and that the item can gain electoral advantage, they are more likely to jump onto the idea.

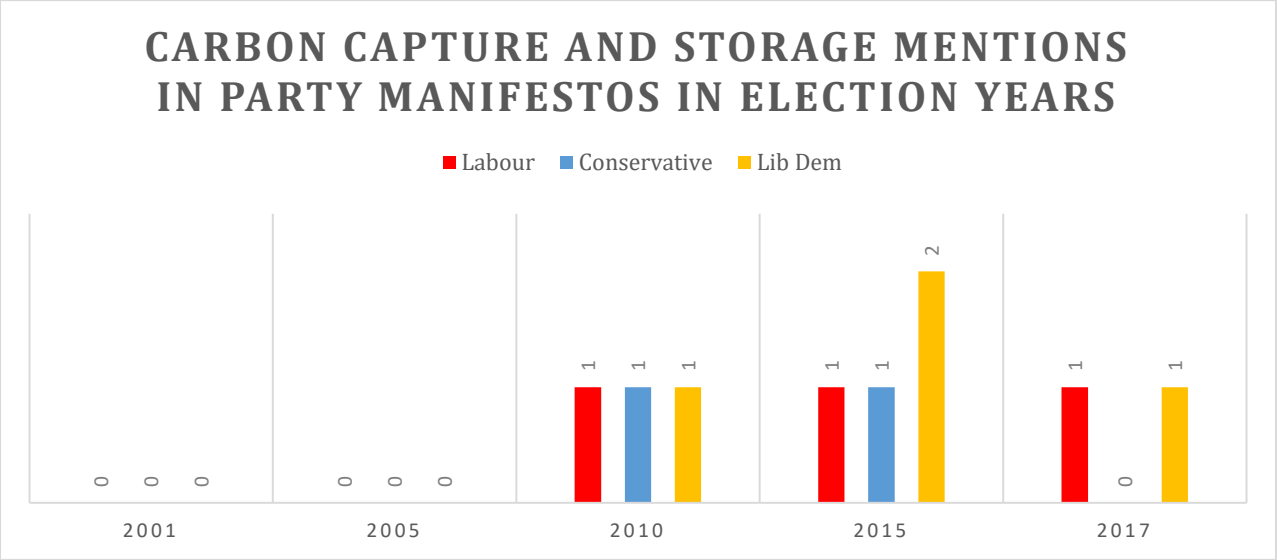

Figure 15: Comparing CCS mentions in Elections years

In relation to lessons these insights have for proponents of emerging technologies, there is reason to suggest that:

(viii) Proponents may want to consider utilising election cycles to promote their policy proposal

Previous documentary analysis suggests that proponents of emerging technologies may find value in utilising election cycles to promote their technologies. It is without doubt that during election cycles, there appears to be competition amongst political parties, and this creates a *policy window* as parties may want to be seen as presenting favourable policy options. Proponents may want to take advantage of these opportunities to lobby for their preferred policy solution.

I will now move on to the second section of this chapter which is a discussion about what proponents may want to consider doing in order to *'maintain'* an idea's position on the political agenda when the *policy window* is opened.

6.2 MAINTAINING AN OPENED POLICY WINDOW: INSIGHTS FROM THE PROBLEM, POLICY AND POLITICS STREAMS

One of the focus points of this Chapter is to highlight the factors that appear important in *'maintaining'* an idea's position on the political agenda when the *policy window* is opened. Previous sections have noted the factors that appeared important in creating a *policy window* for CCS to gain political attention. Since *policy maker* attention can lurch from one issue to another (Cairney, 2015), it is important that proponents seek ways to *'maintain'* an idea's position on the political agenda when the *policy window* is opened. This issue of *'maintaining'* is important because previous analysis revealed that there were things that *policy makers* missed, including things previous analyses suggested to be important (discussed further below) – the result of which *policy maker* attention could not be sustained. The importance of these factors is what I have ascribed as *'maintaining'* an opened *policy window*. Thinking about *'maintaining'* is particularly important for technologies that potentially appear as not yet fully developed, and that need to gather and garner investment and evidence to prove that they can/or be developed in order to secure desired outcomes. In this section, I will therefore reflect on previous insights and the broader literature more generally to delineate the factors which prevented CCS from remaining consistent on the agenda. Based on the insights gathered, the section will draw on some key lessons that may be valuable to proponents of emerging technologies should they want to bring about change.

6.2.1 Facilitators/Ingredients of success for *'maintaining'* an opened *policy window* as shown in the analyses

In presenting the discussion in this section, I introduce the lesson of importance in relation to *'maintaining'* an idea's position in an opened *policy window* and discuss the importance of these in the light of what actors missed doing and the events which occurred to shift *policy maker* attention away from CCS. This section thus offers three lessons that proponents of emerging technologies may want to take forward.

(ix) Proponents may want to make attempts to lobby government for legislative commitments and clear regulated policy instruments/mechanisms to secure commitment to ongoing exploration of a policy with a view to developing a viable response

One of the issues that came up in the documentary and interview analyses is that there was failure to commit money and to ring-fence funds in order to promote the development and commercial deployment of CCS technology in the UK. Indeed, as it was earlier revealed in the interview analysis, a Male, Government Rep stated, *"the money was always provisionally committed. If you look at the Treasury documents, it was always an intention but never an absolute commitment..."* (Male, Government Rep 1). There is reason to suggest that since the money was

always provisionally committed, this slowed down progress on investing in a demonstration of CCS technology. The interview analysis revealed that although government took interest in the subject and made promises to develop CCS technology, there was no evidence of any absolute commitments or ring-fenced funds to support the technology. With the absence of absolute commitments to funding, *policy makers* were not compelled to implement the funding promised, making it easier for *policy makers* to withdraw whenever other competing issues emerged.

These insights are akin to the ideas of Bache *et al.* (2015) in their work on climate change transport policies (meta-policies) in the UK. The work of Bache *et al.* (2015) particularly focused on how meta-policies declared by the government may (or may not) be translated into significant action on the ground level. The results of their study suggested that meta-policies in relation to the transport sector appeared to be 'symbolic' in nature and did not translate into specific carbon reduction targets at the local level. In other words, Bache *et al.* (2015) argue that there was no evidence of specific mechanisms in place at the local government level to aid in the implementation process of the policy targets. To explain 'symbolic' briefly, Bache *et al.* (2015) stated that *"symbolic policies are seen as having low practical effectiveness but a high 'politico-strategic' effectiveness and are often observed in the field of environmental policy"* (p. 200). They add that the inability of local implementers to action the targets were as a result of financial, political and organisational factors largely controlled by the central government. This argument resonates with the insights from my analysis; for instance, across the period in the CCS case, it was observed that although the government made financial commitments and sometimes went further to propose certain policy instruments [such as, Contracts for Difference (CfDs)], policy mechanisms for the implementation process never came into reality. In other words, CCS policy did not contain specific mechanisms to be able to implement the commitments the government made. I showed in my case that there were times where some funding mechanisms such as the CCS levy and funding from the public accounts were being considered. However, there were concerns for its financial sustenance (Chapter 4, p. 105), especially in the face of austerity and hence *policy makers* drew back on the idea of demonstrating CCS.

On the basis of the evidence gathered in this study and the wider literature, proponents may want to lobby for legislative commitments and clear regulated policy instruments across government to secure ongoing government commitment to a policy solution**.** Proponents may want to consider pushing for formal commitments from the minister around budgets to be allocated to enacting principles. Proponents may also want to make attempts to lobby government for the enshrinement of spending commitments in the White paper as they go through parliament. In other words, they may want to advocate for written commitments with a legal backing/requirement to support the policy solution. There is evidence of regulated policy instruments or legislative requirements which work in practice. For instance, the Renewables Obligation (RO) is a policy instrument put in place to support renewable energy generation in the

UK by placing a requirement on licensed power generators to increase their electricity generation from renewable sources (OFGEM, 2020). Allan *et al.* (2011) reported that, *"the Renewables Obligation (RO) scheme has succeeded in delivering investment in UK onshore wind capacity, with three times as much wind capacity installed in the UK between 2002 (the first year of the RO) and 2006"* (p. 35). This quote suggests that the RO has previously delivered policy outcomes. Evidence for this idea can also be found beyond the UK. In the US, and closely related to CCS technologies, the 45Q tax credit[5] provides an example of a policy instrument which was passed in Congress, aimed at supporting CCS implementation, by serving as an incentive for companies to capture and store or utilise CO_2 (Moore, 2020). Bomgardner (2020) reported that companies involved in ammonia, methanol and ethanol production in the US, for instance, are exploring the development of industrial carbon capture utilisation and storage facilities, owing to the benefits the 45Q tax credit provides. These examples, suggest that by having legislative backing, a policy proposal is more likely to succeed.

