Explaining Climate Policy Variation in Developed States

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Abstract

The climate policies of developed states vary from small greenhouse gas emissions reduction targets to the formulation of highly ambitious, legally-binding objectives. As such, the research question of this thesis is 'What explains variation amongst developed states' climate policies?' This thesis seeks to explain variation in climate policy ambition in the twenty-three developed states of the UNFCCC Annex II between 2006 and 2010.

This investigation employs a nested design approach. It commences with a critical evaluation of the existing literature on environmental and climate policy to identify potential independent variables. Fuzzy set Qualitative Comparative Analysis then tests four hypotheses, in order to find the patterns that influence climate policy in the twenty-three states and select case studies. Austria, Finland, Germany and Sweden are selected as case studies, as their climate policies are not explained by the medium-n analysis. The four states also share very similar scores for each of the conditions being tested, but differ regarding the outcome. From here, semi-structured elite interviews with forty policy-makers and analyses of primary sources are employed as part of a small-n analysis on the four case studies. The concept of 'path dependence' is employed to facilitate an understanding of the long-term processes involved in climate policy development.

Three main arguments are made in this thesis. Firstly, the combination of left-wing government and membership of the European Union is sufficient to result in ambitious climate policy, while non-membership of the European Union is sufficient to result in 'not ambitious' climate policy. Secondly, states which developed renewable electricity policies according to the principles of Ecological Modernisation formulated pioneering climate policy. Thirdly, states that produced nuclear power, but also sought to phase out the energy source, formulated more ambitious climate policy than states that did not produce any nuclear power, or sought to expand the energy source. This thesis furthers the understanding of climate policy variation, adds to the burgeoning field of set theoretic methods, and provides more nuanced explanations of how Ecological Modernisation and nuclear energy can influence climate change policy.

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Declaration

I certify that the thesis I have presented for examination for the PhD degree from the University of York is solely my own work, other than where I have clearly indicated that it is the work of others.

I warrant that this authorization does not, to the best of my belief, infringe the rights of any third party.

None of the research presented in this thesis has been published or is under review, at the time of submission.

Chapter 1: Explaining Climate Policy Variation in Developed States

This PhD thesis seeks to provide a robust understanding of why developed states – despite a shared responsibility and capacity to mitigate climate change – possess climate policies of varying ambition. The extent of variation amongst developed states is vast; while some states, such as Germany and Sweden, have invested large sums into becoming world-leading actors in climate policy, similar states, such as Austria and Finland, have lagged behind (Burck *et al.* 2007; 2008; 2009*a*; 2010; 2011). Climate change threatens every aspect of society, from energy security to food production; it even makes the difference between life and death in many developing states, and increasingly, in developed states too (DiMento & Doughman, 2007). Kofi Annan (*in* Barnett, 2007: 1361), the former Secretary-General of the United Nations, argued that:-

"Climate change is not just an environmental issue . . . It is an all-encompassing threat. It is a threat to health. It could imperil the world's food supply. It could endanger the very ground on which nearly half the world's population live. Climate change is also a threat to peace and security."

Despite the potential threats of climate change, at the time of writing in 2014, the worst effects of climate change were yet to be felt in developed states. As such, if developed states have already begun to formulate ambitious climate change policies – as noted above – prior to experiencing the potentially catastrophic effects of climate change, there must be factors at play other than the vulnerability of the state to climate change that explain the ambition of their policies. This thesis seeks to identify those factors.

To begin the investigation, this chapter is broken into five sections. The first section lays out the research agenda and puzzle, arguing that there is a gap in the literature on why seemingly similar states have formulated markedly different policy approaches to climate change. Next, the argument and theoretical approach will be stated. The third section will outline the research design and the details of the mixed methods approach, and explain the process by which case studies will be selected. The sources of information and the rationale for selecting 2006-2010 as the timeframe under investigation will also be summarised in this section. The penultimate section will explain how the thesis makes a number of original contributions to the literature. Finally, the outline of the thesis will be stated.

1.1: The research agenda and puzzle

Estimates vary, but around 140,000 people die annually from the impacts of climate change (WHO, 2010). Evidently, climate change is already a significant feature of physical and human geography, rather than a mere potential future threat. While the likely impacts of climate change vary dramatically depending on the geographical region in question, every continent can be expected to face dramatic problems (IPCC, 2013). Climate change is a 'public bad' – that is to say, it is both non-excludable and non-rivalrous – and thus features a large degree of free rider potential, encouraging states to rely on others' emissions reductions rather than implementing their own (Nordhaus, 1998). Despite the already large numbers of estimated deaths, it is difficult to attribute any individual extreme weather phenomenon to climate change, reducing the effect of problem pressure, which could force governments to formulate more ambitious climate change mitigation policies (Compston and Bailey, 2012). As such, it may be argued that democracies are poorly suited to mitigating climate change, if their short-term nature is ill-suited to such a long-term threat (Dobson, 2007). Yet, the twenty-three developed states identified as holding the greatest obligation to reduce emissions are all democracies. Amongst these twenty-three states, a number of governments have elected to pursue highly ambitious climate change mitigation policies, despite a varying lack of support amongst domestic constituents and potential exploitation by free-riders in the international arena. Other states have formulated much less ambitious policies. What explains the variation between these states?

This section details the existing research agenda associated with explaining ambitious climate policy and the puzzle to be answered by this investigation. To do so, firstly the science underpinning climate change will be briefly stated. Next, the creation of the United Nations Framework Convention on Climate Change (UNFCCC) will be detailed, noting the identification of twenty-three 'Annex II' states as the developed states with the greatest obligation and capacity to reduce emissions. From here, the variation in policy responses amongst the twenty-three states will be explored, highlighting the vast range in ambition demonstrated by countries sharing similar responsibilities and capabilities for mitigating climate change. It is particularly interesting, for example, that states that have previously been identified as environmental pioneers have not necessarily expressed such attitudes towards climate change. The puzzle that this thesis seeks to answer is therefore why there is variation between the climate policies of developed states. Finally, the research questions to be explained by this investigation will be stated.

1.1.2: The science of climate change

Mark Twain's (*in* Abatzoglou *et al.*, 2007*a*: 13) acerbic truism that climate is what you expect, while weather is what you get, is relatively accurate, in that 'climate' reflects more long-term meteorological phenomena, while 'weather' is more short-term (and could be influenced by climate change). In 1824, Joseph Fourier proposed that carbon dioxide could act as an atmospheric blanket that traps heat, as part of a phenomenon known as the 'greenhouse effect' (Bulkeley & Newell, 2010). By the 1970s, the science of anthropogenic climate change was achieving widespread acceptance, as well as a feeling of foreboding about the potential impacts of such changes to the global temperature (Weart, 2003). Despite fluctuating levels of scepticism, scientists have argued that it is extremely likely (that is to say, they are at least 95% certain) that the global average net effect of human activities since 1750 has been one of warming (IPCC, 2013: 4). The year 1750 is pinpointed due the role of the industrial revolution in increasing rapidly the emission of Greenhouse Gases (GHGs).

The most significant of the GHGs is carbon dioxide (a direct product of fossil fuel consumption), which, because of the quantities of the gas that are produced, has a greenhouse effect three times larger than the second most significant gas, methane (Pilkey & Pilkey, 2011: 5). As a result of these emissions, "the current rate of change exceeds the largest warming rate seen in earth's climate history" (Abatzoglou *et al.*, 2007*a*: 33). Humans have become geological agents in their own right, capable of transforming the earth's entire climate, such that the current geologic era is known informally as the 'Anthropocene' (Oreskes, 2007: 93). If trends continue and replicate regularly the deadly summer of 2003 – the hottest in Europe in five hundred years – temperature increases will make inland cities feel like Death Valley (Abatzoglou *et al.*, 2007*b*: 56). As well as rendering some regions uninhabitable to humans, higher temperatures will increase the number of extreme weather events, such as forest fires, storms and hurricanes (IPCC, 2013). As recently as 2005, extreme weather contributed to over $200bn of damage worldwide (Abatzoglou *et al.*, 2007*b*: 48). As such, climate change poses one of the most significant threats to humanity's existence on earth.

1.1.3: The United Nations Framework Convention on Climate Change

In 1992, the United Nations Conference on Environment and Development, held in Rio de Janeiro, Brazil, took place. On the agenda were a range of issues, such as water scarcity, biodiversity loss, leaded petrol and the protection of indigenous peoples. While "a number of legal instruments were adopted at the Summit, the most active and prominent amongst them was the adoption of the FCCC [Framework Convention on Climate Change]" (Ramakrishna, 2000: 59-60). All UN member states are Parties to the FCCC, thus institutionalising engagement on climate change for every state (UNFCCC, 2014*a*). In addition to creating the Convention, the Rio conference identified the 'common but differentiated responsibilities' (CBDR) of states; that is to say, developed states have a greater obligation to reduce their GHG levels due to their historic emissions and their larger share of emissions produced currently, while developing states need to increase their emissions in order to develop economically (*see* Hurrell & Sengupta, 2011: 465). The concept of 'equity', whether between states or between generations, has been the hallmark of negotiations so far. Although negotiators in Rio could not have foreseen the imminent and rapid development of certain states, such as China, India and Brazil, CBDR created a differentiated international response to climate change in which developed states were expected to make the biggest reductions. This decision would hold significant political ramifications.

As a result of the principle of CBDR, three categories of states were created. ‘Annex I’ nations included both industrialised states and ‘economies in transition’ from Communism. ‘Annex II’ nations comprised solely of developed states, without the ‘economies in transition’. Finally, the ‘non-Annex I’ countries were the remaining, developing states (UN, 2014*a*). The Annex II states, therefore, were identified from the beginning of the UNFCCC as holding primary responsibility for reducing global emissions levels. After passing the required number of state ratifications, the Convention entered into force on 21st March, 1994 (Schroeder, 2010). Thus, at the time of writing, it has been over twenty years since developed states defined themselves as holding the greatest obligation to curb climate change. While highly significant policy *outcomes* may be unlikely in this relatively nascent field, twenty years should be sufficient for states to develop ambitious policy *outputs* (Schaffrin *et al.*, 2014: 864).

1.1.4: Variation in climate policy ambition amongst developed states

Developed states have produced around 70% of the GHG emissions since 1970, despite being a much smaller percentage of the global population, making these states crucial in mitigating climate change (Stern, 2010: 25). The oil industry stands to lose billions if it is replaced by non-fossil fuel energy sources. As a result, “contrarians have put inordinate amounts of effort into trying to find something that is wrong with climate science” (Oreskes, 2007: 89) and have found very little. However, certain instances, such as the ‘Climategate’ and ‘Glaciergate’ scandals (*see* Pilkey & Pilkey, 2011: 34) have been seized upon as examples of a scientific conspiracy. As such, those states which are the biggest producers of fossil fuels, such as the USA, Canada and Australia, have seen climate scepticism prosper while policy ambition has plummeted (Nuticelli, 2014). A significant factor when explaining these states’ climate policies is therefore the challenge of appeasing thousands of citizens who are dependent on fossil fuels for employment, or the powerful fossil fuel corporations who employ them. However, what is not clear is why states that do not export large quantities of fuel are not pioneers, for example, Italy and New Zealand. Even more intriguing is why states that have previously been identified as environmental pioneers have not extended such leadership to climate change mitigation. Liefferink and Andersen (1998*b*) and Börzel (2002) found that Austria, Denmark, Finland, Germany, Netherlands, and Sweden were a sextet of environmental leaders in the late 1990s and early 2000s. Yet, regarding climate change, Finland has sought to stymie international progress on climate change (Teräväinen, 2010*a*: 207), while Austria failed to meet its Kyoto Protocol targets by a staggering 39%, having aimed to reduce emissions by 13% but actually increasing them by 26% (OECD/IEA, 2007: 25). On the other hand, Germany and Sweden have extended their environmental leadership into the realm of climate mitigation, with Germany going so far as to place the issue at the top of its foreign policy agenda (Wurzel, 2008: 24). The reasons for the divergence amongst these states, and across the Annex II group as a whole, have not yet been explained.

1.1.5: Research question

As noted immediately above, in the existing literature it has not been explained why there is variation between the climate policies of developed states. Certain states have become climate pioneers, while similar states that have comparable obligations and capacities for climate mitigation – and have previously been environmental pioneers – have not become so. Thus, the overarching puzzle of this thesis is:

Why is there variation amongst the climate policies of developed states?

To address this overarching puzzle, the following research question will be answered.

Research Question: What explains variation amongst developed states' climate policies?

As such, the dependent variable to be explained in this thesis is variation amongst developed states' climate policies, while a variety of independent variables will be explored throughout the thesis, as discussed below.

1.2: The argument and theoretical approach

To answer the question outlined above, the following argument will be made. This thesis employs a nested analysis approach (Lieberman, 2005), in which a medium-n analysis is conducted, comprising all twenty-three of the Annex II states, before selecting case studies to be explored in detail. Chapter 3 uses set theoretic methods in the form of fsQCA ('fuzzy set Qualitative Comparative Analysis') and demonstrates the variation of ambition demonstrated in developed states, with a particular focus on which states were climate policy pioneers and which states were laggards. It is argued that the most ambitious climate policy pioneers during the period of analysis were Germany, Iceland, Portugal, Sweden and the UK, and to a lesser extent, France, Ireland and Norway. Austria, Canada, Italy, Japan and the USA, and to a lesser extent, Australia, Belgium, Finland, Greece, Luxembourg, Netherlands, and New Zealand, were the least ambitious of the Annex II states. Denmark, France, Spain and Switzerland are shown to have neither been leaders nor laggards regarding climate policy ambition during the period.