(x) ***Proponents may want to consider making attempts to be well prepared for disruptive changes to a 'window of opportunity'. These can come in many forms (e.g. financial shock; competitor technologies; changes in the underpinning rationale for technology investment like a phasing out of coal)***

They may want to consider doing the following:

- Remain in contact with and continually advocate their case with *policy makers*;
- Broadening the appeal of the policy solution by presenting it as a reaction to multiple problems, as opposed to addressing a single problem;
- Forge strong alliances with other groups and policy advocates and develop a consistent narrative that reflects the changing context.

Previous insights suggested that CCS policy was affected by disruptive changes to the *policy window*. Disruptive changes to the policy landscape can be likened to what Kingdon (2014) described as 'unpredictable windows' (See Chapter 2, p. 50). The CCS case study showed that the context of *agenda setting* is not constant, and that changes can occur in each of Kindgon's three streams that can affect the fortunes of a policy idea. One of such disruptive change which occurred was the Global Financial Crisis. As shown in this quote from the documentary analysis, *"Given the current fiscal constraints, value for money is a crucial consideration. While the promotion of CCS is an important objective, the implied cost of carbon savings needs to be compared with other technological solutions for delivering reductions in carbon emissions and decarbonising generation"* (See Chapter 4, p. 102), it appears that certain events may affect the kind of policy action a

[5] The 45Q tax credit provides, for instance, $50/mt credit for CO_2 captured and permanently stored and $35/mt credit for CO_2 captured and utilised (for instance, in Enhanced Oil Recovery (EOR)) (Bomgardner, 2020).

government may be willing to take. The CCS case suggests that government is less likely to invest in 'uncertain technologies' during periods of austerity, but may be more willing to invest when there are more resources available. It is worth acknowledging that there may be events that actors won't be able to control and this is a consequence of the turbulent issue-attention cycle within politics (Downs, 1972). However, my analysis suggests that there are some things they can do when faced with such difficulties. For example, advocates may want to continue to expound on the factors that helped to draw the attention of *policy makers* to their issue when the *policy window* was opened. Such activities may include continual lobbying, advocacy and public education about the *'problem'* and its *'solution'*. Other practical ways they may want to consider are preparing reports, submitting position papers, seeking direct contacts with relevant state actors, responding to government consultations. These ideas are akin to what Kingdon (2014) has described *'softening up'* – the process of getting *policy makers* well-apprised to the policy proposal as previously discussed (See Chapter 2, p. 36).

Furthermore, previous insights suggested that interest in coal, to which CCS was initially linked, began to phase out across the period. This represented another 'unpredictable window' that was not foreseen. One thing that CCS *policy actors* appeared to have missed which previous analysis suggests affected support for the idea was failing to speak to the 'co-benefits' or the broader opportunities of CCS from onset; CCS was narrowly focused on coal in the early periods. In seeking solutions to *problems*, one inference that could be made is that issues were not looked at in isolation, but rather *policy makers* were seeking the optimal solution-mix that could address the *problems policy makers* faced. For instance, *policy makers* explored different solutions, including CCS in meeting climate change and energy security objectives (See Chapter 4; p. 122). I argue that this process had implications on the priority placed on CCS, because competitor technologies emerged. For these reasons, in pre-empting and dealing with disruptive changes, proponents may want to be aware of the multiple and evolving benefits of their technology, and seek to articulate a message that emphasises multiple, not single advantages. This has happened in relation to nuclear power in the UK. A government consultation was launched in 2007 on the future of nuclear power, to examine whether (or not) nuclear power should be part of the portfolio of low-carbon technologies in meeting the climate-energy challenge. This document revealed that although some environmental and safety concerns were raised by respondents in relation to this technology (amongst others) (See *'2008 Meeting the Energy Challenge – A White Paper on Nuclear Power'*, p. 6), the Government still concluded that *"new nuclear power stations should have a role to play in this country's future energy mix alongside other low-carbon sources…"* (ibid., p. 7), explaining that existing or further policies could be used to address such concerns. In this document, nuclear power was re-framed as *"low-carbon, affordable, dependable, safe and capable of increasing diversity…"* (ibid., p, 5), suggesting that it was a pro-environmental option to pursue.

It is important to draw on the literature on framing here as this is particularly important to *'maintaining'* an idea's position in an opened *policy window*. Existing literature has shown the relationship between advocacy and framing, arguing that advocates' efforts to push for a *policy* in a desired direction largely depends on the kinds of frames used (Baumgartner, 2007; Baumgartner and Mahoney, 2008; Boräng *et al.*, 2014; Klüver and Mahoney, 2015). Entman (1993) provides a definition for framing: "*to frame is to select some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation for the item described"* (p. 52). Nilsson *et al.* (2009) reiterate that *policy makers* require specialised information (in other words, particular frames) - to make decisions and make clear that *"policy is thus shaped by informational influences of policy actors within and outside the government"*. (p. 4455). De Bruycker (2017) also suggests that *"interest groups strategically deliberate about which frames are best suited to promote their policy goals and ideas"* (p. 777). Different strategies to framing have been conceptualised by scholars: Stone (1997) argues that *'policy entrepreneurs'* link their policy issues to crisis; Baumgartner and Jones (1993) argue that *'policy entrepreneurs'* strategically frame issues to highlight policy failures; and Dewulf and Bouwen (2012) argue that *'policy entrepreneurs'* discover their frames through discussions with others. To demonstrate the significance of problem framing, Mintrom (2019) cites an example of a figure – Ken Livingston (a former mayor of London) - whose actions led to the formation of the influential C40 Cities Climate Leadership Group.[6] Mintrom (2019) argued that *"Livingstone's fundamental problem framing act involved representing cities – rather than nation states – as central agents in the response to climate change"* (p. 15). By focusing the frame on climate change action on cities, this gave the opportunity to leaders of other cities to show leadership on climate action in their respective cities. Taken together, these insights show that framing matters to advocacy. Therefore, proponents need to be strategic and consider testing different problem frames, but more importantly and as previous insights show, they should speak to the wider benefits of their policy proposals from their inception. As Moore (2014) emphasizes, whole product solutions are appealing to the majority.

In line with these ideas, proponents of emerging technologies may also wish to conduct comprehensive review and research of their policy solution to analyse all the transferable wider benefits of the policy solution from its inception. They can do this by establishing inter-agency research units which will research to establish the various benefits that could be derived from the policy solution. Such inter-agency research units may be funded by the various industries that benefit from the work they do, suggesting the importance of cross-sector collaboration. This exercise can usefully involve identifying possible beneficiaries of their policy solution, not only to facilitate lobbying activity, but also to grasp the priorities and agendas of those within Government. This may help to further inform how their policy solution is moulded so that right from the inception, they can achieve a policy solution that is broad-based, and from which could

[6] C40 Cities Climate Leadership Group – Mayors of world's biggest cities pursuing climate change action (Mintrom, 2019)

be derived transferable benefits for all stakeholders involved. This exercise may need to evolve over time, and should seek to focus on long-term and short-term outcomes. Focusing on both long-term and short-term outcomes, proponents may also want to forge strong alliances with other groups and policy advocates and develop a consistent narrative that reflects the changing context. Taken together and based on the insights from the CCS case, proponents should consider testing different frames, and this process should be continual and not temporal. This is because other issues can emerge to change the political landscape and shift *policy maker* attention (i.e. there could be *'unpredicted windows'* in Kingdon's terms). This kind of reframing is likened to Shpaizman *et al.* (2016) who described it as 'conversion'; *"redirecting existing policies to new ends beyond their initial intent"* (p. 1046). Framing may therefore need to be trialled continuously to withstand the test of time, and ensure that the policy idea receives continual attention.

(xi) For specific projects, where a cross-departmental government networking group does not already exist, proponents of emerging technologies may want to consider lobbying for the establishment of such groups whose aim will be to inform and coordinate the activities of relevant government departments to facilitate engagement around a policy idea.