The fsQCA in Chapter 3 also serves to identify the factors that were necessary and sufficient for pioneering climate policy in developed states. It is argued that there were no necessary conditions that resulted in pioneering climate change policy – although membership of the European Union (EU) came close – suggesting that there are no individual requirements or barriers that facilitate or prevent states from developing pioneering climate legislation. In the most parsimonious solution of Chapter 3, the combination of EU membership with a left-wing government was found to be sufficient to result in a state becoming a climate policy pioneer. In order to progress onto the small-n stage of the nested analysis, four case study states were selected that were not explained by the fsQCA solutions. These cases were then explored in detail in Chapter 4, in order to control for further conditions, and explain why the climate policies of the states were graded as they were in the fsQCA.

Two main arguments are developed in Chapters 5 and 6 to explain the policy outputs of the four case studies selected in Chapter 3. Path dependence (David, 1985; Pierson, 2000) provides an effective conceptual approach for understanding these two arguments. Path dependence occurs when an actor becomes ‘locked in’ to a certain approach, which then shapes future actions on the same issue. Following a critical juncture in which a key decision is made, positive feedback mechanisms reinforce this original decision, resulting in the recurrence of a particular pattern (Collier & Collier, 1991). While the original decision may have been somewhat modest, the impacts of the decision can become stronger and more consolidated with time. Once an actor is on such a path, it may be difficult to reverse the original decision, thus resulting in an outcome that may not otherwise have been without the original critical juncture. The two chapters will therefore identify the critical junctures and the positive feedback mechanisms that ‘locked in’ certain patterns within the states, and demonstrate how these patterns influenced climate policy outputs.

Path dependence is used as a means of understanding how processes can both facilitate (Chapter 5) and inhibit (Chapter 6) climate policy ambition. This is not to say that the nature of the two arguments made in the small-n analysis are qualitatively different to the four conditions of the fsQCA, but rather that by employing the concept of path dependence to examine the arguments made in the small-n analysis, a greater understanding of the causal process may be developed. In Chapter 5 it is argued that the presence of Ecological Modernisation (EM) in government policy-making facilitates the development of ambitious climate policy. EM posits that environmental solutions can and indeed must be profitable economically. I argue that path dependence can be used to provide a fuller understanding of the development of renewables policy in climate policy pioneers. The two climate pioneers were locked into a path that favoured investment in renewables as a means of creating exportable products, because of two critical junctures that had both occurred in 1991. As a result of the jobs created and the economic benefits of burgeoning renewables sectors, the pioneers were encouraged to develop even more ambitious renewables policies, which in turn facilitated climate policy ambition, as the states stood to benefit economically from reductions in GHGs. In the two laggard states, such critical junctures did not occur, meaning that the states did not become locked into a path of pioneering renewables policy, thus ensuring that the states were not encouraged to develop highly ambitious climate policy.

In Chapter 6, I argue that a state must possess – but be seeking to phase out – nuclear power in order to be a climate policy pioneer. This 'Goldilocks Hypothesis' – in which a state shows neither total opposition to nuclear power, nor unwavering support for the energy source – is demonstrated by the two climate pioneers, but not the two laggards. In this chapter, path dependence is used as a concept for understanding why ambitious climate policy was *inhibited*. The decision of one laggard to ban nuclear power in 1978 was reinforced by nuclear energy disasters in other states, such as Three Mile Island in the USA and Chernobyl in the former USSR, which strengthened opposition to the energy source still further. Unable to source electricity from nuclear power, the state was thus dependent on imported fossil fuels, which hindered its capacity to formulate ambitious climate policy. In the other laggard state, a desire to remain independent from a former colonial ruler strengthened the willingness of policy-makers to support nuclear energy, and with a highly educated workforce that was trusted to manage nuclear power stations safely, nuclear energy was not seen as a significant threat. As a result, nuclear energy was expanded throughout the period under investigation, reducing the need to invest in renewables or reduce electricity consumption, and thus weakening climate policy ambition. The two climate policy pioneers were not locked into such paths, enabling a more dynamic approach to nuclear electricity to be developed. These states could thus source electricity from nuclear power, but also seek to phase out the energy source, creating an incentive to invest still further in renewable energy, and also reduce overall electricity consumption.

Finally, in Chapter 7, I posit that in order for a state to be a climate policy pioneer, it must possess favourable conditions regarding climate policy from both arguments made in Chapters 5 and 6. For the sake of clarity, let the argument around renewable electricity be 'A', and the nuclear argument be 'B'. Argument A supports climate policy ambition; if a state's renewable electricity policy is shaped by EM, then the state develops more ambitious climate policy. Argument B also supports climate policy ambition; if a state sources electricity from nuclear power, but is seeking to phase out the energy source, then the state develops more ambitious policy. As such, the following will be argued:-

If a state exhibits A and B, then the state becomes a pioneer.

If a state exhibits neither A nor B, then the state becomes a laggard.

If a state exhibits either A or B, then the state is neither a leader nor a laggard.

Therefore, in answer to the overarching puzzle that seeks to explain variation amongst the climate policies of developed states, the following arguments are made. While EU membership is almost necessary for pioneering climate legislation, the combination of EU membership and left-wing government is sufficient for a state to become a climate policy pioneer. However, not all of the states possessed this combination of conditions, necessitating the selection of four case studies. From here, two pathways are identified that explain why certain states are pioneers while others are laggards. If the tenets of Ecological Modernisation influence policy-making decisions regarding renewable electricity policy, then climate policy will be more ambitious. If a state does not produce nuclear energy, or seeks to expand the use of the energy source, then climate policy ambition will be impeded. Thus, in order for a state to become a climate policy pioneer, then its renewables policy must be influenced by EM, and it must be seeking to phase out nuclear energy. Similarly, if a state's renewables policy is not influenced by EM, and the state is not seeking to phase out nuclear energy, I argue that the state will be a climate policy laggard. In a state that either demonstrates renewables policy influenced by EM, or seeks to phase out nuclear energy, then the state will be of average climate policy ambition when compared with other developed states, *ceteris paribus*. The concept of path dependence is particularly useful for understanding how both of these scenarios are introduced, become consolidated, and influence policy-making within a state.

1.3: Research design

This thesis of seven chapters employs a mixed methods approach to explain policy in a variety of case studies. This section on the research design of the investigation is broken into three parts. The first section documents the methodology employed in the thesis, and the process for selecting the four case studies. Next, the sources to be used as a means of gathering data will be outlined, noting the combination of existing primary data sources, secondary evaluations from the existing literature, and elite semi-structured interviews that were conducted as a part of this project. The final part then details the timeframe to be explored, explaining the reasons for selecting 2006-2010.

1.3.1: Methodology and case selection

This investigation employs a mixed methods approach (*see* Bryman, 2012: 637) centred on a nested analysis design (Lieberman, 2005). Nested analyses begin with a medium-n or large-n analysis. As a result of this analysis, patterns between the cases are identified, and case studies can also be identified to be explored in further detail (Schneider & Rohlfing, 2013). In so doing, selection bias can be minimised, as the case studies to be investigated are selected because of their explanatory power, rather than the preferences of the researcher (*see* King *et al.*, 1994: 28). From here, a small-n analysis involving a few case studies can be conducted, with which to address any questions left unanswered by the large-n analysis (Lieberman, 2005: 439). Two sets of hypotheses will therefore be developed in this thesis; one set that is applicable to the medium-n analysis, and one set that is applicable to the small-n analysis. The hypotheses that are tested in the small-n analysis may not be translated into terms that can be tested in the medium-n analysis, otherwise they would have been included (Lieberman, 2005: 437).

Lieberman (2005: 436) states that the "promise of the nested research design is that both LNA [Large-N Analysis] and SNA [Small-N Analysis] can inform each other to the extent that the analytic payoff is greater than the sum of the parts." Nested analyses are particularly useful when a researcher is seeking to explain an outcome involving a large number of cases and has yet to determine which cases will be explored in greater depth. The method provides direction for making comparisons and the selection of case studies. These case studies can be used to test additional hypotheses, which either cannot be tested in the medium-n analysis, and analyse cases that are not explained in the medium-n analysis. In so doing, the strengths of both small-n and medium-n analysis can be married. Seeking to explain climate policy variation across twenty-three states would be considered a medium-n analysis. In the likely event that certain states are not explained by the medium-n analysis, the critical evaluation of certain case studies in greater depth would be highly beneficial. Therefore, nested analysis is an ideal means of explaining climate policy variation across developed states.

While many statistical analyses are conducted using regression analyses, this thesis employs fsQCA, which is also recommended by Lieberman as a suitable method for the medium-n stage of a nested analysis (2005: 437). In regression analyses, each of the causal factors is examined in isolation as an independent variable. In contrast, Qualitative Comparative Analysis enables the researcher to examine how factors interrelate, by linking together independent variables (henceforth ‘conditions’) into unique patterns (‘causal configurations’) and then assessing their significance in the resulting dependent variable (‘outcome’). QCA is seen as drawing from both quantitative and qualitative methodology (Byrne, 2002: 156), as variables are graded quantitatively, but only through strong qualitative knowledge of the subject matter (Kent, 2009).

QCA is a ‘set theoretic method’; that is to say, it seeks to place conditions and outcomes into sets that pertain to necessity and sufficiency with regards to the outcome, as prescribed by the principles of Boolean algebra. In contrast to crisp set QCA (Ragin, 1989) – in which scores of either 1 or 0 are accorded to cases in order to denote the membership or non-membership of a set – fuzzy set QCA involves the grading of cases from 0 to 1, depending on their degree of membership in a set, as determined by empirical evidence and substantive knowledge of the subject (*see* Pennings, 2003).

Although regression studies are adept at determining the extent to which a particular variable affects an outcome, few are able to identify the necessary and sufficient causal underpinnings of an outcome, particularly when these conditions are considered in conjunction. As Katz *et al.* (2005: 569) neatly summarise, regression studies are more appropriate when "one's concern is more with the "effects of a cause" and less with the "causes of an effect."" When a phenomenon is presumed to be complex – suggesting a high number of variables involved – as well as 'equifinal'– whereby multiple pathways lead to a given outcome – regression studies are not appropriate (Goertz & Mahoney, 2005). Similarly, while in-depth case study analysis is a useful tool when attempting to examine a particular case, such methods are impractical when comparing a variety of cases, and also struggle to explain how variables interact as patterns. While fsQCA is less suited – but not unsuited – to investigations featuring very small or very large numbers of cases (*see* Schneider & Wagemann, 2006: 751), the method is ideal for handling medium-n analyses, such as the twenty-three cases under investigation in this paper. Thus, the primary motivation for employing fsQCA in this investigation is to isolate which combinations of conditions are necessary or sufficient in influencing ambitious climate policy, and the twenty-three cases under investigation are an ideal number when employing this methodology.

This thesis is divided into seven chapters. Following this chapter, Chapter 2 identifies salient factors from the existing literature on environmental policy and climate policy, before seeking to identify patterns using fsQCA in Chapter 3. The data analysed in the fsQCA are drawn from secondary sources to minimise the possibility of subjective coding. None of the conditions examined were sufficient to result in ambitious or 'not ambitious' climate policy. The analysis finds that EU membership combined with a left-wing government is sufficient to result in ambitious climate policy. For the negation of the outcome, 'not ambitious' climate policy, it is sufficient for a state not to be a member of the EU.

There were two criteria for selecting the case studies. Firstly, it was necessary that two of the states were not explained by the solution for ambitious climate policy, while the other two states were not explained by the solution for the negation of the outcome. As a result, two leaders and two laggards were selected. Secondly, the case studies also needed to follow Mill's (1884) Method of Difference, whereby each of the cases possessed the same independent variables, but express different outcomes. As Norris (2005: 36) states, "by 'controlling' for certain common features… the analyst can thereby exclude these factors from the analysis and focus upon those conditions that do vary systematically". Thus, all four of the states are controlled for the four conditions analysed in the fsQCA, namely EU membership, GDP per capita, government partisanship and the political discretion of the government, as shown in the table below, *Table 1*. However, two of the states were leaders, while the other two were laggards. In addition, *Table 1* also includes the conditions that are controlled for in the critical evaluation conducted in Chapter 4, which took place after the case selection; namely, that each of the four case studies is a multi-party, corporatist, parliamentary democracy.

Table 1: Controlled conditions in case study selection.

Cases	**State**	**Austria**	**Finland**	**Germany**	**Sweden**
Causal conditions controlled for in Chapter 3	**EU Membership**	Yes	Yes	Yes	Yes
	Political discretion	High	High	High	High
	Left-wing Government	No	No	No	No
	GDP per capita	High	High	High	High
Causal conditions controlled for in Chapter 4	**Multi-party**	Yes	Yes	Yes	Yes
	Corporatist	Yes	Yes	Yes	Yes
	Parliamentary	Yes	Yes	Yes	Yes
Outcome	**Ambition of climate policy**	Low	Low	High	High

As Burnham *et al.* (2004) state, the primary challenge with comparative design is "finding comparable cases: that is, examples which are similar in a large number of respects to the case which [is] constant, but dissimilar in the variables that they wish to compare." Indeed, Lijphart (1971) argues that researchers can never be certain that two different states are the same on all issues except the one under investigation; a perspective shared by this investigation. However, despite this potential vulnerability, Chapters 4 to 6 of this thesis employ in-depth analysis of the four case studies. The nested analysis design enables the potential conditions listed in *Table 1* to be controlled for, such that other potential explanations may be identified. The research conducted for the small-n analysis enables two further causal arguments to be made, as described in Section 1.2 of this chapter and made in Chapters 5 and 6. As a result, specific arguments regarding renewables policy and nuclear energy policy are developed, which can be used to explain the outcomes of the cases not explained by the fsQCA.

1.3.2: Sources

In order to base the arguments made in this thesis on empirical data, this investigation analyses data taken from a variety of sources. For the conditions tested in the fsQCA, data are coded into a 0 to 1 scale, creating an original data set. For the outcome scores, raw data were kindly provided by Germanwatch from its Climate Change Performance Index related to the five years from 2006 to 2010 (for the raw data, see Appendix 1). This data related to national, rather than international, policy ambition and was sourced from specialists working for Non-Governmental Organisations (NGOs) based in each state. The Germanwatch data were then recoded into an fsQCA scale. Regarding the coding of conditions, while EU membership was coded into categories – non-members, non-members that are members of the European Free Trade Association (EFTA), and members – the other three conditions were coded on continuous scales according to existing data. Political discretion was coded according to the Political Constraint Index (NSD, 2011), which in turn was based on the work of Henisz (2002). The third condition, government partisanship, was coded according to the coding by Armingeon *et al.* (2012) of OECD states from 1960-2010 as part of the Comparative Political Data Index (CPDI), which used the Schmidt index (*see* Schmidt,

1996) in order to grade governments from left to right on the political spectrum. Finally, GDP per capita was coded using the data from the OECD (2014*a*) dataset in US $, using constant prices, constant Purchasing Power Parities (PPPs) and a reference year of 2005. The raw data and coding are listed in the appendices at the end of this thesis.

The small-n analysis in this thesis utilises government policy documents, legislation, published research articles, working papers and news articles as primary sources. In order to triangulate the research findings, forty semi-structured interviews with elite actors were conducted between June 2013 and April 2014. The affiliations of these confidential interviews are listed in the appendices at the end of this thesis. The semi-structured interview techniques employed in the investigation build upon the research methodology of Jones and Clark (2001), and Dexter's (2012) seminal work on elite interviewing. Policy-makers in each of the four states were targeted, including civil servants, party employees, employees of NGOs, researchers working for think-tanks and elected politicians. In addition, the snowball method was employed prior to, during and after interviews to locate potential targets for further interviewing (*see* Denzin & Lincoln, 2000; Dexter, 2012: 20). In addition to acting as a means of confirming hypotheses, the interviews were also used for exploratory purposes, by providing new ideas and interpretations with which to consider the period under investigation.

1.3.3: Time frame

This thesis seeks to explain climate policy between 2006 and 2010. This time period was selected in order to be as recent as possible, whilst also ensuring that data were fully available with which to code each case as part of the fsQCA. Moreover, the period reflected a great deal of diversity with regards to climate policy, whereby some states – such as Germany – expended both financial and political capital in order to become climate pioneers, while in others – such as the USA – climate scepticism was rife. The global economic crisis also occurred during this period, ensuring that ambition before, during and after the crisis could be considered. The economic crisis was not identified as a significant explanatory factor regarding the variation of policy developed between 2006 and 2010, as it is argued to have reduced ambition in both pioneers and laggards.

1.4: Originality and contribution of thesis

This thesis seeks to explain pioneering climate policy in developed states and makes a number of original contributions to the wider literature in the process. The scope of the project (variation in climate policy ambition in the Annex II states), the application of fsQCA to identify patterns of causation, and the arguments made regarding Ecological Modernisation and nuclear phase-out are all innovative developments in the field of climate policy analysis. Firstly, innovation is demonstrated in response to the main research puzzle that seeks to explain climate policy variation amongst developed states. In the existing literature there is no piece of work that has sought to explain variation of climate policy across all of the Annex II states. As such, the scope of the project is innovative. Moreover, the case studies employed in greater detail for the in-depth analysis – Austria, Finland, Germany and Sweden – have not been explored in detail as a group of four before, enabling novel parallels to be identified between the states.

Secondly, fsQCA has not been employed previously to analyse climate policy ambition in developed states. Never and Betz (2014) published an investigation into climate policy performance (rather than ambition) regarding developing (rather than developed) states a couple of months prior to the submission of this thesis, but the objectives of the article, and the conditions explored, differ to the use of fsQCA in this thesis. Similarly, a working paper by Sehring *et al.* (2013) uses fsQCA to examine REDD+ (Reducing Emissions from Deforestation and Forest Degradation), but again this work employs different conditions to different cases in order to explain a different outcome. As such, the use of fsQCA to explain climate policy ambition is a new application of the burgeoning method. Moreover, the findings of the fsQCA are significant, as they suggest there is no condition that is necessary for ambitious climate policy, and that GDP per capita and the degree of political discretion are not part of the most parsimonious combination of factors that is sufficient to result in ambitious policy. The argument that EU membership *in conjunction with* left-wing government is sufficient for pioneering climate policy is new to the existing literature. Furthermore, by employing a mixed methods approach, this thesis makes an original contribution to the literature on climate policy by marrying medium-n analysis with elite semi-structured interviews and the qualitative analysis of other data.

The concept of path dependence and the arguments made in Chapters 5 and 6 provide new interpretations of existing paradigms within the literature. As Schaffrin *et al.* (2014: 866) argue, the transformation of the energy system of electricity and heat production takes centre stage in countries' political efforts to mitigate climate change, and thus the two main explanatory chapters focus on electricity policy when highlighting pioneering policy-making. The argument made in Chapter 5 that Ecological Modernisation incentivised ambitious climate policy is a new interpretation of the concept. It has been argued that EM may exacerbate climate change, as emissions production may be exported to developing states, thus making no difference to transboundary threats, such as climate change (Schnaiberg *et al.*, 2002: 21). Moreover, it has also been argued that the pro-capitalist and pro-growth sentiments underpinning EM are incompatible with preventing the worst effects of climate change. This thesis provides a new understanding of this argument by positing that EM may be a means of facilitating climate ambition relatively early on – such as between 2006 and 2010, as explored in this thesis – but that in the long-run, a more ambitious approach is necessary. Thus, rather than being either adequate or inadequate for responding to climate change, I argue that EM is a time-specific stepping stone that facilitates innovative technological advancement before more ambitious policies are required in future.

Finally, the argument made in Chapter 6 that nuclear phase-out engenders climate policy ambition is a new interpretation of the relationship between nuclear power and climate policy. While it has been argued previously that nuclear power is a vital solution to climate change, as the energy source does not produce greenhouse gases directly during electricity production (EDF, 2014; Massey, 2014), I argue that a dependence on nuclear energy inhibits investment in renewables and stymies calls for improved energy efficiency. On the other hand, it has been argued that due to the mining of uranium, the processing of radioactive resources, the transport of fuels and the construction of nuclear power plants (amongst many parts of the nuclear energy lifecycle), nuclear power does not reduce GHG emissions significantly enough to be considered a climate-friendly solution (Caldicott, 2006; Green American, 2014). This thesis debunks that argument too, by arguing that a total ban on nuclear energy – in the current electricity environment at least – necessitates a reliance on fossil fuels, which exacerbates climate change significantly. Thus, those states that produce nuclear electricity but seek to phase out the energy source demonstrate a 'Goldilocks Effect', facilitating the decoupling from fossil fuels, whilst also being incentivised to develop renewables and improve energy efficiency, thus facilitating more ambitious climate policy.

1.5: Outline of thesis

This PhD thesis has seven chapters, of which this Chapter is the first. Chapter 2 provides a critical evaluation of the existing literature that is salient to this investigation, and highlights the theoretical approach to be taken in the thesis. The dependent variable – variation of climate policy in developed states – will be explained in detail, before selecting the independent variables to be taken forward as conditions for the fsQCA. In the final section of the chapter, the existing literature on Ecological Modernisation and nuclear energy will be surveyed, before the conceptual foundations of path dependence will be discussed.

Chapter 3 isolates which states were climate pioneers and which were laggards during the period, identifies the patterns that influence climate policy, and selects the case studies to be explored in detail. Firstly, the methodological principles underpinning fsQCA will be explained. Next, the four conditions – EU membership, GDP per capita, government partisanship and the degree of political discretion possessed by the government – will be operationalised. From here, the results of the fsQCA will be detailed, before discussing the findings. It will be argued that the combination of EU membership and left-wing government is sufficient to result in pioneering climate policy, while non-membership of the EU is sufficient to result in 'not ambitious' climate policy. However, due to exceptions to this finding, four case studies will be selected to be explored in further detail: Austria, Finland, Germany and Sweden.

Having selected the case studies, Chapter 4 describes the salient details of the four states. In doing so, the similarity of the political systems will be noted, and therefore controlled for, as each state is a multi-party, corporatist, parliamentary democracy. The energy make-up of each state will be detailed, explaining the economic demands and sources of electricity used to support each state. As the arguments made in Chapters 5 and 6 are based significantly around electricity policy, a thorough understanding of each state's electricity portfolios is crucial. Finally, the dissimilarity of climate policies will be explained, highlighting Austria and Finland as climate policy laggards, while Germany and Sweden were pioneers, as argued in the fsQCA. The four cases therefore demonstrate significant variation in climate policy ambition.

Chapter 5 argues that the pioneering states were incentivised to increase their renewable electricity provision as a result of the influence of Ecological Modernisation in policy-making. By decreasing rapidly the production of GHGs from their energy supplies through investment in renewable technology, Germany and Sweden were emboldened to formulate more ambitious emissions reductions targets for the future, and stood to benefit economically be investing in climate-friendly technologies. Moreover, by doing so, and acting as pioneer states that encouraged other states to formulate more ambitious climate policies, the two states were expanding the potential markets for their own renewables industries. These ideas were not found to have been the case in Austria and Finland; while Austrian policy-making lacked the influence of technologically-focussed EM and instead focussed on organic renewables, Finland instead developed end-of-pipe solutions for heavy industry, thus maintaining high emissions levels by supporting polluting industries, rather than developing new climate-friendly industries, as demanded by proponents of EM (*see* Christoff, 1996: 101; Zannakis, 2009: 67).

Chapter 6 argues that the presence of nuclear power, when combined with the intention to phase out the energy source, results in ambitious climate policy. Austria and Finland provide stark contrasts to the positions adopted by Germany and Sweden. The Austrian ban on nuclear energy meant that the state could only fulfil its electricity requirements by turning to fossil fuels, while Finland expanded its production of nuclear energy, ensuring that energy efficiency and investment in other electricity forms, such as renewables, were disincentivised. Germany and Sweden, on the other hand, fell in between these two positions, and therefore represented ideal 'Goldilocks' approaches to nuclear power. The latter two states both relied heavily on nuclear power as an electricity source, but were also committed to phasing out the energy source in the future, thus necessitating further investment in renewables and energy efficiency schemes. Therefore, because Germany and Sweden were *not* locked into certain policy paths regarding nuclear power, the states were able to assume a more dynamic approach to the electricity source, which in turn enabled greater ambition in their climate policies.

Finally, the concluding Chapter 7 reviews the main findings of the thesis before placing these results in the wider context of the literature on climate policy. The relevance and contribution of the thesis is explored, as well as the generalisability of the findings with regards to the other nineteen Annex II states. Future avenues of research are then discussed.

Chapter 2: Theorising Climate Policy Variation

Having outlined in the previous chapter why climate policy is of acute global significance, this chapter explores the existing literature on climate change, climate policy, and the factors that may influence policy development, in order to situate the overall puzzle explored by this thesis with regards to existing research. This chapter seeks to define the dependent variable that is to be explained in this thesis, namely, variation in climate policy ambition amongst developed states. From here, the academic debate surrounding four themes of independent variables – which will become conditions for the medium-n stage of the nested analysis – will be detailed. It must be noted that much of the existing literature refers to environmental policy, rather than climate policy. While it may be expected that these two policy realms are similar, at times, environmental policy objectives may conflict with climate policy objectives, for instance, the localised environmental destruction of 'climate-friendly' hydropower (Tobin, 2014), and so the existing literature may only be used as a guide for the potential variables. The relatively small literature seeking to explain climate policy suggests that any hypotheses drawn primarily from the environmental policy literature in this area might miss crucial variables, or include factors that hold no sway. Indeed, the relative paucity of literature underlines why this project provides an original contribution. The literature seeking to explain leadership in environmental and climate policy appears to fall into four main themes; institutional, economic, international and ideological. A variable from each of these themes will be used in Chapter 3 of the thesis to test existing assumptions and select case studies for the small-n analysis in Chapters 5 and 6.