Previous insights suggested that there were conflicting priorities between two government departments (disbanded DECC and Treasury) regarding funding for CCS, creating tensions around ownership and approach (See Chapter 5, pp. 144-145). This gives us reason to think about what actors can do in terms of seeking to *'maintain' policy maker* attention on their preferred policy proposal. The interview analysis suggested that while one part of government i.e. disbanded DECC were seeking to promote the policy solution, another part of government i.e. the Treasury department were opposed to the idea of spending the funds promised – suggesting that these two groups had different priorities at this time. Existing literature already tells us that government can be fragmented and often fail to be 'joined-up', even despite initiatives to prevent it (Carey *et al.*, 2015; Pollitt, 2003).

Deducing from this insight, I argue that the effective coordination of the various roles of government departments to bring them to the same level of understanding of specific issues may be an important factor in progressive policy making. While different departments work on behalf of the government, priorities could be different. With an issue such as climate change and CCS which cuts across different aspects such as energy and environment, it may be valuable that proponents consider making concerted efforts to facilitate engagement around a policy idea amongst the relevant departments and agencies that are likely to be involved in making decisions about the adoption and implementation of the policy solution. Proponents may therefore want to lobby government for the set-up of a cross-departmental networking group which will have responsibilities for informing or briefing, coordinating and maintaining the communication lines amongst different departments with regard to major projects proposed by proponents. By

making attempts to seek broad-based support from different government departments through cross-collaborative groups, this may aid in getting *policy makers* more apprised to the policy solution.

6.3 CONCLUSION

Taken together, this chapter has offered lessons which proponents of other emerging technologies may want to take forward in promoting their policy solution. In presenting these lessons, I argued that there are factors that appear to be influential in *'opening'* a *policy window* based on previous insights. I further discussed that there are factors which appear to be also influential in *'maintaining'* an idea's position on the political agenda, inferred from previous insights. Taken together, the lessons show that while there are issues that may be out of actors' control, there are also many things that actors can do from the inception of their policy solution that may be influential in attracting and maintaining *policy maker* attention to their policy ideas - cultivating alliances with NGOs and other civil society actors; building links and relationships with politicians; testing different *'problem frames'*; engaging in active lobbying; being well-prepared for disruptive changes to the environment; amongst others. These lessons are particularly valuable for proponents of technology proposals that have not been fully 'worked out' and may need government investment to show that they work as they reveal the conditions under which investment in developing these technologies are likely to emerge.

So what are the main conclusions that can be gathered from this study? The next chapter provides a reflection of the study and the general insights this thesis offers.

CHAPTER 7: CONCLUSIONS

7.1 INTRODUCTION

This concluding chapter provides a summary of the general insights gained in this thesis. In beginning this chapter, I revisit the purpose of this research, to reflect on why a study of *agenda setting* in the CCS case is interesting in the UK context, and valuable to identify the lessons that may be beneficial to proponents of other emerging technologies. I then reflect on the methodological and theoretical approaches laid out in this work to evaluate their usefulness in drawing the insights gained in this work, and its implications for future research. Next, I lay out the main findings and analysis this thesis offers in relation to *agenda setting* in the CCS case, in particular, outlining the factors that appeared to be influential in both opening and closing a *policy window* in the CCS case, presented according to the streams of Kingdon's MSF (*'problem'*, *'policy'* and *'politics'*). I also revisit the contributions this thesis has offered to our understanding of *agenda setting*. Finally, I acknowledge the limitations in this work, but also consider the implications of the insights gained in this work for future research and applications.

7.1.1 Why does a study of *agenda setting* in relation to CCS matter?

In beginning this thesis, I outlined the aim of applying insights from policy theory, and specifically Kingdon's *agenda setting* framework to CCS developments in the UK (2000-2017), to identify lessons that may be valuable to proponents seeking to promote other emerging technology options in the UK context (See Research Questions in Section 1.2). Given the stated ambitions for CCS (as outlined in Section 1.0.3), I argued that a focus on an analysis of CCS in the UK context is interesting because of the inconsistencies in government support for, and investment in the technology within the scope of analysis in this thesis. I argued that this dynamic policy environment makes it interesting to gain insights into the *agenda setting* and policy making process of CCS, and especially what leads a policy to be supported over time, in order to identify insights likely to be of interest to those promoting other policy responses to climate change. I argued that while science and engineering advances for technologies developed as policy responses to climate change, it is important to understand the insights that can be gained by studying political discourses as there could be many possible barriers to the introduction of environmental technologies. In light of these difficulties, I argued that insights can be gained by employing an interdisciplinary approach, applying insights from the literature on public policy and, specifically, *agenda setting* (developed by political scientists) to work on CCS technologies (the preserve of scientists and engineers). I argued that Kingdon's work (2014) on *agenda setting* is particularly useful for the approach adopted in this thesis because he offers a distinctive conception of *agenda setting* where he considers not only how an issue emerges on the agenda to be considered seriously by *policy makers*, but also the factors that lead the policy getting enacted in government. Presenting the key arguments in Kingdon's work on *agenda setting*, I

demonstrated that Kingdon's work can be extended to a new policy arena (i.e. CCS) to focus on new questions around emerging technologies for addressing climate change (See Chapter 3).

7.1.2 Outline of methodology for thesis

To generate the insights in this work, I drew on Kingdon's Multiple Streams Framework (MSF) to trace and analyse the *agenda setting* process of CCS by seeking to understand (i) how CCS came on the government agenda; (ii) why CCS grew in prominence on the government agenda; and (iii) why CCS faced struggles on the government agenda, within the scope of analysis. To identify the data of relevance in this study, I applied a qualitative case study approach, utilising two complementary sources of data (document analysis and interviews), and drawing on the structural components of Kingdon's MSF to outline the themes of importance in helping to explain the *agenda setting* process. By applying document analysis, I was able to gain insights into the 'official story' of CCS, using primarily government policy documents (Command Papers) but also other official supplementary sources which I used to explore and verify specific points. Additionally, I employed elite interviews which were used to generate insights into the 'unofficial story' of the CCS case by exploring the views of different actors from government, industry, the academic community and CCS trade union associations, to construct meaning in this research. By employing interviews, I aimed at testing respondents' accounts of the CCS case to examine whether they mirrored the findings and analysis of documentary analysis (or extended or challenged the previous insights gained).

To begin to explore these insights, I developed the *'5-PH framework'*, representing the profile of government documentary discussion on CCS, which served as a template for investigation and analysis in this research. The *'5-PH framework'* was made up of '5-segments', developed to capture the ebbs and flows of CCS on the government agenda. This heuristic was developed based on my line of reasoning that the periods reflected key happenings of the CCS case; the 1st period (floating period of CCS), 2nd period (active period of CCS), 3rd period (first struggles of CCS), 4th period (rejuvenation period of CCS) and 5th period (second struggles of CCS). This *'5-PH framework'* allowed me to identify trends and patterns in the CCS case to aid in isolating factors that appeared important in accounting for the fortunes of CCS technology. For each period, Kingdon's MSF (outlined in detail in Chapter 2 and 3) was used to identify developments in the *'problem'*, *'policy'*, *'politics'* streams, including *'policy windows'* and *'policy entrepreneurs'*, to construct meaning in the CCS case. By determining the factors that appeared to be influential in explaining *agenda setting* in the CCS case, lessons of value were identified from the analyses with support from the broader literature, for proponents of emerging technologies.

7.1.3 Contributions of this thesis

From the key findings and analysis offered in this thesis (as outlined in Chapters 4 & 5), this thesis has offered three types of contributions in terms of empirical, practical and theoretical insights.

(i) ***Empirical insight by applying agenda setting theory to CCS***

This thesis builds on existing literature surrounding CCS by employing an *agenda setting* perspective to the CCS case. The insights generated show that Kingdon's MSF has been relevant in explaining the fluid attention given to CCS across the period within the scope of analysis in this thesis. The findings of this thesis have shown that attention to CCS issues has fluctuated over time. By using the *'5-PH framework'* which segmented the scope of analysis into 5 periods of time, my analysis provided a systematic way to show the developments and changes in the streams of Kingdon's framework which we did not know before, and therefore has provided insights for those seeking to understand the policy process. This approach may be of use to others when thinking in terms of different periods in studying *agenda setting*. In terms of the findings garnered in this thesis, by employing Kingdon's MSF, my analysis has revealed the factors (indicated below) that appeared influential in both *opening* and *closing* the *policy window* in the CCS case. By drawing direct attention to the changes in the three streams, Kingdon's MSF has helped to provide possible explanations of the changing fortunes of CCS and enabled us to arrive at insights that offer a better understanding of the dynamics of CCS *agenda setting*. While the *'5-PH framework'* offered a systematic approach to analyse the data generated in this thesis according to different periods, I highlight below the key findings generally obtained in terms of *opening* and *closing* the *policy window* in the CCS case.