By selecting variables that the literature indicates may shape environmental policy, as well as climate policy, it is likely that there will be exceptions to the findings of the fsQCA. Blondel (1995: 3) posits that comparison is "the only truly satisfactory way of approaching the study of environmental politics". Thus, Chapters 5 and 6 will seek to explain the policies of four case study countries that have not been explained by the fsQCA, via a small-n comparative analysis. The third section of this chapter explores the topics of the hypotheses to be tested in the small-n analysis by examining the literature on Ecological Modernisation and nuclear energy. These concepts could not be translated into fsQCA terms, and so are explored in the small-n analysis. It will be argued that the concept of path dependence explains how renewable electricity policy (influenced by EM principles) and nuclear energy policy became established, and subsequently influenced the climate policies of 2006-2010. In essence, path dependence refers to the principle that behaviours become 'locked-in' as a result of previous decisions or events, and once locked-in, future decisions will be influenced heavily by these past events (Pierson, 2000, 2004). The existing literature on path dependence, Ecological Modernisation and nuclear energy will be explored, and will suggest that the current research is mixed on the relationship between the latter two topics and climate change. The final section of this chapter then outlines how the research puzzle will be answered.

This chapter will begin by critically evaluating the literature surrounding the fours themes that underpin the independent variables for the medium-n analysis. From here, the literature surrounding the two independent variables for the small-n analysis will be surveyed. In addition, the literature on path dependence will be explored. Next, the hypotheses related to the four medium-n variables and the two small-n hypotheses will be stated. As fsQCA tests conditions in combination as well as in isolation, the method is not suitable for falsifying hypotheses related to individual conditions, yet the development of hypotheses regarding directional assumptions regarding each condition is vital (Kent, 2008: 8). Regarding the medium-n analysis, one hypothesis for each of the four themes identified in the literature will be made. In the small-n analysis, it is hypothesised that renewable electricity policy that is shaped by the principles of EM will result in more ambitious climate policy outputs, as will a reliance upon nuclear power in conjunction with the intention to phase out the energy source. Finally, the potential falsifiability of the arguments will be stated.

2.1: Existing literature on pioneering climate policy and defining the dependent variable

This section of the chapter is broken into two parts. Firstly, the existing literature on defining pioneering climate policy will be explored. Two approaches to defining pioneering approaches are identified: measuring the extent of a state's co-operation in the international arena (Baettig *et al*., 2008: 478; Seidel, 2011); and attempts to combine existing policies and measures into one overall score (Bernauer and Böhmelt, 2013*a*; Boasson 2013; Huitema *et al*., 2011: 182; Knill *et al.*, 2012; Liefferink *et al*., 2009). The latter interpretation will be favoured, because, as Grant and Kelly (2008: 306) argue, "simply counting laws without accounting for their content is likely to produce measurement error when attempting to measure policy production". Most important of all, however, is the argument that a pioneer is defined in relative, rather than absolute, terms (Knill *et al*., 2012: 36; Schaffrin *et al.*, 2014). The second part of this section then defines the dependent variable. It will be argued the primary measures of climate ambition will be a state's overall emissions reductions target and the extent of the change between the Kyoto Protocol targets and the policies formulated during 2006-2010. The emissions reduction target is complex, and is shaped by the reduction deadline, whether flexibility mechanisms are included or not, and whether the target is legally binding, amongst other features. However, as the reduction of emissions is the overall objective when seeking to mitigate climate change, the dependent variable (climate policy variation) will relate to overall emissions reductions goals, when compared to those of other developed states.

2.1.1: Policy variation in the literature

Much of the existing literature explaining the dependent variable relates to environmental policy, rather than climate policy. As climate change ascends the political agenda, further research into the policy area is being conducted. However, as a starting point for this investigation, I begin by assuming that many of the findings relate to climate policy as well as environmental policy. This assumption will be tested by the fsQCA in Chapter 3. Boasson (2013: 5) notes acerbically that many European governments present themselves "as climate policy leaders and models for others… However, others may not always agree with policymakers' flattering descriptions of their own achievements." Thus, it is necessary to ascertain how to measure variation in climate policy, in order that the factors which influence the outcome may be determined. Within the existing comparative climate policy research, there are broadly two camps into which most of the research falls. These camps are the extent to which the state leads and supports international co-operation, and the attempt to categorise existing policies and measures into a form of index, either quantitatively or qualitatively, which is the more common approach. These latter approaches provide the framework for developing the dependent variable of this thesis.

The extent to which a state fosters international co-operation has been identified as a means of determining whether a state is a climate 'pioneer'. For example, Baettig *et al.* (2008: 478) argue that developed countries with emission targets under the Kyoto Protocol ratified the Protocol more often and faster, submitted their reports in a more timely fashion, and paid their annual financial contributions to the UNFCCC secretariat more regularly than the other countries. Saul and Seidel (2011) argue that a state that assumes the role of a leader during international negotiations will foster more ambitious results, finding that different leadership tactics contribute to co-operation to varying degrees. Such conceptualisations are not suitable for this thesis because they seek to explain international rather than domestic policy outputs; behaviour in the international arena may be shaped by factors other than climate policy ambition. Thus, focusing on domestic policy outputs is more relevant when seeking to identify the factors explain variation in a state's climate policy ambition.

By far the most common means of comparing variation in climate policy ambition are the attempts to aggregate policies and measures into an index. Dolsak (2001) sought to grade states according to a 1-9 scale, depending on the number of climate policies a state has agreed and achieved. Knill *et al.* (2012) applied a similar approach to assessing environmental policy, while Huitema *et al.* (2011) categorised each state according to 10 main criteria and 50 sub-criteria; both of these investigations related only to European states. A clear weakness in this approach is shown by the score accorded to the USA in Dolsak's (2001: 421) work, whereby the noted climate laggard achieved a high score of 7, suggesting the state was a climate leader, when it was not. Thus, it is necessary that the dependent variable in this thesis measures policy variation qualitatively rather than according to the number of policies to which a state has committed (*see* Grant & Kelly, 2008: 306).

Liefferink *et al.* (2009) employed a 'gap approach' with regards to defining environmental policy, whereby the authors sought to identify the gap between existing policy and the strictest policy available across 40 environmental policy areas in 24 states. Bernauer and Böhmelt (2013*a*) developed their innovative Climate Change Cooperation Index (C3-I) to explain countries' overall climate policy performance in terms of political behaviour (output) and emissions reduction (outcome). However, as Boasson (2013: 9) notes, policies and measures will not achieve mitigation immediately, and so it may take a decade or more before the effects of a climate policy can be assessed. Therefore, including emissions reductions as a means of determining pioneering behaviour does not meet the requirements of this thesis, which seeks to explain *policy* ambition. Finally, Boasson's (2013: 10) study explored climate policy in six states, and distinguished three different aspects of ambitiousness, according to the states' market approach, social costs and technical development.

2.1.2: The dependent variable

All of the studies in the second cluster of research highlighted above seek to create some form of composite index with which to compare states' environmental or climate policies. However, this thesis distinguishes itself from all of the existing pieces of research because of the states involved in the investigation. No research has yet sought to explain climate policy variation across the twenty-three Annex II states, thus rendering this investigation an original contribution to the field. As a result of the large number of states under investigation, it is beyond the scope of this thesis to create a composite index of each of the policies and measures within each state. Climate mitigation policy outcomes can be affected by a number of factors in addition to climate policy outputs, and thus, when seeking to explain variation of climate policy within developed states, policy *outputs*, rather than *outcomes*, are most salient. For example, because energy liberalisation and opposition to the coal miners' unions were two key policies of the Thatcher administration, gas increasingly replaced coal for much of the UK's electricity generation, which pushed down emissions levels (Lorenzoni *et al.*, 2008: 104). This outcome was a result of policies that were not directly related to climate change, demonstrating how policy outputs, rather than outcomes, are more relevant when explaining ambition towards climate mitigation. As Knill *et al.* (2009: 521) argue, "[w]e do not consider policy outcomes, because they are usually affected by a number of intervening variables, and hence can only be indirectly related to the causal mechanisms triggering domestic policy change". It may prove to be the case, however, that policy outputs can be influenced by factors other than the degree of ambition; this thesis therefore seeks to determine whether policy outputs are shaped by the wishes of policy-makers, or other factors as well, and identify these factors.

Therefore, when seeking to define the ambition of a climate mitigation policy output from an Annex II state, I argue that the most significant measure of leadership is the overall emissions reductions goal. This target is diverse across the twenty-three states – if it exists at all – ranging from legally-binding to voluntary, with goals allowing increases in emissions in certain states, to significant reductions in others. Thus, a pioneering state is one that possesses a legally-binding, specific and measurable overall emissions reduction goal that seeks to reduce overall emissions by the largest percentage, relative to other states, based on 1990 levels, during the period of 2006-2010. In order to determine how ambitious these policies were, the most ambitious climate reduction target of 2006-2010 is contrasted with the state's emissions reduction goal for the Kyoto Protocol. These twin determinants – the overall emissions reductions goal and the difference from the Kyoto Protocol goal – thus enable a full understanding of both the overall objectives of the policy during the period, and the extent to which these objectives build on previous goals. The objectives may be facilitated by any number of smaller policies, instruments and measures in order to make the emissions reduction goal achievable, across several different sectors, such as energy, industry, housing and transport. These additional factors are likely to feature within the operationalisation of ambition in the fsQCA.

2.2: Defining the independent variables for the medium-n analysis

Having defined the dependent variable to be explained within this thesis, it is now necessary to identify the conditions that are considered to influence environmental and climate policy and will be analysed in the medium-n analysis in Chapter 3. The existing literature will be surveyed, noting the considerable breadth of factors which have been identified as influencing policy ambition. Christoff and Eckersley (2011: 444) argue that it is 'near-futile' to find a single or small set of factors that shape climate policy. As such, this thesis will seek to group highlighted variables into themes, but, noting the complexity of climate change, it is impossible to identify every condition that shapes climate policy ambition. The themes are grouped as institutional, economic, international and ideological variables. These groupings are broad brush signifiers of the main themes I have identified in the literature; some variables do not fit neatly into just one of the themes.

A state's geography could have been identified as a fifth theme, but the literature does not find a strong relationship between geographical conditions and the outcome. Tubi *et al.* (2012) explored the impact of geographical vulnerability on climate mitigation policies and found the variable did not influence policy, while Neumayer (2002*a*) argued that income is a much more potent predictor of cross-country differences in emissions than natural factors. As such, geographical variables have not been included in this investigation. fsQCA provides an effective means of testing existing assumptions about a given outcome, but it is not suitable for testing large numbers of independent variables, nor can every variable be translated into an fsQCA score (Schneider & Wagemann, 2010: 6). Indeed, two further independent variables which could not be translated into fsQCA terms will be explored in the next section of this chapter. Thus, the number of veto points, GDP per capita, EU membership and government partisanship will be taken forward for the fsQCA in the following chapter to be tested as explanatory conditions for climate policy. Much of the research outlined below relates to environmental policy rather than climate change policy, and none of it refers specifically to the twenty-three Annex II states, ensuring that the findings obtained in the fsQCA will provide an original contribution to the literature.

2.2.1: Institutional factors

The first grouping of independent variables identified in the literature regards institutional factors. Democracy is identified as a variable that results in ambitious environmental policy outputs by Bättig and Bernauer (2009), List and Sturm (2006), and Neumayer (2002*b*), while on the other hand, Dobson (2007) notes that democracies may be too short-term to formulate long-term policy solutions. However, as all twenty-three Annex II states are democratic rather than authoritarian states, the presence of democracy is controlled for in this investigation. Much of Jänicke's work identifies states with high institutional capacity as environmental pioneers. Capacity in this sense includes intersectoral co-operation, structured public participation and strong government leadership in the planning process (Jänicke & Jörgens, 1998: 47). Jänicke (2005: 136) argues that close collaboration between the government, industry and pro-environmental stakeholders facilitates ambitious environmental policy, comprising what he terms a 'coalition for Ecological Modernisation'.

More broadly, collaborations in the form detailed above traditionally dominate corporatist states, leading Crepaz (1995), Downes (1996), Liefferink *et al.* (2009) and Scruggs (1999) to argue that corporatist states are more environmentally friendly. Relatedly, civil society was identified by Binder and Neumayer (2005) and Bryner (2008) as salient factors influencing climate policy, as their engagement in the policy process can add new opinions and expert advice to legislation, particularly in corporatist states. Finally, Fredriksson and Millimet (2004) and Lachapelle (2011) posit that the system of election within a state – specifically Proportional Representation and large, multi-member districts – influences environmental public goods. Thus, the institutional makeup of a state has been identified for a variety of reasons by numerous researchers to influence environmental policy outcomes. I argue that the existence of 'veto points' can be used to explain why these factors result in such outcomes (*see* Tsebelis, 1995; 1999). Therefore, this overview begins by defining veto points, before analysing parliamentary and presidential systems as examples of how veto points can influence policy development. Finally, it will be argued that a holistic approach that notes all of the potential veto points, rather than isolating just one as an independent variable, is crucial, and should be taken forward as the condition to be tested in the fsQCA.

Lijphart (1999) argues that the type of democracy in place shapes policy outputs. In an attempt to increase responsiveness to the needs of different demographic groups in society and prevent absolutist rule, democracies may seek to divide powers. These artificial dividing lines are better known as ‘veto points’, whereby a veto player is an individual or collective actor whose agreement is necessary for a change of the status quo (Tsebelis, 1999: 593). It has been argued that the more of these points that exist within a governance structure, the more difficult it is for policy to change (Hallerberg & Basinger, 1998; Tsebelis, 1995). Not only are veto points argued to be as significant for affecting policy decisions as the parties of those in government (*see* Korpi, 1983), but Jahn & Müller-Rommel (2011) find that institutional veto points can be more influential than the expression of policy-makers’ preferences within the governance model.

In addition to institutional veto players, electoral systems can act as a form of collective veto point. Duverger (1954) argued that majoritarian, winner-takes-all systems generally result in a two party system, while proportional systems often result in a multi-party system. Although there have been clear exceptions to these rules (*see* Cox, 1997; Taagepera & Shugart, 1989), electoral systems can significantly affect how actors engage with the policy process (Morelli, 2004: 831). As such, Sartori (1968) labelled the electoral system the “most manipulative instrument of politics”. Yet, the electoral system is just one of many ways in which veto points can be added to governance model. According to Cox & McCubbins (1997), four primary methods can prevent absolutist rule and increase democratic accessibility by increasing the number of veto points: a bicameral legislature; federalism; division between the legislature and executive; and a judiciary to interpret the law separately from the legislature. Division between the legislature and executive will now be explored in detail, as an example of how veto points can influence policy-making.

The differences between presidential and parliamentary systems of government highlight how different governance models can aid or hinder climate policy. Parliamentary governments may be reluctant to adopt unpopular or niche policies, such as strong climate change policies, as the survival of the government rests on the support of the majority in the legislature (Weaver & Rockman, 1993). In addition, this concentration of power in the executive can enable parliamentary systems to renege more confidently on unpopular policies, without fear of repercussions (Eaton, 2000). Alternatively, in the event of a coalition government, parliamentary systems can face additional veto points; a problem which is not faced by presidencies (Laver and Schofield, 1990). Thus, the most crucial requirement for parliamentary policy-making is the creation of an executive; once this has been achieved, the government often enjoys a free rein to pursue its favoured policy positions with little interference from opposition parties.

Presidential systems, on the other hand, do not share this stability. Presidential systems feature a separation of powers, in which the executive does not derive its authority from the legislature, but is directly elected separately (Weisehomeier & Benoit, 2009). As such, an additional veto point is introduced into the governance model, which theoretically enables greater responsiveness and accountability (Samuels & Shugart, 2003). Indeed, as Vogel (1986: 287) states, “the separation of powers… was designed to minimize the likelihood that government would exercise its power in a coercive manner.” Presidential systems can impair policy-making especially when different parties control the executive and legislature, resulting in ‘divided government’ (Samuels & Shugart, 2003: 44). A syndrome of ill effects featuring any of four problems can result, namely institutional warfare (Kiewiet and McCubbins 1991), unilateralism (*see* Cox & McCubbins, 1997), gridlock (Birchfield & Crepaz, 1998) and budget deficits (McCubbins, 1991). Lachapelle and Paterson (2013: 564) argued that as a result of the larger number of veto points in presidential systems, relatively costly environmental regulations tend to be more difficult to implement, whereas the concentration of power in parliamentary systems empowers leaders with a greater capacity to implement such policy.

However, there is more to the literature on veto points than the presidential-parliamentary dichotomy. For many critics, the presidential-parliamentary dichotomy is too broad to yield meaningful insights. Shugart and Carey (1992) highlight the diversity of presidential systems and attribute these differences to lower-level institutional factors, such as the electoral calendar. Jones (1995) emphasises electoral laws which produce majorities for the president's party in the legislature, while Mainwaring (1993) argues that the number of parties is more significant than the actions of those parties or whether the state is presidential or parliamentary. Finally, Tsebelis (1995) notes the similarities between presidential systems and multiparty coalitions to argue that dichotomies can prove to be overly reductionist.

As a result, therefore, while it has been shown how veto points can influence policy development through the example of the presidential-parliamentary dichotomy, it is important to consider all of the salient veto points that may be in place within a democratic system. Jänicke (2005: 129) argues that a "necessary condition for becoming a pioneer country in environmental policy is a high domestic capacity for environmental policy-making." Thus, when seeking to explain how veto points and political discretion influence climate policy, a broad conceptualisation of the institutional structures, beyond merely parliamentary or presidential systems of governance, must be considered. Therefore, the number and significance of veto points will be used as a proxy for the array of institutional arrangements that can help or hinder policy formulation when this variable is operationalised as a condition for the fsQCA.

2.2.2: Economic factors

The second theme identified within the literature regards economic factors. The role of wealth as a factor that shapes environmental behaviour dates back to Inglehart's (1990) work on the concept of post-materialism, in which he posits that citizens are more likely to prioritise non-materialist values upon reaching a certain economic threshold. These post-material sentiments arise as a result of the security achieved once certain basic requirements have been fulfilled, such that other issues – for example, protection of areas of natural beauty – are prioritised due to their innate, rather than material, values. The extent to which these values extend to climate change has not been explored in great detail. However, at the state level rather than individual level, the Environmental Kuznets Curve (EKC) has been highlighted as a means of expressing similar changes in values, but across a whole society. Building on the Kuznets Curve on inequality, the EKC argues that environmental gains are producing with economic development as result of improved efficiency through technological advancement (Bernauer & Schaffer, 2012: 448-451; Hallegate *et al.*, 2011:2).

However, as Ekins (2000: 506-507) argues, environmental improvement in line with economic growth may be a result of other factors, and if this is the case, economic growth could be wrongly seen as a means of providing environmental protection. Moreover, an inexorable reliance on growth will result in greater (albeit more efficient) resource use, with potentially significant damage to the environment and climate as a result. Alternatively, while it may be the case that environmental performance improves with economic development, this development may be a result of polluting industries being exported to developing states. In such states, citizens may be less able to oppose pollution as a result of their dependence on the source of pollution as a means of economic development. Indeed, Neumayer (2002*c*) found that economic growth can worsen those environmental problems that can be externalised, thus drawing a distinction between localised environmental problems and climate change. For transboundary issues, such as climate change, the export of polluting industries to other states will not mitigate the problem as global emissions will not be reduced. As such, the EKC may be applicable only to localised, rather than transboundary problems.

Regardless of the rationale underpinning *why* a state is more likely to develop ambitious environmental policies in line with increased economic development, several studies have found that economic development is linked to environmental outcomes. Liefferink *et al*. (2009) found that a high level of economic development was significant in influencing environmental policy. Neumayer (2002*c*) argued that richer states were more likely to have signed the Kyoto Protocol. Börzel (2002) argued that a state’s identity as a pace-setter, fence-sitter or foot-dragger regarding

EU environmental policy is shaped by economic development. In this latter case, while all member states of the EU are developed economically, relatively speaking, certain members, such as Greece, are comparatively less well developed, and so are argued to formulate less ambitious environmental policies for fear of hindering an already inferior economic status (Lekakis & Kousis, 2013). Thus, while economic development may play a significant role in explaining differing levels of ambition amongst richer and poorer states, economic factors may also play a role in explaining differences between the rich and very rich nations. This argument is salient here, as all twenty-three Annex II states are, by definition, developed, and possess the greatest ability to reduce emissions, and the greatest historical responsibility for creating emissions (*see* Hurrell & Sengupta, 2011: 465). Thus, economic disparities amongst wealthy states may be responsible for influencing climate policy, with the very wealthiest states able to prioritise climate protection policy over encouraging economic growth.

In addition to the degree of economic development, the type of economic model may also influence policy. Specifically related to climate change policy, Lachapelle and Paterson (2013) explore the distinction between Liberal Market Economies (LMEs) and Coordinated Market Economies (CMEs) and the effect of these differences on emissions trends. They suggest that "one might expect CMEs, such as Germany and Sweden, to have more ambitious climate policies and greater capacity to affect GHG emissions than LMEs such as the US and Canada" (Lachapelle & Paterson, 2013: 549). It will be argued later in this thesis that Germany and Sweden were both climate pioneers during 2006-2010, while the USA and Canada were not. Bernauer and Böhmelt (2013*b*) were ambivalent on the role of the economy on environmental policy, providing theoretical arguments in favour of economically 'kinder, gentler societies' to be greener, but finding inconsistent empirical support that social policies and environmental performance are systematically related. Again, Germany and Sweden were identified as examples of environmental policy pioneers (Bernauer & Böhmelt, 2013*b*: 11994).

Not all research argues in favour of a positive relationship between the economy and environmental policy. MacNeil and Paterson (2012) suggest that neoliberal economic approaches, which can lead to a significant increase in GDP, can also lead to the commodification of the atmosphere. This problem may arise because marketization seeks to maximise efficiency, but in so doing, identifies implicitly certain amounts of damage to the climate as acceptable, which could hinder policy outputs. Madden (2014) argues that GDP per capita has had a modestly negative relationship with major climate policy adoption and therefore argues for further research into the role of economic development as an explanatory variable. By assessing the impact of GDP per capita, states that are wealthy but also have a large population, such as the USA, do not skew the data, as would be the case if absolute GDP were used. Therefore, from a theoretical perspective, GDP per capita could be expected to result in post-material values, which in turn could reduce the pressure on a state government to prioritise economic growth, and instead strengthen climate policy. However, with all Annex II states being economically developed, the extent of the economic difference between each state could be minimal. Yet, the weight of the research so far appears to find support for higher GDP per capita favouring stronger environmental policy.

2.2.3: International factors

The third theme that emerges from the existing literature relates to the impact of international influences on a state's climate or environmental policies. Tosun and Knill (2009) noted that the more states' trading agreements become integrated, the states involved will develop more environmental policy in order to to facilitate trade. Such integration is required in order to create a 'level playing field' between states. The European Union is the most integrated common market on earth, and is also vital to mitigating climate change. EU member states emit 10% of the world's emissions, the EU has a normative desire to exploit the issue to define itself internationally, and Europe represents a microcosm of the global climate change challenge (Jordan *et al.*, 2011*a*: xvi). As such, the EU can be seen as "a laboratory in which to test the likelihood of international action on a range of threats to the global environment" (Grant *et al.*, 2000: 90).

It was the inclusion of environmental issues into the 1987 Single European Act that catapulted the EU to the forefront of global environmental action, usurping the USA as hegemon on the issue (Damro & MacKenzie, 2008: 66). Regarding climate change specifically, the EU became the pioneering actor during international negotiations as a result of the election of George W. Bush in 2000 and the subsequent opposition to climate policy ambition during his presidency. Membership of the EU shapes profoundly a state's environmental policies as all members are required to adopt the *acquis communautaire*, which features over 300 environmental directives (Kazakos, 1999: 384). While national policies are formulated at the state level, factors influencing climate policy are not limited to within the domestic sphere (Jahn & Müller-Rommel, 2010: 39). Indeed, the EU has been a pioneer in the creation of climate change policies, with the flagship 'burden-sharing' approach and emissions trading scheme to be explored shortly. While the EU's policies have been slightly less effective than hoped originally, they have still facilitated the formulation of more ambitious domestic policy outputs.

Dolsak's (2001) research argued that states that emitted a small percentage of global emissions, such as Austria, are unlikely to formulate ambitious climate policies as they believe subsequent reductions would only have a limited impact on climate change. As a result, international co-operation over climate policy may be expected to facilitate more ambitious policy outputs. This argument supports the work of those who argue that EU membership is crucial in facilitating ambitious climate policy. Liefferink *et al*. (2009) found EU membership to be the most significant factor when explaining climate policy. Jänicke (2005), Jordan *et al.*, (2010), Lenschow *et al.* (2005), and Schreurs and Tiberghien (2007) developed similar findings. The motivations for EU leadership are manifold. According to Wurzel (2008: 68-71), the EU is incentivised to facilitate environmental policy because differening standards can create trade barriers, many environmental issues are transnational and cannot be solved by individual states alone, legitimate production facilitated by the EU can create negative externalities such as pollution, and finally, pollution worsens living standards. Thus, Liefferink *et al.* (2009: 696) found that "EU membership turned out to be the most powerful factor explaining a strong domestic environmental policy output."

Article 4 of the Kyoto Protocol stated that by increasing emissions, no member state is in breach of the Protocol if the EU as a whole does not (UNFCCC, 1997). While burden-sharing was to be a success for the collectivist ideals of the EU, others at Kyoto were less supportive. Certain developed, non-EU states, such as the USA, argued that every state should be attempting to reduce emissions, rather than allowing relatively prosperous states to ride on the reductions of others (Obertür & Ott, 1999). While 'legitimate' free-riding may be unsatisfactory to other states, if the system were to be employed on a global scale, it could provide a means of reducing emissions whilst supporting simultaneously the growth of developing states. However, by giving the green light to some of its members to increase their emissions by up to 27%, as in the case of Spain (EEA, 2002), EU membership may suggest that certain states need not develop very ambitious climate change policies. As such, burden-sharing supports the adoption of strong climate change policies in wealthier states, but places less pressure on poorer members (despite them being more economically developed than most states outside the EU).