So, which factors appeared influential in opening a policy window in the CCS case?

Table 10: Factors of influence in *opening* the *policy window* in the CCS case

Kingdon's stream	Key factor in *opening* the *policy window*
Problem stream	✓ growing domestic and international saliency on the *'problem'* and the perceived need for action with high political events taking place; ✓ focusing events which highlighted the *'problem'*; ✓ increasing evidence-base about the *'problem'* (identified by an economic analysis).
Policy stream	✓ industry lobbying
Politics stream	✓ political pressure from civil society organisations; ✓ influential roles and strategies of visible actors (i.e. Prime Minister & Special Advisor); ✓ party competition and issue ownership.

And which factors appeared influential in closing the policy window in the CCS case?

Table 11: Factors of influence in *closing* the *policy window* in the CCS case

Kingdon's stream	Key factor in *closing* the *policy window*
Problem stream	✓ emergence of new problems e.g. 2008 Global Financial Crisis
Policy stream	✓ emergence of alternative technologies i.e. renewables; ✓ gradual phase out of coal; ✓ cost concerns and 'value for money' considerations; ✓ concerns for technology readiness; ✓ no strong lobby for CCS.
Politics stream	✓ change of government

Taken together, it appears that the factors identified concur with the conditions which Kingdon (2014) cites as influential for *agenda setting* to occur (See Chapter 2). Like Kingdon (2014) argues, for policy change to occur, then three streams must couple to increase the likelihood of an issue getting on the agenda. It is however important to recognise here that none of these factors acting alone was sufficient to open or close the *policy window* but rather, a culmination of two or more factors working concurrently or consecutively tended to have a greater influence. For instance, previous analysis (as detailed in Chapter 4 and 5) showed that when *policy maker* attention was drawn to the subject of CCS, it was as a result of a confluence of factors which opened the *'policy window'*: political pressure from NGOs advocating for a ban on the building of coal-fired power plants; political awareness of climate change as a pressing problem and consensus for action; an increasing evidence base about the problem; high political events taking place on the national and international stage; central government figures seeking venues to highlight the *'problem'* of climate change; CCS being recognised as a 'silver bullet' solution by *policy makers*; focusing events to highlight the *'problem'*; and industry lobbying. However, when *policy maker* attention appeared to have shifted away from CCS, other factors converged and worked concurrently or consecutively to close the *'policy window'*: e.g. emergence of new problems (e.g. Global Financial Crisis); emergence of alternative technologies; concerns about cost and technology readiness; and a change of government (amongst others). While the precise order of events was not the focus of my thesis, what my analysis does show is that a combination of factors is important in explaining the 'change' which occurred in relation to *agenda setting* in the CCS case. This chimes with Kingdon's (2014) conception of *agenda setting* that *"public policy is not one single actor's brainchild"* (p. 71). Rather, Kingdon (2014) argues that *"a complex combination of factors is generally responsible for the movement of a given item into agenda prominence"* (p. 76).

(ii) ***Practical insights for proponents seeking to promote emerging technology***

From my analysis and the broader literature, this thesis has identified lessons (highlighted below) that may be valuable to proponents of emerging technologies in pursuing 'change' both in *'opening'* a *policy window* and keeping the *policy window 'maintained'*. This thesis argues that it is important to think about these lessons for various reasons. For instance, since there could be many possible barriers to the introduction of environmental technologies (such as social and political), these lessons may offer some guidance by which such challenges (if encountered) could be managed for a possible policy change. Furthermore, these lessons may offer value to research outcomes by facilitating engagement around a policy idea and possible adoption for policy change. These lessons may also offer valuable insights to advocates of emerging technologies to help them understand the policy making process so that they can be better informed and also be prepared to better engage. Taken together, these lessons may be particularly beneficial to advocates of policy proposals which require government investment to be demonstrated or to address feasibility issues as they suggest the conditions/factors under which government investment may be more likely. The lessons garnered in this thesis have been outlined below (See Chapter 6 for discussion).

The Eleven (11) lessons from CCS for proponents of emerging technologies:

1) cultivate alliances with environmental NGOs and other civil society actors in order to generate a shared belief about a *'problem'* and its *'solution'*;
2) be aware of the value of increasing the saliency of a political issue both nationally and internationally (by driving more attention to it and increasing public awareness and interest in the issue);
3) find opportunities to act as *'policy entrepreneurs'* to link a preferred *'policy solution'* to a pressing problem in order to raise the profile of the issue;
4) recognise the value in testing different *'problem frames'* to which a *'policy solution'* addresses, to show the importance of the issue in different ways (one of which is economic analysis);
5) lobby visible or mainstream actors and *policy makers* (for instance, MPs and opinion leaders) for the chosen policy solution;
6) recognise the value in establishing industry associations to build consensus around a preferred *'policy solution'* to lobby *policy makers*;
7) make attempts to build relationships and links with politicians to promote the chosen *'solution'*;
8) make attempts to utilise election cycles to promote preferred technologies;

9) lobby government for legislative commitments as well as clear regulated policy mechanisms to support the *'policy solution'* to secure commitment to ongoing exploration of a policy with a view to developing a viable response;
10) be well prepared for disruptive changes to the political landscape and environment;
11) lobby for a cross-departmental government networking group (if this does not already exist) which will coordinate the activities of all relevant parties to facilitate engagement around a policy idea.

(iii) ***Theoretical insight by developing existing agenda setting theory***

Based on the analysis from this work, this thesis has offered one theoretical contribution that extends Kingdon's work (2014) on *agenda setting*. This thesis has shown that the process of policy development can occur as part of the *agenda setting* process. From the insights gained from both documentary and interview analyses, my analysis showed that when CCS came on the agenda, this was an idea that was not fully *'worked out'* i.e. it was an idea not yet tested and tried and required government investment to be demonstrated to prove that it could work. Nevertheless, the insights show that government took interest in the issue and were working to facilitate its implementation. Referring back to the 2nd period of the *'5-PH framework'*, when the idea was prominent on the government agenda, the documentary analysis suggested that there was concerted effort shown by the government to overcoming the prevailing challenges associated with the technology as they believed CCS could play a potential role in meeting climate change and energy security objectives. (See Chapter 4; pp. 96-99). This suggests that while government took the idea seriously, it was not an idea that was fully *'worked out'*. My analysis therefore suggests that government can play an active part in working to facilitate the implementation of an idea. This particular finding appears to suggest a rather complex nature of the *agenda setting* process than suggested in Kingdon's work.

While Kingdon's work suggests that a policy proposal needs to be *"worked out"* or *"ready to go"* before being seriously considered by *policy makers*, (Kingdon, 2014; p. 142) (indicating some sort of 'certainty' of the process), my analysis suggests that this is not always the case and that *policy makers* can still take interest in an issue and work to facilitate its progress. This particular finding chimes with work by Zhu (2008) who argued that proposals that are infeasible can succeed on the agenda, and that technical feasibility is not a necessary requirement for policy change to occur, as Kingdon (2014) posits. This insight therefore suggests that there is a need to think about the agenda in two ways – both in terms of taking an idea seriously and actually getting that idea implemented. This understanding, which is different from what Kingdon suggests, is important as it helps us to appreciate the conditions under which advocates can secure this type of attention for policy solutions that are yet to be fully tested. This adaptation to Kingdon' work matters and is important to integrate into theory because it suggests that advocates of policy

proposals should not be put off from floating their ideas on the agenda if they have not yet addressed all feasibility issues associated with the idea since *policy makers* could still take the idea seriously. However, whilst proponents may want to promote their idea, they need to be aware that external factors can emerge to shift *policy maker* attention (for instance, competitor technologies or less resources) as shown from the insights in this case study. They may therefore want to recognise that only a limited *policy window* exists for them to act if they do secure investment to explore the idea. Since external factors can exist to shift *policy maker* attention and can sometimes be unpredictable (for instance, a crisis or a disaster), the practical lessons offered in this thesis are valuable to help advocates be better prepared for such disruptions and also identify the areas for improvement in order to promote their policy ideas.