The Emissions Trading Scheme has also been problematic. While a couple of member states had attempted domestic schemes, as a continent, "Europe, unlike the USA, had scant knowledge of emissions trading, and no practical experience" (Skjærseth & Wettestad, 2009: 109). As a result, the implementation of the scheme initially was to be broken into two parts, with Phase I acting as a trial between 2005 and 2007, and Phase II coinciding with the Kyoto Protocol's first commitment period between 2008 and 2012. While Phase I was defined by acute price fluctuations before a sudden price crash (Ellerman & Buchner, 2007; van Asselt, 2011: 129), prices broadly remained too low during Phase II, resulting in some steady but uninspiring levels of reductions, before beginning to head towards a state of maturity (Daskalakis, 2013). Phase III of the ETS began on the 1st January 2013 and will run until 2020 (Gov.uk, 2014). In contrast to the previous phases, allocations for Phase III are based on historical production multiplied by best available emissions technology benchmarks, which appears to have succeeded in preventing windfall gains (Sartor, Pallière & Lecourt, 2014).

It has been shown that the EU has not only taken a global leadership role in driving forward negotiations, such as with the Kyoto Protocol, but has also sought to lead by example with innovative climate change policies of its own. There have been a few dissenting voices over the impact of EU policy-making, however, with Madden (2014: 581) finding that EU membership has a modestly negative impact on policy outputs – perhaps because of the volume of minor policies adopted by EU states – while Liefferink & Andersen (1998*a*) suggest that EU membership was perceived as a hindrance to policy ambition by environmental pioneers Austria, Finland and Sweden when they joined in 1995. Overall, the majority of research appears to argue that international inter-linkages – such as those facilitated by the EU – are correlated positively to environmental protection. It may be argued that the burden-sharing agreement has legitimised less developed members of the EU to increase their emissions and the ETS has failed to deliver meaningful reductions. However, since 2000 the EU has created over 30 climate change initiatives which have sought to facilitate member states' emissions reductions (*see* Damro & MacKenzie, 2008: 67). Moreover, states that are not members of the EU but trade heavily with member states, such as Norway, have subsequently employed their own initiatives in order to support trade with EU states (Jordan & Liefferink, 2004: 4). While some of the bigger, flagship schemes, such as the ETS and burden-sharing agreement, have seen some flaws, the overall impact of the EU on climate policy outputs appears to be strong.

2.2.4: Ideological factors

The final theme found within the literature relates to the role of ideological factors in determining a state's environmental policy. For the most part, these pieces relate to the political ideology of parties, but religious influences may also be found. Climate sceptic organisations, such as the Cornwall Alliance, have close connections with the political right in the USA and suggest that because the Earth was designed by God for humanity, a phenomenon potentially as catastrophic as climate change could not exist (Cornwall Alliance, 2014). On the other hand, many Christian Democrat parties posit that the climate must be protected as it is part of God's creation. Vogel (2002) argues that there is a relationship between the presence of the Protestant work ethic and strong environmental policy, while Liefferink *et al.* (2009) found there to be no link between dominant religion and climate policy outputs. The evidence for a relationship between religion and environmental policy is therefore mixed.

A more salient ideological connection may be the influence of political partisanship on policy. Green parties may be expected to be significant voices in shaping environmental policy, but, as Poguntke (2002: 38) notes, "Greens in government means Greens in coalition government"; there are no empirical examples of green parties as the majority party in a national government, so ascertaining the role played by such parties is difficult. Rihoux and Rüdig (2006) argue that agenda-setting is the most effective means for Green parties to influence policy formulation. As such, a more common relationship between partisanship and environmental policy is found regarding the role played by the traditional left-right spectrum. This section will therefore critique the accuracy of a 'left-right' spectrum before exploring whether environmental protection may be considered a left- or right-wing party issue. The existing research suggests that ambitious policy is most likely to be linked with those parties on the political left – but not exclusively so – and that other factors are involved too in shaping the influence of the political spectrum.

Lachapelle and Paterson (2013: 555) suggest that political variables are of limited explanatory power regarding climate policy when examined on their own, and Sartori (1976: 79) argued that any attempt to employ the left-right spectrum could be seen as 'a grand oversimplification' of data. Until the 1970s, the left-right scale was perceived in an impressionistic manner (for example, Lipset, 1960). However, one of the most significant findings of Huber and Inglehart (1995) was that the left-right scale remained the predominant political cleavage within states, dissecting 80% of cases, with the next most frequent being the conceptually-similar 'progressive-to-conservative' spectrum. Indeed, the dominance of the left-right scale is bolstered by parties' own willingness to be located on such a continuum in order to appeal to their core constituencies (Neumayer, 2004: 167). The resulting political spectrum "is an explicit or implicit 'left-right' scale that defines a spatial language understood by almost every political commentator" (Benoit & Laver, 2006: 129). As such, although flawed, and increasingly more complex than merely left to right, the traditional spectrum dominates party politics. Political parties may then be identified upon this spectrum according to their values and policies. While it appears that the left-right scale is an almost ubiquitous presence within democracies, the position of environmentalism upon that scale and the reasoning for that location can vary greatly between states.

The social movements of the 1970s that supported anti-militarism, women's rights and multiculturalism also incubated the green movement (Dalton, 2009: 163). By espousing radical positions, these groups sought to distance themselves deliberately from the prevailing status quo. As such, the green movement and related political parties claimed to represent a distinct and new ideological stance that would challenge the existing party alignments (Laver & Hunt 1992; Müller-Rommel 1989). Indeed, it was often stated that green parties were "not left-wing, nor right-wing, but up in front" (King & Borchardt, 1994: 225). The result is that environmental issues increasingly dissect the left-right spectrum which once defined party families (*see* Gallagher *et al*., 2006: 230–254). Kitschelt (1989) argued that green issues were steadily being assimilated into the established left-right continuum; it may be the case that the definition of left and right is changing in order to incorporate environmental issues (*see* Inglehart 1990; Knutsen 1995). Evidently, the environment has transformed from a peripheral interest to a mainstream feature of contemporary political affiliation.

Determining which end of the political continuum houses environmental issues is not a simple task, and there are good reasons why it is not the left of the spectrum. With industrialisation responsible for creating a large working class in many advanced democracies, "the traditional political objectives of left-wing parties might make them adversary to environmental protection measures" (Neumayer, 2003: 204). Environmental measures which affect (or are perceived to affect) heavy industry may threaten jobs in industries which are noted for widespread unionisation and have strong links with socialist and social-democratic parties (Neumayer, 2003: 218). Moreover, with many on the political right in Western states linked with Christian voters, conservatives may identify nature as sacred because it was created by God (Dietz *et al.*, 1998: 465). Jänicke (1992: 49) argued that "there is little to be said for the assumption that, in international comparisons, left-wing governments as a whole do more for the environment than those on the right wing" when describing Japan, Netherlands and German Länder, which were all run by right-wing parties at the time. Scruggs (1999) also found predominantly insignificant results relating to left-libertarian or even green parties regarding the environment, while Jahn (1998) found that any positive relationship between left-wing party strength in parliament was not repeated in government. For Carter (2013), while left-wing parties adopt more pro-environment positions, mainstream parties have mostly been dismissive or accommodative towards the environment, while issue salience between left and right is only marginal and fluctuates over time.

However, on the whole, the literature finds an association between left-wing party strength and the environment. Benton (1997: 43) argues that since the industrial revolution, environmental damage has affected those who are poorest within society more than the rich. These poorer citizens are a core demographic of parties on the political left. Furthermore, Neumayer (2004: 167) argues that "equality, distributional concerns and market skepticism are typically regarded as defining factors of left-wing political orientation" as well as being cornerstones of many environmentalists' thinking. With a history of suspicion towards market principles often endemic to left-wing thinking, and climate change identified as the greatest market failure the world has seen (Stern, 2010), the twin objectives of state-led economic policy and environmental protection find much support on the left (Kirchgässner & Schneider, 2003: 383). This stance has been supported in both qualitative and quantitative studies of the field. Neumayer (2003, 2004) found that the presence of left-wing parties in government is associated with lower pollution levels while Rohrschneider (1988) argued that 'Old Left' parties in many states adopted environmental issues for fear of losing voters to green parties on their left. Meanwhile, studies examining Germany (Davis & Wurth 2003; List & Sturm 2006) have found the environment to be a left-wing issue predominantly, with Dunlap, Xiao and McCright (2001) finding the same in the USA.

2.3: Defining the core concepts for the small-n analysis

As part of the nested analysis design, once the fsQCA has been conducted using the conditions outlined above, a more in-depth, small-n case study analysis will be conducted. The case studies will be selected from those states which were not explained by the solutions created by the fsQCA. The case studies will possess similar scores for the four conditions, but different scores for the outcome, maximising the comparability of the states by controlling for as many potential independent variables as possible. Two potential independent variables will then be tested. These variables are tested separately to the medium-n analysis as they cannot be translated into fsQCA terms, and both relate to electricity policy. Electricity policy has been highlighted as one of the most significant sources of GHG emissions in developed states (FOTE, *undated*), and also one of the areas in which pioneers have made the greatest progress (Burck *et al*., 2010). As a result, when explaining variation, the largest gap between pioneers and laggards is likely to be found in electricity policy. The two primary sources of energy that enable the electricity sector to be decoupled from fossil fuels are renewables and nuclear energy.

As such, Chapter 5 will analyse renewable electricity policy in the four case studies, and Chapter 6 will critically evaluate nuclear electricity policy. In Chapter 5, the relationship between Ecological Modernisation and renewable electricity policy will be explored. Ecological Modernisation posits that pro-growth strategies can and, realistically, must be employed in order to mitigate environmental degradation (Mol & Sonnenfeld, 2000). While for some, EM ideas provide the only likely solution to environmental problems due to the entrenchment of the capitalist system (Gibbs, 2000: 10), for others (Eckersley, 2000: 239), the principles of EM legitimise the factors that create environmental issues in the first place; namely, materialist consumption in a pro-growth economy. As such, this section will begin by overviewing the literature on EM. Although there are some disagreements over the extent to which renewables can provide a significant percentage of a state's energy supply, the climate-friendly nature of renewables is undisputed.

The literature on nuclear energy will be explored, however, as existing research on the impact of nuclear energy on the climate is as divided as that on EM. Some research finds that nuclear power presents a means of providing a low carbon solution to electricity production (Caplan, 2014; Lynas, 2011; Massey, 2014; Sailor *et al.*, 2000), yet, when the GHGs produced throughout the lifecycle of nuclear power are considered, as well as the other potential environmentally damaging side effects, such as radioactive waste, the pro-environmental credentials for nuclear power may be questioned (Caldicott, 2006; Kopytko & Perkins, 2011; Sovacool, 2008). The third part of this section will then survey the existing work on path dependence, which is not an independent variable in itself, but a concept with which to analyse the two indepdent variables. Path dependence will be employed as a concept for understanding the two arguments in greater depth. The concept will demonstrate how certain policy approaches can become locked in over time, resulting in significant outcomes after what may have been a relatively modest original decision or event.

2.3.1: EM Theory

In stark contrast to the 'Limits to Growth' thesis (Meadows *et al.*, 1972), which argued that environmental problems were a consequence of economic and population growth, the concept of sustainable development has achieved increasing support in recent years. Sustainable development has been dissected into a variety of normative and analytical frameworks, of which Ecological Modernisation has drawn the most attention (Mol & Sonnenfeld, 2000). EM is presented as a means by which capitalism can accommodate the environmental challenge (Gouldson & Murphy, 1997: 75). Emerging in the industrialised states of Germany and the Netherlands, proponents of EM seek to provide a techno-institutional solution to environmental problems (Hajer, 1995: 304). The social conditions in which EM developed have proved pivotal, with the concept dependent upon a context of pre-existing market regulation, environmental awareness and advanced environmental protection technologies. As such, proponents of EM attempt to facilitate environmental protection by building on the strengths of the most environmentally damaging states (Gibbs, 2000: 10). This section will therefore overview the two primary tenets of EM – technological innovation and capitalism – before outlining the criticisms of the concept as a response to environmental problems, particularly climate change.

For those favouring EM, technology is a potential solution to environmental problems. This utility is demonstrated most starkly by the concepts of dematerialisation and (absolute) decoupling, whereby fewer resources are required to manufacture a product and there is "an absolute decline of natural resources used and emissions produced, regardless of economic growth" respectively (Mol & Sonnenfield, 2000: 6). Moreover, as environmental approaches shift from end-of-pipe, interim solutions to transformations of the production system, technology can provide further growth by enabling an expansion of the environmental protection sector (Christoff, 1996: 101; Langhelle, 2010: 394). Since EM relies upon technological advancement to improve efficiency, it is through innovation and change that environmental concerns can begin to be integrated into production, garnering the support of those favoured by the market, who arguably hold the greater political sway in developed (and, indeed, less developed) states (Murphy, 2001: 9). Thus, rather than arguing that technological innovation has resulted in increasing damage to the earth, proponents of EM argue that the increased efficiency enabled by technological advancement is a solution to environment damage. In order to facilitate rapid technological development, those favouring EM argue that capitalism is crucial for incentivising research (Murphy & Gouldson, 2000).