7.2 Recommendations for Further research

Kingdon's MSF in conjunction with the *'5-PH framework'* which I developed has proven very useful in mapping out the trajectory of the *agenda setting* process of CCS. It has been helpful in identifying the various factors that either promoted or constrained the issue of CCS on the government agenda, from which useful lessons have been drawn for proponents of emerging technologies in addressing climate change. However, reflecting on the research process in this thesis, it is acknowledged that there were limitations (further discussed) because of certain choices made, which could be addressed in future research work. Again, the insights from this study has prompted new questions to be considered in future research and applications. In this section, I therefore reflect on the research process, to outline the areas that will extend inquiry as far as the subject is concerned.

First, reflecting on the methodological processes and the scope of analysis in this thesis, it is acknowledged that certain choices were made in selecting documents and interviewees, and there are a number of ways in which these sources could be expanded to address potential limitations in the approach taken. In relation to documents, this thesis utilised data primarily from specific documents (i.e. Command Papers). While this specific dataset provided valuable insights in the study of CCS government *agenda setting*, which was the core focus of this thesis, it represents only one document type from which data was retrieved and analysed and therefore potentially limits the range of data that could have been retrieved to explore the *agenda setting* process in the CCS case. On this basis, further research can therefore expand the scope of work that has been done in this thesis to systematically integrate 'other' types of documents and data (for instance, the Hansard, parliamentary documents, select committee reports, record of political speeches, record of parliamentary debates, media reports, etc.). By integrating different types of documents, this will aid in substantiating and verifying the specific findings from this thesis and provide more nuanced details into the dynamics of *agenda setting*. In relation to interviews, there is also potential to expand the scope of analysis. As this project focused on the period 2000-2017,

interviews were retrospective in nature and it was therefore not possible to capture the reflections of interviewees in real time. Future research could adopt a more contemporary focus, aiming to track both current and historic reflections to determine if participants' perceptions of explanatory factors changes over time. Furthermore, future work may want to extend the analysis to other groups of actors (for instance, NGOs and the public) to understand their views of the *agenda setting* process in order to gain more useful insights. There is also potential to consider other methods in gathering these insights, with a possibility of using surveys to gauge public and *policy makers'* perceptions on a more wide-ranging scale.

Second, further research can build on this thesis' insights by integrating ethnographic approaches (for instance, direct observation at a government department) (Crewe, 2018; Rhodes, 2015), in order to gain first-hand experience of how policy making works in government. As mentioned above, as this analysis was retrospective it was not possible to gain insight into the dynamics of policy making in practice, however there are reasons to believe that such observation would provide a valuable supplement to the documentary analysis and interviews conducted here. Ethnographic insights could, for example, provide insight into the dynamics of interactions between *policy makers* and *policy entrepreneurs* to reveal the nature and extent of lobbying efforts. Alternatively, it could cast light on the degree to which political factors featured in policy development debates, and where concerns or pressures originated from. The ethnographic method therefore has the potential to provide insight into the 'everyday practice' of policy making, helping to test and develop the explanations offered through the methods used within this thesis.

Furthermore, in building on this work, further research could integrate data sources from the devolved administrations in the UK. By seeking to explore the *agenda setting* process from the devolved administrations (Scotland, Wales and Northern Ireland), this will allow for comparisons of the *agenda setting* process to be made by revealing the conditions under which *agenda setting* may occur in each jurisdiction. It would also be useful to expand this thesis' scope to the international realm by integrating international documents to explore the *agenda setting* process of CCS on the international level in order to make comparisons with different country settings. Finally, while the theoretical insight gained from this study is a significant finding and shows a departure from Kingdon's principle (See Section 7.1.3 (iii)), it is important to recognise that this exception was based on one case study, therefore this is an area that may require further exploration with different cases to test the wider resonance of this idea.

7.3 Final thoughts

Government *agenda setting* matters because it can tell us what *policy makers* are prepared to prioritise. Patterns of agenda or policy change can be studied to understand how and why policy change occurs. The CCS case in the UK is a specific example that shows that barriers can exist to prevent technologies from seeing the light of day. In particular, this thesis demonstrates that it is not enough to have technology available, social and political barriers also need to be overcome. By exploring the *agenda setting* process in the CCS case drawing on Kingdon's MSF, this thesis has offered a first *agenda setting* perspective to the CCS case, telling us of the influential factors that accounted for the fortunes of CCS on the UK government agenda between 2000-2017. So what do we know now that we did not know before? What this case has shown is that *agenda setting* is highly complex and involves many actors and processes. Indeed, this analysis has shown that CCS was influenced by a confluence of different factors working concurrently or consecutively to open or close a *policy window* to different extents over time. So why should these factors matter to proponents of emerging technologies? There may be technologies which will require government support to see to their implementation. Without understanding how *agenda setting* or policy making works, there can be difficulties in: knowing what proponents can do to offer a technology which government can see value in; knowing how to engage to increase the likelihood of the technology proposal being seriously considered; and knowing who to engage with as far as the technology is concerned. The factors and associated lessons offered in this thesis enable us to appreciate the conditions under which *agenda setting* can occur. In this way, this thesis offers one way to bridge the gap that can exist between science and policy, providing not only empirical insights into this specific case, but also practical recommendations that advocates of other technologies may wish to consider. Taken together, this work therefore maps out the likely trajectory that emerging technologies are likely to travel through, the challenges likely to be met and the lessons of value that may help to manage the challenges for a possible policy change. It shows that it is important to think through the specific challenges that those advocating emerging, not yet proven technologies, may likely face.

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Appendix I: Command Papers

Period	Year	Documents	CP Number	Departments
1st	2000	Climate Change – The UK Programme	Cm 4913	DETR
	2001	The Government's Expenditure Plans 2001-02 to 2003-04 and Main Estimates 2001-02	Cm 5112	DTI/DEFRA/DT
	2003	The U.K. Government Response to the Royal Commission on Environmental Pollution's Twenty-Second Report: Energy - The Changing Climate	Cm 5766	DEFRA
	2003	Our Energy White Paper	Cm 5761	DTI & DEFRA
2nd	2005	The UK Government Sustainable Development Strategy	Cm 6467	DEFRA
	2005	Autumn Performance Report 2005	Cm 6692	DEFRA
	2005	Britain meeting the global challenge: Enterprise, fairness and responsibility. Pre-budget Report 2005	Cm 6701	HM Treasury
	2006	Investing in Britain's potential: Building our long-term future. Pre-Budget Report	Cm 6984	HM Treasury
	2006	Climate Change – The UK Programme 2006	Cm 6764	DEFRA
	2006	The Energy Challenge – Energy Review Report 2006	Cm 6887	DTI
	2006	DEFRA Departmental Report 2006	Cm 6827	DEFRA
	2006	Prospects for the European Union in 2006	Cm 6735	FCO
	2006	Autumn Performance Report - Progress Report on HM Treasury Public Service Agreement Targets	Cm 6990	HM Treasury
	2007	Planning for a Sustainable Future – White Paper	Cm 7120	DCLV/DEFRA/DTI/DT
	2007	DEFRA Departmental Report 2007	Cm 7103	DEFRA
	2007	Draft Climate Change Bill	Cm 7040	DEFRA
	2007	Foreign & Commonwealth Office Departmental Report	Cm 7099	FCO
	2007	Meeting the Energy Challenge – A White Paper on Energy	Cm 7124	DTI
	2007	Prospects for the European Union in 2007 - The German Presidency, January to June 2007	Cm 7024	FCO
	2007	Prospects for the European Union in 2007 – The Portuguese Presidency, July to December 2007	Cm 7177	FCO
	2007	Meeting the aspirations of the British people - 2007 Pre-Budget Report and Comprehensive Spending Review	Cm 7227	HM Treasury

2007	The Governance of Britain – The Government's Draft Legislative Programme	Cm 7175	Leader of the House of Commons
2007	The Reform Treaty – The British Approach to the European Union Intergovernmental Conference, July 2007	Cm 7174	FCO
2007	A Sea Change - A Marine Bill White Paper	Cm 7047	DEFRA
2008	Departmental Report 2008	Cm 7399	DEFRA
2008	HM Treasury Annual Report 2007–08	Cm 7408	HM Treasury
2008	Meeting the Energy Challenge - A White Paper on Nuclear Power	Cm 7296	BERR
2008	Pre-Budget Report November 2008 - Facing global challenges: Supporting people through difficult times	Cm 7484	HM Treasury
2008	Prospects for the European Union in 2008 - The Slovenian Presidency, January to June 2008	Cm 7318	FCO
2008	Annual Report on Human Rights 2008	Cm 7557	FCO
2009	Building Britain's Future	Cm 7654	Prime Minister
2009	DEFRA Departmental Report 2009	Cm 7599	DEFRA
2009	European Community Finances: statement on the 2009 EC Budget and measures to counter fraud and financial mismanagement	Cm 7640	HM Treasury
2009	Tenth Report of the Foreign Affairs Committee Session 2007-08 Global Security: Japan and Korea	Cm 7534	FCO
2009	Government Response to the House of Commons Environmental Audit Committee Report: Carbon Capture and Storage (CCS)	Cm 7605	DECC
2009	Pre-Legislative Scrutiny of the Proposed National Assembly for Wales (Legislative Competence) (Environment) Order 2009	Cm 7608	Wales office
2009	Prospects for the European Union in 2009 - The Czech Presidency January to June 2009	Cm 7508	FCO
2009	The National Security Strategy of the United Kingdom: Update 2009 Security for the Next Generation	Cm 7590	Prime Minister
2009	The Road to Copenhagen - The UK Government's case for an ambitious international agreement on climate change	Cm 7659	DECC
2009	The UK Renewable Energy Strategy	Cm 7686	DECC
2009	Miscellaneous No. 9 (2009) Amendments to Annex II and Annex III to the OSPAR Convention for the Protection of the Marine Environment in the North-East Atlantic in Relation to the Storage of Carbon Dioxide Streams in Geological Formations	Cm 7696	FCO

3rd	2009	Her Majesty's Most Gracious Speech to both Houses of Parliament		Her Majesty The Queen
	2009	The Draft Legislative Programme 2009/10 – Government's Response and Summary of Consultation	Cm 7739	Leader of the House of Commons
	2009	Pre-Budget Report: Securing the recovery: growth and opportunity	Cm 7747	HM Treasury
	2010	Beyond Copenhagen: The UK Government's International Climate Change Action Plan	Cm 7850	DECC
	2010	Government's response to the North East Regional Committee's Second Report of Session 2009-10 into Teesside Cast Products	Cm 7868	BIS
	2010	Electricity Market Reform Consultation Document	Cm 7983	DECC
	2010	Government Response to the House of Commons Environmental Audit Committee 4th Report of Session 2009-10: The role of carbon markets in preventing dangerous climate change	Cm 7933	DECC
	2010	Local growth: realising every place's potential	Cm 7961	BIS
	2011	Pre-Legislative Scrutiny of the Proposed National Assembly for Wales (Legislative Competence) (Health And Health Services) Order 2011	Cm 7992	Wales office
	2010	Spending Review 2010	Cm 7942	HM Treasury
	2011	Pre-Legislative Scrutiny of the Proposed National Assembly for Wales (Legislative Competence) (Highways And Transport) Order 2011	Cm 7999	Wales office
	2011	Twenty-ninth Report – Demographic Change and the Environment	Cm 8001	RCEP
	2011	Planning our electric future: A White Paper for secure, affordable and low-carbon electricity	Cm 8099	DECC
	2011	Scotland Office and Office of the Advocate General for Scotland - Annual Report 2011	Cm 8102	Scotland office
4th	2012	Annual Energy Statement 2012	Cm 8456	DECC
	2012	Draft Energy Bill	Cm 8362	DECC
	2012	Electricity Market Reform: policy overview	Cm 8498	DECC
	2012	Energy Security Strategy	Cm 8466	DECC
	2012	Gas Generation Strategy	Cm 8407	DECC
	2012	Government Response to the House of Commons Energy and Climate Change Select Committee Report into the draft Energy Bill	Cm 8504	DECC
	2012	Government's response to the Heseltine review	Cm 8587	BIS

	2013	Treasury Minutes - Government responses on the Fourteenth, the Seventeenth to the Nineteenth, and the Twenty First Reports from the Committee of Public Accounts Session: 2012-13	Cm 8556	HM Treasury
	2013	Autumn Statement 2013	Cm 8747	HM Treasury
	2013	Annual Energy Statement 2013	Cm 8732	DECC
	2013	Electricity Market Reform: Capacity Market – Detailed Design Proposals	Cm 8637	DECC
	2013	Electricity Market Reform: Consultation on Proposals for Implementation	Cm 8706	DECC
	2013	Electricity Market Reform: Delivering UK Investment	Cm 8674	DECC
	2013	Investing in Britain's future	Cm 8669	HM Treasury
	2013	Memorandum to the Energy and Climate Change Committee Post-legislative Scrutiny of the Climate Change Act 2008	Cm 8696	DECC
	2013	Scotland analysis: Science and research	Cm 8728	BIS
	2014	Scotland analysis: Energy	Cm 8826	DECC
5th	2014	Annual Energy Statement 2014	Cm 8945	DECC
	2014	Autumn Statement 2014	Cm 8961	HM Treasury
	2014	Association Agreement between the European Union and the European Atomic Energy Community and their Member States, of the one part, and Ukraine, of the other part	Cm 8939 - I	FCO
	2014	Memorandum to the Energy and Climate Change Committee: Post Legislative Scrutiny off the Energy Act 20008	Cm 8893	DECC
	2015	Memorandum to the Energy and Climate Change Committee: Post Legislative Scrutiny of the Energy Act 2010	Cm 9018	DECC
	2015	Powers for a Purpose: Towards A Lasting Devolution Settlement For Wales	Cm 9020	Wales office
	2015	Government Response to the House of Lords Science and Technology Select Committee Inquiry: The Resilience of the Electricity System	Cm 9083	DECC
	2016	Office for Budget Responsibility: Economic and fiscal outlook	Cm 9212	HM Treasury
	2016	Oil and Gas Authority - Framework Document	Cm 9390	BEIS

Legend:

Acronyms	Government Departments
DETR	Department for Environment, Transport and the Regions
DEFRA	Department for Environment, Food and Rural Affairs
DT	Department for Transport
DCLV	Department for Communities and Local Government
DTI	Department for Trade and Industry
BERR	Department for Business, Enterprise and Regulatory Reform
BIS	Department for Business, Innovation and Skills
FCO	Foreign & Commonwealth Office
DECC	Department for Energy & Climate Change
BEIS	Department for Business, Energy & Industrial Strategy
RCEP	Royal Commission on Environmental Pollution

Appendix II: Excerpts of "climate change" and "carbon capture and storage" in political party manifestos

Party	Excerpts on climate change	N1	Excerpts on carbon capture and storage	N2
Labour 2001	"Delivering Kyoto and international development targets, as we help tackle climate change and global poverty". "We are convinced of the science of global warming. We pledge to meet tough national targets for environmental protection, and we will work at international level to halt and reverse climate change" "We will continue to provide leadership abroad, working for international agreement on climate change, improved integration of the environment in European policies and a strong global environment agency built around the current UN environment programme. We will work to improve marine and forest conservation overseas and in the UK"	7		0
Labour 2005	"Climate change is the one of the most pressing challenges that the world faces. We will continue to lead internationally on climate change, and to strive for wider acceptance of the science and the steps needed to combat the problem".	11		0