In conjunction with the role played by technological advancement, capitalism is a crucial feature of EM. EM requires the state to only 'steer' the direction of EM while the market 'rows' by driving innovation (Rhodes, 1997). As such, "regulation can be used to drive the process of industrial innovation with environmental and economic gains realised as a result" (Murphy & Gouldson 2000: 43). Indeed, Ecological Modernisation not only flourishes under capitalism, it is entirely dependent upon it. For proponents, dependence on capitalism is a strength, as the most environmentally-degrading states are mainly capitalist, rendering the market not the cause of environmental problems, but a solution waiting to be applied correctly (Redclift, 2005). Crucially, therefore, EM speaks in a language understood by business, such that an important part of

Ecological Modernisation is the adoption of more inclusive approaches regarding businesspeople whilst marginalising the more radical voices (Young, 2000: 13). By doing so, EM policies are depicted as more pragmatic and, therefore, more likely to gain the political capital needed to be enacted in capitalist-minded states. A defining feature of EM is the controversial Environmental Kuznets Curve, highlighted earlier in this chapter.

The dependence of EM upon technological innovation, however, generates potentially decisive weaknesses. Firstly, according to Gouldson and Murphy (1997), the presumption that sufficiently revolutionary future technology will be developed is overly optimistic. This technologically deterministic outlook is uncertain enough to demand that some form of biocentric conservation is partly employed, in order to avoid drastic resource shortages in the future (Spaargaren & Mol, 2010: 72; Taylor, 1981). In addition, the concepts of dematerialisation and decoupling have also been called into question. It has been argued that dematerialisation is unable to accommodate high levels of economic growth due to a dependence upon continuous and highly effective innovation (Warner, 2010: 544). Continuous economic growth on a planet with finite resources has been identified as impossible (Bina & La Camera, 2011; Daly, 2007). Meanwhile, decoupling and the EKC have been labelled 'misleading' as it is argued that economies are not being transformed, but rather relocating their most damaging industries to developing states where environmental legislation may be weaker (Schnaiberg *et al.*, 2002: 21). This criticism is crucial when considering a transboundary issue, such as climate change; if GHG production is merely relocated elsewhere, the emissions that lead to catastrophic climate change will not be reduced overall.

In addition to the criticism over the role of technology, EM legitimises existing power imbalances by giving greater influence to the market; a realm which is poor at distributing wealth evenly and thus unable to assist those who development seeks to support. For those states lacking in natural resources and technological advancements, EM provides no answer at all, meaning that such states may only develop economically by attracting the polluting industries of developed states, resulting in a regulatory 'race-to-the-bottom', severe environmental degradation and no long-term solution (Pearce & Barbier, 2000: 42). As such, EM has been labelled "a thinly-disguised endorsement of the existing distribution of economic and political power" (Eckersley, 2000: 239). Thus, there are good reasons to believe that in the middle- to long-term, EM cannot provide sustainable development.

2.3.2: Nuclear energy

The production of electricity from nuclear energy began during the 1950s, resulting in the first commercial nuclear power plant (NPP) at Calder Hall in the UK, in 1956 (Grubb *et al.*, 1991). Since then, public and political support for nuclear power has fluctuated significantly in developed states, particularly in Europe. The 1973 Oil Crisis created a demand for Western states to break away from a dependence on Middle Eastern oil, resulting in a massive expansion of nuclear energy (Jean-Baptiste & Ducroux, 2003). In France, during the 2000s, 79% of electricity was sourced from NPPs (Sovacool, 2008: 2950). Yet, the Three Mile Island accident in 1979 and the Chernobyl disaster in 1986 (and, most recently, the closure of the Fukushima Dai'ichi NPP following an earthquake and tsunami), have weakened support for the energy source (*see* Forbes, 2011; Jean-Baptiste & Ducroux, 2003: 162).

With the ascension of climate change into the public consciousness, however, nuclear energy achieved somewhat of a resurgence in acceptability prior to the accident in Fukushima, particularly during the period under investigation. Nuclear power does not produce GHGs as a direct product of electricity generation, ensuring that the energy source has been referred to increasingly as a low carbon electricity solution (*see* Jean-Baptiste & Ducroux, 2003; Kopytko & Perkins, 2011; Sovacool, 2008). Thus, the extent to which nuclear power may be considered a solution or problem depends on the framing of different risks within a given society (*see* Beck, 1992). In those states where nuclear meltdown is seen as the primary environmental risk, nuclear energy may be opposed above all other concerns. On the other hand, in those states where nuclear power is seen as relatively safe and reliable, climate change may be seen as a bigger risk, thus lending favour to the energy source. Moreover, geographical conditions may make certain renewable technologies, such as wind, solar or hydro power, impossible. Considering that two nuclear power station accidents that could have been highly significant went unreported in the USA, many publics are poorly informed when making decisions about their attitudes towards both nuclear power and climate change (Mazur, 2013: 170-171). The existing literature is mixed as to whether nuclear energy has a positive or negative impact on the climate.

In 2005, 435 nuclear plants supplied 16% of the world's power, constituting 368 GW of installed capacity and generating 2,768 TWh of electricity (IEA, 2007*a*). At the time of writing, nuclear fission (in which the nucleus of an atom splits into small parts) is the only method of generating electricity from nuclear energy, although nuclear fusion may offer new possibilities in the future (Mazur, 2013). In nuclear fission, the nucleus of a radioactive element, such as Uranium or Plutonium, is hit by a neutron to split; when many such nuclei are split, multiple fissions take place, generating enormous amounts of energy. Unlike the burning of hydrocarbons, such as oil, coal and gas, nuclear fission does not produce GHGs which worsen climate change, resulting in increasing calls for the nuclear energy to be used as a 'real green' alternative (Marshall, 2005). Nuclear safety has improved significantly in recent decades, with European Pressurised Reactors described as able to contain a meltdown (Marshall, 2013). Indeed, accidents at hydroelectric dams have killed more people than nuclear accidents (Mazur, 2013: 101). As such, Bickerstaff *et al.* (2008) note that interview participants generally opposed nuclear energy, but demonstrated reluctant acceptance of nuclear power when the electricity source was positioned alongside climate change. Thus, even environmental NGOs increasingly support nuclear power, despite opposition to the energy source being the primary raison d'être of many environmental groups. Patrick Moore, co-founder of Greenpeace, has publicly stated that "nuclear energy is the only non-greenhouse gas emitting energy source that can effectively replace fossil fuels and satisfy global demand" (*in* Sovacool, 2008: 2950).

However, if the renaissance of nuclear is motivated primarily by fears over climate change, it is imperative that the energy source does actually mitigate the phenomenon. Although nuclear power does not directly emit GHGs, the lifecycle involved in energy production – featuring plant construction, operation, uranium mining and milling, transportation, and plant decommissioning – is highly carbon intensive (Sovacool, 2008: 2950). As a result, it has been argued that wind turbines have one-third the carbon equivalent emissions of nuclear power over their lifecycle and hydroelectric one-fourth the equivalent emissions (Sovacool, 2008: 2950). Thus, while nuclear power may not produce GHGs during electricity production, large quantities of emissions may be created during the overall lifecycle of nuclear power. Kopytko and Perkins (2011: 319) argue that nuclear energy is unsuitable for mitigating climate change for a different reason; NPPs are highly vulnerable to extreme weather events, making the electricity source intermittent at best, or liable to meltdown at worst. While wind turbines and tidal barriers may also be threatened by such extreme weather phenomena, these technologies do not pose as significant threats as accidents at NPPs. Thus, nuclear energy may not be a suitable long-term replacement for fossil fuels when climate change is considered. As such, because a degree of climate change is almost certain to occur due to historical GHG emissions, it may be the case that nuclear energy becomes increasingly unsafe in a warming climate.

In addition to concerns over the effectiveness of nuclear energy in responding to climate change, there are a number of concerns regarding the safety of the electricity source. It is this unsafe reputation that continues to tarnish nuclear energy in the eyes of many people. While Plutonium could be explosive in the wrong hands, in the event of an accident that results in ‘China syndrome’, Uranium could melt through everything below it, creating dangerous radioactive steam upon contact with water (Mazur, 2013). Moreover, with a half-life of around 4.5 billion years, the radioactive waste created from used Uranium-238 must be safely secured for the remainder of human existence (Sovacool, 2008: 2953). As such, for Sovacool and Cooper (2008: 4), NPPs face “immense capital costs, rising uranium fuel prices, significant amounts of lifecycle greenhouse gas emissions, and irresolvable problems with reactor safety, waste storage, weapons proliferation, and vulnerability to attack.” The role of nuclear energy as a response to climate change is therefore far from settled, while its impact on climate change policy, rather than climate change mitigation, is unknown. It appears that nuclear energy can both help and hinder policy decisions that favour climate policy ambition. Thus, it may be hypothesised that if a state produces nuclear energy, but also seeks to phase out the energy source, the state will develop more ambitious climate policy. As will be seen in Chapter 6, such hypotheses, which require a state to fall between two extremes, are known as 'Goldilocks Hypotheses' (*see* Kidd *et al.*, 2012; Martin, 2011; Rosa, 2001).

2.3.3: Path dependence

When seeking to understand complex political phenomena in which multiple variables are involved – such as climate change policy – feedback loops and non-linear dynamics are likely to be involved (Garud *et al.,* 2010: 760). Here, path dependence can provide a conceptual foundation for analysis (Greener, 2005: 62). Proponents of using path dependence argue that certain decisions or outcomes are shaped, reinforced or limited by preceding factors. Crucially, it is not merely the argument that 'history matters', but rather that "particular courses of action, once introduced, can be virtually impossible to reverse; and consequently, political development is often punctuated by critical moments or junctures" (Pierson, 2000: 251). These junctures are 'critical', because once made, the resulting institutional arrangements can be difficult to change (Pierson, 2004: 135). This inflexibility does not mean that individuals are without a degree of agency (Mahoney, 2000), but rather that past events or even seemingly unrelated decisions can alter an outcome. Path dependence has been employed within a variety of investigations in comparative politics, such as labour incorporation in Latin America (Collier and Collier 1991) and the comparative development of health care systems (Hacker 1998).

A classic example of path dependence is the history of the QWERTY keyboard, where David (1985) argues that a sub-optimal design became 'locked-in', as typists learned to type on a less ergonomic design. As such, path dependence offers a means of conceptualising how complex processes can be non-ergodic, whereby once a particular policy approach has been locked-in, actors cannot break out unless exogenous shocks occur (Garud *et al.*, 2010: 760). Policy approaches become locked in as a result of positive feedback mechanisms, which reinforce the occurrence of a particular pattern, thus consolidating the original decision (Collier & Collier, 1991). Exogenous shocks can create critical junctures, whereby structural influences on political action are significantly relaxed, both enabling a wider range of policy possibilities, and increasing the significance and duration of the consequences of the policy decision (Capoccia & Keleman, 2007: 343). The durations of these critical junctures are short, relative to the length of the path dependence that results; for Collier and Collier (1991), a critical juncture of twenty-three years was identified in Mexico. During this time, individual actors may be considered as either barriers or carriers for change (Hogan & Doyle, 2007). Thus, when seeking to demonstrate path dependence, it must be shown that a critical juncture with multiple courses of action led to path dependence, which in turn influenced decision-making during a period of stability and even during a further critical juncture. Liebowitz and Margolis (1995: 34) argue that being 'locked-in' to a certain path implies being trapped with something inferior; I argue instead that path dependence can demonstrate how paths can influence the policy output positively or negatively. Thus, path dependence may be used to identify pathways that lead a state towards pioneering climate legislation, or inhibit such policy being developed.

2.4: Answering the research question

As this thesis employs a nested analysis approach, two sets of hypotheses will be developed. The two sets of hypotheses are methodologically distinct, as noted in Chapter 1. The hypotheses to be tested in the small-n analysis cannot be tested in the medium-n analysis, as they cannot be translated into fsQCA terms. The first set of hypotheses features four hypotheses and will be tested by the medium-n analysis, with each hypothesis relating to one of the causal conditions examined in the fsQCA. The second set comprises two hypotheses and relates to the small-n comparative analysis conducted in Chapters 4, 5 and 6. This section begins by exploring the hypotheses to be taken forward from this chapter to be tested in the rest of this thesis. The second part of this section will then assess the extent to which these hypotheses are falsifiable.

2.4.1: Hypotheses

Due to the combinatorial nature of the method, “QCA is rarely ever applied with the main purpose of testing ready-made hypotheses distilled from the literature” (Schneider & Wagemann, 2010: 14). Ragin (1987) argues that QCA seeks to explore the relationship between theoretical ideas and empirical evidence, rather than testing theories. As such, the above literature review has resulted in the selection of four conditions to be explored in the fsQCA. The existing research has led to assumptions regarding the relationship between each of the conditions and the outcome, as listed below. These may be expressed as hypotheses regarding the direction of the condition on the outcome; that is to say, the extent to which the condition helps or hinders climate policy ambition. However, as the conditions are tested in conjunction, fsQCA is not an effective method for falsifying the hypotheses listed below.

Hypothesis 1: The fewer the number of veto points, the more ambitious the climate policy outputs.

Hypothesis 2: The higher the GDP per capita, the more ambitious the climate policy outputs.

Hypothesis 3: If a state is a member of the EU, it will develop more ambitious climate policy outputs.

Hypothesis 4: Left-wing governments will develop more ambitious climate policy outputs than right-wing governments.