Labour 2010	"Over the next ten years we will confront major challenges - intensive global competition, climate change, an ageing society, and bringing stability to Afghanistan". "We will use our international reach to build security and stability – combating terrorism and extremism, curbing proliferation, preventing and resolving conflict, and tackling climate change". "Our industrial strategy will ensure that the drive to green our economy will create jobs and businesses in Britain in the manufacture and installation of low-carbon and environmental technologies".	13	"We have taken the decisions to enable a new generation of nuclear power stations, and a programme of four clean coal plants with carbon capture and storage technology with a levy to fund them. We are the only Government in the world to have banned new unabated coal-fired power stations".	1
Labour 2015	"Our country faces global challenges of climate change, terrorism and the spread of disease. In particular, tackling climate change is an economic necessity and the most important thing we must do for our children, our grandchildren and future generations".	13	"We will create an Energy Security Board to plan and deliver the energy mix we need, including renewables, nuclear, green gas, carbon capture and storage, and clean coal".	1
Labour 2017	"A Labour government will put us back on track to meet the targets in the Climate Change Act and the Paris Agreement".	11	"Emerging technologies such as carbon capture and storage will help to smooth the transition to cleaner fuels and to protect existing jobs as part of the future energy mix".	1
Conservative 2001	"The biggest global environmental challenge is to prevent climate change causing long-term damage through extreme weather conditions. We will meet the	2		0

	commitments made by successive British governments by a comprehensive package of emission permit trading, energy conservation measures, tax incentives, greater encouragement of renewable energy and cleaner energy generation".			
Conservative 2005	"To ensure Britain plays its part in combating climate change, we will phase out the use of harmful HFCs and deliver greater incentives to make homes more energy-efficient".	1		0
Conservative 2010	"We need to cut our carbon emissions to tackle the challenge of climate change. But the low carbon economy also provides exciting opportunities for British businesses. We will encourage private sector investment to put Britain at the forefront of the green technology revolution, creating jobs and new businesses across the country".	18	"Creating four carbon capture and storage equipped plants, taking coal – one of the most polluting fuels of all – and transforming it into a low carbon fuel of the future".	1
Conservative 2015	"Meet our climate change commitments, cutting carbon emissions as cheaply as possible, to save you money".	4	"We have been the greenest government ever, setting up the world's first Green Investment Bank, signing a deal to build the first new nuclear plant in a generation, trebling renewable energy generation to 19 per cent, bringing energy efficiency measures to over one million homes, and committing £1 billion for carbon capture and storage".	1
Conservative 2017	"So, after we have left the European Union, we will form our energy policy based not on the way energy is generated but on the ends we desire – reliable and affordable energy, seizing the industrial opportunity that	5		0

	new technology presents and meeting our global commitments on climate change".			
Lib Dem 2001	"The burning of fossil fuels - coal, oil and gas - is a major contributor to climate change, and also causes acid rain and local air pollution. Our top priorities are to reduce energy consumption overall, improving the efficiency with which it is used, and to switch from polluting forms to clean energy sources". "We will place Britain at the forefront of climate change negotiations, pressing other nations to ratify and implement the 1997 Kyoto protocol by the Rio+10 world summit in mid-2002. We will seek to extend its terms and targets further. We will ensure that Britain achieves its target well before the deadline, and establishes a new target of a 20% reduction in CO_2 emissions by 2010". "We would give priority to research on climate change mitigation and cleaner production and consumption techniques, and set up an Academy of British Invention. We will fund the Academy and provide extra money for scientific research by stopping the Export Credit Guarantee Department using taxpayers' money to support arms exports".	8		0

Lib Dem 2005	"Catastrophic climate change is the major environmental threat to the planet. Urgent action is needed. Liberal Democrat plans will make sure that Britain achieves its targets from the Kyoto Protocol (the international agreement on the pollution that causes climate change) well before the deadline".	14		0
Lib Dem 2010	"Britain must work together with our partners abroad if we are to have the best hope of meeting the challenges the world faces. We believe in freedom, justice, prosperity and human rights for all and will do all we can to work towards a world where these hopes become reality. Above all, climate change is the greatest challenge facing this generation". "Our response to climate change will give the British people more secure energy supplies, reduce air pollution and related health costs – and create thousands of new jobs". "Liberal Democrats will work within Europe and internationally to give renewed urgency to global efforts to combat climate change".	16	"Block any new coal-fired power stations – the most polluting form of power generation – unless they are accompanied by the highest level of carbon capture and storage facilities".	1
Lib Dem 2015	"Protect nature and fight climate change with five green laws".	24	"Increase research and development and commercialisation support in four key low-carbon technologies where Britain could lead the world: tidal power, carbon capture and storage, energy storage and ultra-low emission vehicles".	2

			"Regulate to end the use of unabated coal in electricity generation by 2025 because of its high carbon emissions and impact on local air quality, and require any new gas stations built after 2030 to be fitted with Carbon Capture and Storage (CCS) technology. We will implement a second phase of CCS projects by 2020".	
Lib Dem 2017	"Support the Paris agreement by ensuring the UK meets its own climate commitments and plays a leadership role in international efforts to combat climate change".	8	"Support an ambitious carbon capture and storage programme, which is essential for delivering clean industrial growth".	1

Legend:

N1 = Number of mentions on Climate change
N2 = Number of mentions on Carbon Capture and Storage

Appendix III: Mentions of Carbon Capture and Storage (CCS) in Annual Government Budgets

Yearly Government Budgets	Mentions of "Carbon Capture and Storage"
Budget 2004	No mention
Budget 2005	"The Government is therefore examining how it might support the development of CCS in the Climate Change Programme Review, including the potential for new economic incentives".
Budget 2006	"To advance the understanding of CCS, the Government is launching a consultation document on the barriers to wide-scale commercial deployment of CCS in the UK and the potential role of economic incentives in addressing those barriers".
Budget 2007	"The Government announces today that it will launch a competition to develop the UK's first full-scale carbon capture and storage demonstration, the result to be announced next year".
Budget 2008	"The Government will shortly be launching a consultation on CCS regulations as well as what it would mean for a new coal-fired power station to be 'capture ready', (i.e. to be in a position to retrofit CCS technology once it is proven at a commercial scale), and whether all new fossil fuel power stations should demonstrate that they are capture ready".
Budget 2009	"Budget 2009 announces that it is the Government's intention to put in place a mechanism to deliver up to four CCS demonstration projects, including both pre- and post-combustion coal projects. Budget 2009 announces that £90 million is being allocated to fund companies in the current competition to undertake detailed preparatory studies for CCS".
Budget 2010	No mention
Budget 2011	"The Government remains committed to providing public funding for CCS demonstration plants. However, consistent with its objectives for tax simplification, it will not proceed with the CCS levy. It will instead fund its commitments to CCS demonstration from general taxation".

Budget 2012	"The Government has introduced further measures including: setting out plans for the Green Deal to support energy efficiency; introducing the Renewable Heat Incentive; providing £1 billion to support the commercialisation of Carbon Capture and Storage; taking forward the Renewables Obligation Banding Review; and developing five new Centres for Offshore Renewable Engineering".
Budget 2013	"The Government intends to take forward two Carbon Capture and Storage projects to the detailed planning and design stage of the competition. This represents the next step in the £1 billion Carbon Capture and Storage commercialisation programme and follows a period of intensive commercial negotiations with a number of bidders".
Budget 2014	"The government is therefore providing £60 million for new low carbon innovation to support carbon capture and storage (CCS) technologies that show significant potential to reduce the cost of low-carbon generation in the UK".
Budget 2015	No mention
Budget 2016	No mention
Budget 2017	No mention

Appendix IV: Other Government Reports

- 2006 Stern Review Report on the Economics of Climate change
- 2008 UK Climate Change Act
- The UK Low Carbon Transition Plan – National Strategy for Climate and Energy, 2009
- Gleneagles Communique and Plan of Action
- UK Energy in Brief 2018
- CCS Roadmap - Supporting deployment of Carbon Capture and Storage in the UK, 2012
- CCS Cost Reduction Taskforce Final Report - The Potential for Reducing the Costs of CCS in The UK, 2013

Appendix V: Report from CCS industry and intergovernmental bodies

- 2005 IPCC Special Report on Carbon Capture and Storage

Appendix VI: Ethics Approval

The University Of Sheffield.

Downloaded: 04/05/2020
Approved: 14/08/2017

Gloria Mensah
Registration number: 160126840
Politics
Programme: Politics Research Training

Dear Gloria

PROJECT TITLE: Agenda-setting and Carbon Dioxide Utilization technologies in the UK
APPLICATION: Reference Number 016101

On behalf of the University ethics reviewers who reviewed your project, I am pleased to inform you that on 14/08/2017 the above-named project was **approved** on ethics grounds, on the basis that you will adhere to the following documentation that you submitted for ethics review:

- University research ethics application form 016101 (form submission date: 08/08/2017); (expected project end date: 01/10/2020).
- Participant information sheet 1034893 version 2 (30/09/2018).
- Participant consent form 1034891 version 4 (30/09/2018).

If during the course of the project you need to deviate significantly from the above-approved documentation please inform me since written approval will be required.

Your responsibilities in delivering this research project are set out at the end of this letter.

Yours sincerely

Edward Hall
Ethics Administrator
Politics

Please note the following responsibilities of the researcher in delivering the research project:

- The project must abide by the University's Research Ethics Policy: https://www.sheffield.ac.uk/rs/ethicsandintegrity/ethicspolicy/approval-procedure
- The project must abide by the University's Good Research & Innovation Practices Policy: https://www.sheffield.ac.uk/polopoly_fs/1.671066!/file/GRIPPolicy.pdf
- The researcher must inform their supervisor (in the case of a student) or Ethics Administrator (in the case of a member of staff) of any significant changes to the project or the approved documentation.
- The researcher must comply with the requirements of the law and relevant guidelines relating to security and confidentiality of personal data.
- The researcher is responsible for effectively managing the data collected both during and after the end of the project in line with best practice, and any relevant legislative, regulatory or contractual requirements.

Appendix VII: Participant Information Sheet

The University Of Sheffield.

Participant Information Sheet

Project Title: Agenda-setting, Policy making and Carbon Capture and Storage (CCS) technologies in the UK

Project Overview

This project seeks to gain an understanding of political processes surrounding Carbon Capture and Storage (CCS) technologies in the UK. So far, work has been conducted with Government documents to try and understand what happened with this technology in terms of Government's interest in this issue over the years.

As part of this work, I have come up with a diagram (attached) that I think helps to explain what happened to this technology. I'm hoping that we can use this diagram to talk about your perspective of what happened to CCS. My interest lies in whether you think this is a good way of understanding what happened, or if there are things that it missed or that need to change.

Your Participation:

You are being invited to participate in this research given your experiences and expertise working in this field. Your participation is entirely voluntary and you are free to withdraw from the study at any point of the interview.

If you wish to participate, you will be provided with a consent form to fill out and submit before the interview is conducted. You will be given the opportunity to remain entirely anonymous or retain partial anonymity by granting the researcher the opportunity to use your position in government/parliament or industry or be identified in any published literature.

A copy of the consent form will be provided to you for your records. Your participation will include a single interview lasting between 30-45 minutes. The interview will be conducted at your place of convenience, or through telephone or Skype.

Confidentiality and Data Storage

Please be informed that all data generated in the interview will be confidential. Interviews will be tape-recorded given your permission. Interview data will be transcribed and following this, interview transcripts will be provided to you to make comments, amendments or clarifications if any.

Files will be encrypted where anonymity is selected. You will be given the opportunity to consent to quotations to be used in any research output. Only the researcher and supervisors

will have access to any form of data from this project. All data produced as part of this project will be stored anonymously on a password protected computer.

Ethics Approval

This research has been approved by the University of Sheffield Ethics Committee.

This project has been funded by the Grantham Centre for Sustainable Futures, an ambitious and innovative collaboration between the University of Sheffield and the Grantham Foundation for the Protection of the Environment whose aim is to conduct sustainability-driven research projects which creates knowledge and connects it to policy debates on how to build a fairer world and save natural resources for future generations.

For any further information and queries, please contact:

Gloria Mateko Mensah (Doctoral Researcher)
Email: gmmensah1@sheffield.ac.uk
Telephone: +447577863766

Dr. Katharine Dommett (Project Lead Supervisor)
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Dr. Christopher Jones (Second Supervisor)
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Prof. Peter Styring (Second Supervisor)
Email: p.styring@sheffield.ac.uk

Many thanks for your time in reading this and hope that you will be able to participate in this research

Appendix VIII: Informed Consent

University of Sheffield

Title of Research Project: Agenda-setting, Policy making and Carbon Capture and Storage (CCS) technologies in the UK

Name of Researcher: Gloria Mateko Mensah

Participant Identification Number for this project: ..... **Please tick box**

1. **I confirm that I have read and understand the information sheet dated*..../..../2019* explaining the above research project and I have had the opportunity to ask questions about the project.** ☐
2. **I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences. In addition, should I not wish to answer any particular question or questions, I am free to decline.** ☐
3. **I understand that my responses will be kept strictly confidential. I give permission for members of the research team to have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the report or reports that result from the research.** ☐
4. **I agree to retain partial anonymity whiles granting permission to the researcher to use my position in government/parliament or industry or be identified in published literature.** ☐
5. **I agree for the interview to be audio recorded** ☐
6. **I agree for the data collected from me to be used in future research** ☐
7. **I agree for direct quotations to be used in any research outputs** ☐
8. **I agree to take part in the above research project.** ☐

Name of Participant *(or legal representative)*	**Date**	**Signature**
Name of person taking consent *(if different from lead researcher)*	**Date**	**Signature**
To be signed and dated in presence of the participant		
Lead Researcher	**Date**	**Signature**
To be signed and dated in presence of the participant		

Appendix IX: Interview Protocol
Interview Protocol

Introduction

Thank you very much for agreeing to meet/speak with me. I've got five topics I want to discuss today and I'm hoping we will have the time to cover them all. If we don't, would it be possible to follow up any questions by email? Can I just check how much time you have for this interview?

Get consent form signed. So, to kick off

- ✓ Can you briefly tell me about your background in relation to CCS? (i.e. have you worked in industry, government etc.)

Thanks so much, now, onto the main focus….

My PhD is trying to understand what has happened around CCS. So far, I have been doing some work with Government documents to try and understand what happened with this technology. As part of this work, I have come up with this diagram that I think helps to explain what has happened to this technology in terms of government's interest in this issue.

I'm hoping that we can use this diagram to talk about your perspective of what happened to CCS. I'm really interested in whether you think this is a good way of understanding what happened, or if there are things that it misses or that need to change.

Show the Diagram

This is a profile of government documentary discussion on CCS (Number of command papers e.g. energy white papers in which the subject 'Carbon Capture and Storage' appeared).

General Questions

- ✓ Do you think this diagram is useful in terms of what happened with CCS? Are these five periods accurate? Is there anything that could be improved or anything missing?
- ✓ Could you draw me your own diagram?

Problem stream

- ✓ What kind of factors do you think are significant in explaining these trends?
- ✓ Does this reflect your experience?
- ✓ One of the factors my analysis has shown to be important is changes in how this problem was understood, as progress seemed to be made when CCS was linked to coal - would you agree with this?'
- ✓ How would you describe the *'problem'* across the period? Was it consistent or did it change?

Policy stream

- ✓ How would you describe CCS *'policy'* across the period? Was it consistent or did it change?
- ✓ What issues do you think have adversely affected progress on CCS implementation?
- ✓ In your view, what were the key things that changed across the periods?
- ✓ One of the issues I have picked up in my analysis concerned CCS policy in relation to other technologies, and the possibility that CCS was up against other technologies. Do

- ✓ you think that was influential and how do you think that changed over this time period? How was CCS technology assessed vis a vis other technologies?
- ✓ One of things I have been interested in is whether affordability was a big issue in the CCS case. Do you think that was the case and in which periods was this more pressing? Why do you think this was so?
- ✓ Another issue that came up in the analysis is that coal production declined over the years. In your view, do you think that this affected how CCS policy was viewed and handled?
- ✓ One idea gained from documentary analysis concerned technology readiness. How do you think this affected how the policy was handled?

Politics stream

- ✓ How influential do you think politics was to the attention given to CCS?
- ✓ Did you see changes in how CCS was handled across different governments? How did the handling change?
- ✓ How would you describe the politics across the period? Was it consistent or did it change?
- ✓ Do you think events in international politics were influential in affecting CCS policy in the UK? Can you mention any of such political events which were significant?
- ✓ How do you think political events (such as the financial crisis or environmental crises) affected CCS?
- ✓ What would have happened if the financial crisis did not occur?
- ✓ How, if at all, did public opinion fit into how CCS was handled and viewed?
- ✓ Did you have any lobby groups for CCS at this time and who were they?
- ✓ Can you provide insights into why the government cancelled the competitions in the first and second period?

Window of opportunity

- ✓ One of the explanations for the rise in prominence of an issue is that there is the presence of a pressing problem to be solved, there is a solution seen to be feasible and there exists a right political atmosphere. Do you think that this explanation is compelling with regard to the CCS case? – Kingdon's MSF
- ✓ When do you think all of these conditions came together in these periods? Could you point these on the graph and share in your view what these issues were?

Closing questions

- ✓ In this research, one of the things that I am interested in is whether CCS may offer any lessons to proponents of emerging technologies. What do you think?
- ✓ From your perspective, what do you think has driven the success and/or failure of CCS in regard to the government support this technology has received.
- ✓ How distinctive is the UK's approach to CCS?
- ✓ Is there anyone else you think it would be useful for me to speak to as part of this research? Can you provide their contact details?

Thank you very much for your time in participating in this interview.