It is highly unlikely that there will be a solution that explains all twenty-three cases, due to the variety of cases involved. Some cases will not fit the solutions; for example, states may formulate ambitious policy without possessing the exact combination of variables theorised by the fsQCA, or alternatively, states may possess all of the required variables but not develop ambitious climate policy during the period. Therefore, case studies will be selected from the twenty-three states with which to conduct an in-depth case study analysis, in order to ascertain why certain states’ policy approaches were not explained by the findings of the fsQCA. Indeed, as this thesis seeks to explain variation of climate policy amongst developed states, it will be necessary to identify a case study that demonstrated world-leading climate policy, with a similar, comparable state that did not possess the same outcome. In order to reduce the possibility that any explanations identified are specific to the two case studies in question, a further two cases will be explored. All four of these states must possess similar scores for the conditions identified in the fsQCA. Two states will be climate pioneers, while the other two will be relative laggards. These four case studies will then be detailed in the subsequent chapters.

Two further hypotheses are needed for the small-n analysis. These hypotheses relate to independent variables that can not be translated into fsQCA terms. Specifically, they relate to the impact of EM on renewable energy policy, and the influence of nuclear energy, as detailed in the section above. The concept of path dependence will be used to examine in greater detail how these issues influenced the development of climate policy. The two hypotheses to be tested in Chapters 5 and 6 will be as follows:-

Hypothesis 5: In a state in which Ecological Modernisation plays an influential role in renewable energy policy, more ambitious climate policy outputs will result.

Hypothesis 6: A state that sources electricity from nuclear power and is also seeking to phase out the energy source will formulate more ambitious climate policy outputs.

2.4.2: Falsifiability

In Political research, one "should construct theories so that they can be shown to be wrong as easily and quickly as possible" (King *et al.* 1994: 100). Thus, in order to formulate theoretically rigorous arguments, it is necessary that a theory can be falsifiable (Popper, 1968). This thesis seeks to identify the causal relationship between certain independent variables (termed 'conditions' when applied to fsQCA) and the dependent variable, climate policy variation. As such, the falsifiability of the hypotheses related to each of the independent variables is relatively straightforward. This investigation features two sets of hypotheses, however: one set to be tested via fsQCA; and one set to be tested by small-n comparative analysis. While the latter set of hypotheses may be falsified relatively simply, the fsQCA approach is not well suited to falsifying hypotheses, although the hypotheses are falsifiable in theory.

Hypotheses 1 to 4 may all be falsified relatively simply. For example, if a climate policy pioneer possessed a very large number of veto points, then *Hypothesis 1* would be falsified. However, while each of the hypotheses to be tested by the fsQCA are falsifiable, the method itself is not well suited to falsifying hypotheses. While the specific methodological foundations of fsQCA will be explored in Chapter 3, it is worth noting here that fsQCA produces scores for the 'consistency' and 'coverage' of the solutions created by the methods. 'Consistency' refers to the degree to which the cases sharing a particular causal configuration result in a given outcome. Perfect consistency is almost impossible in the social sciences, however, due to the sheer number of potential variables involved in determining an outcome. 'Coverage' assesses the extent to which the causal configuration accounts for empirical instances of an outcome. As such, not all of the cases under examination will be explained by the solution terms created by the fsQCA. Moreover, fsQCA tests conditions in conjunction as well as in isolation, meaning that if a solution comprises several conditions, it is impossible to determine whether an individual hypothesis relating to just one of the conditions is supported. It is for these reasons that fsQCA assesses conditions, not independent variables that may tested individually. Thus, while each of the four hypotheses to be tested by the fsQCA are falsifiable in principle, thus ensuring that the hypotheses are rigorous, fsQCA will not be able to falsify the four hypotheses.

The second set of hypotheses is more straightforward and will be tested and developed in this thesis. Regarding *Hypothesis 5*, if a state's renewable energy policy was influenced by the principles of EM, but the state did not formulated ambitious climate policy, then the hypothesis will be falsified. Similarly, regarding *Hypothesis 6*, if a state sourced electricity from nuclear power, and also sought to phase out the energy source, but did not formulate ambitious climate policy, then this hypothesis would be falsified. As discussed in Section 1.2 of this thesis, in which the overall argument was discussed, I argue that the arguments related to renewables policy and nuclear energy may be complementary. In order for a state to become a climate policy pioneer, then its renewables policy must be influenced by EM, and it must be seeking to phase out nuclear energy. If a state exhibited this combination of variables but was not a pioneer, then the overall argument is falsified. Similarly, if a state's renewables policy was not influenced by EM, and the state was not seeking to phase out nuclear energy, but the state was not a climate policy laggard, then the overall argument is falsified.

2.5: Conclusion

This chapter has sought to survey the existing literature regarding ambitious environmental and climate policy in developed states. When defining the dependent variable – climate policy variation in developed states – the literature on policy pioneers highlighted that leadership may be expressed in many ways. Existing research has sought to categorise leaders as those that foster co-operation in the international arena (Baettig *et al*., 2008: 478; Seidel, 2011); and those that develop the most ambitious domestic policies (Bernauer and Böhmelt, 2013*a*; Boasson 2013; Huitema *et al*., 2011: 182; Knill *et al.*, 2012; Liefferink *et al*., 2009). This thesis favours the more qualitative means of determining domestic climate policy, and thus defines climate policy by the size of the overall emissions reduction goals during 2006-2010 and the extent to which these goals built upon those formulated for the Kyoto Protocol. Pioneering legislation is defined in relative, rather than absolute, terms (Knill *et al*., 2012: 36). It should be noted, though, that a state "might have strict policies in place… However, this might not necessarily entail a good (or improving) environmental performance" (Knill *et al*., 2012: 44). That is to say, policy outputs are not the same as policy outcomes. Yet, as this thesis seeks to explain variation in ambition, policy outputs are the more relevant measure of climate policy to this investigation.

When seeking to explain why a state may create more ambitious climate policy outputs, the existing literature provides a useful starting point for determining potential factors. Although fsQCA struggles to test hypotheses in the same way as regression studies because conditions are analysed in combination rather than isolation, hypotheses drawn from the literature still play a role. Five themes were identified, although geographical factors were not found to affect policy outputs by the literature, so were excluded from the fsQCA. As such, the existing literature was divided into institutional, economic, international and ideological themes. From here, one variable from each theme will be taken to the fsQCA, namely the number of veto points in an institution, GDP per capita, membership of the EU and government partisanship. The existing literature on these four variables was then explored in detail in order to ensure that the grades accorded in the fsQCA were empirically justifiable, with directional assumptions in keeping with the existing literature (Kent, 2008: 8).

Next, the existing research related to the hypotheses for the small-n analysis was detailed. These variables could not be translated easily into fsQCA terms, hence their omission from Chapter 3. Firstly, it was argued that due to the long-term nature of climate and energy policy, for a state to have been a pioneer during 2006-2010, favourable conditions must have been in place prior to the period under investigation. These conditions then 'lock in' certain behaviours and decisions, which facilitate more ambitious policy formulation. The existing literature on Ecological Modernisation and nuclear energy was then explored, finding that existing research is mixed on whether either will help or hinder climate change mitigation. While EM is a pragmatic approach to addressing environmental degradation, pro-growth strategies could legitimise the continuation of high levels of consumption. For nuclear energy, although the energy source does not produce GHGs during electricity consumption, its lifecycle still results in the production of large quantities of emissions. As such, this thesis finds weight with the argument of Sovacool (2008: 2960), who posits that "nuclear energy is in no way ''carbon free'' or ''emissions free,'' even though it is much better (from purely a carbon-equivalent emissions standpoint) than coal, oil, and natural gas".

The final section in this chapter then turned to how the research puzzle outlined in Chapter 1 will be answered, as shaped by the literature discussed in this chapter. Hypotheses were formulated about each of the individual conditions for the fsQCA. It was suggested that: the fewer the number of veto points, the more ambitious the climate policy; the higher the GDP per capita, the more ambitious the climate policy; if a state is a member of the EU, it will develop more ambitious climate policy; and left-wing governments will develop more ambitious climate policy than right-wing governments. From here, *Hypothesis 5* posited that the influence of Ecological Modernisation in policy-making will result in more ambitious climate policy outputs, while *Hypothesis 6* suggested that reliance upon nuclear electricity, in conjunction with an intention to phase out the energy source, will result in more ambitious climate policy outputs. It was then argued that the findings of this thesis would be deemed falsifiable if one of the nineteen Annex II states not explored in detail should exhibit either EM principles with regards to renewables policy, or the intention to phase out nuclear energy, and not produce pioneering climate policy. Having defined the dependent variable, the conditions for the fsQCA, the hypotheses to be tested in the fsQCA, the independent variables, and the hypotheses to be explored in detail, it is now necessary to determine the climate policy pioneers and laggards, identify the patterns that explain climate policy variation, and select the case studies to be explored in detail.

Chapter 3: Medium-n Analysis of Conditions Influencing Climate Policy in Annex II States

The twenty-three member states of the UNFCCC Annex II share many commonalities. Each Annex II state is comparatively wealthy and highly developed, and thus is seen as holding the greatest obligation to reduce emissions. Where the states differ, however, is in their policy responses to climate change. The UK's pioneering Climate Change Act of 2008 was at the time the most ambitious in the world, requiring a reduction (compared to 1990 levels) of at least 34% of GHG emissions by 2020, and of at least 80% by 2050 (Marden & Gough, 2011). At a similar time, however, "President Bush drove the United States from its place as laggard co-operator into a position of outright opposition to effectively addressing climate change" (Driesen, 2010: 1), with his support for oil exploration in the Alaska Arctic Wildlife Refuge being just one of many examples (Daynes & Sussman, 2010: 191). This chapter therefore seeks to discover the patterns of variables that influence climate change policy in developed states, in response to the overall puzzle of the thesis which seeks to explain climate policy variation amongst developed states. In so doing, the chapter identifies the climate policy leaders and laggards of 2006-2010, whether there are any configurations of conditions that are necessary for ambitious or not ambitious climate policy, and also whether there are any configurations of conditions that are sufficient for such outcomes.

In order to address these questions, several variables will be examined for their significance in shaping policy formulation. As highlighted in the literature review in Chapter 2, the number of veto points within the governance structure, GDP per capita, EU membership, and government partisanship have all been identified as potential factors in shaping climate change policy. The impact of these four variables on the climate change policies of the twenty-three Annex II states will be investigated for the years 2006-2010; a period in which highly ambitious policy formulation and strong climate change scepticism could be seen simultaneously (*see* Driesen, 2010; Burck *et al.*, 2009*b*; Marden & Gough, 2011).

This chapter will be broken into five sections. Firstly, the theory underpinning each of the conditions, as detailed in the second chapter, will be surveyed. Secondly, the intricacies of the fsQCA methodological approach will be explained. Thirdly, each of the causal conditions will be operationalised. Here, it will be argued that Germany, Iceland, Portugal, Sweden and the UK, and to a lesser extent, France, Ireland and Norway, were climate policy pioneers. Austria, Canada, Italy, Japan and the USA, and to a lesser extent, Australia, Belgium, Finland, Greece, Luxembourg, Netherlands, and New Zealand, were climate policy laggards. Denmark, Spain and Switzerland were neither pioneers nor laggards. In the fourth section the findings will be presented and discussed. This fourth section will demonstrate that EU membership is *almost* a necessary condition for ambitious climate change policy. More significantly, the combination of EU membership in conjunction with left-wing government is sufficient for a state to become a climate pioneer. However, five states that exhibited ambitious climate policy – Denmark, France, Germany, Ireland and Sweden – are not explained by this finding. Therefore, in the final section, Germany and Sweden are selected as case studies from these five states as they both received maximum scores for climate policy, thus making them pioneers, and therefore the most ambitious states within the policy variation that is to be explained. The solution for the negation of the outcome, that is to say, 'not ambitious' climate policy, found that non-membership of the EU is sufficient. Austria, Belgium, Finland, Greece, Italy, Luxembourg and Netherlands were not explained by this solution, and so two of these laggard states are selected as case studies. Austria, Finland, Germany, and Sweden scored the same for the outcome and each of the four conditions, while Austria and Germany, and Finland and Sweden also shared many other commonalities. Thus, Austria, Finland, Germany and Sweden will be the case studies for the rest of the thesis.

3.1: Theory

Although explored in greater detail in the second chapter, it is beneficial to overview briefly the rationale for selecting each of the four conditions for the fsQCA. fsQCA can only handle a small number of conditions – for fear of introducing 'limited diversity', which will be explored shortly – thus restricting this investigation to one condition based around each theme. The first causal condition to be examined is the state's system of governance, and the extent of the political discretion within it. Despite all twenty-three states being democracies, there is great variation in the governance structures amongst them; variation which Lijphart (1999) and Jahn and Müller-Rommel (2011) argue not only facilitates or constrains debate, but also shapes policy outputs as well. As such, this chapter focusses upon the role played by political discretion (as determined by the number, strength and position of veto players and points) within a governance structure (*see* Hallerberg & Basinger, 1998; Tsebelis, 1995). According to research by Lachapelle and Paterson (2013: 564) "[i]n all categories, parliamentary systems were more likely than presidential ones to implement a range of climate policies to mitigate emissions." Yet, while Crepaz and Moser (2004: 266) argue that veto points should have a tendency to restrain government, there is little in the literature on how veto players affect climate policy specifically. Indeed, according to Baumgartner and Jones (1993), veto points may provide an access point to new actors, as well as or instead of being an obstacle to policy proposals. Broadly, however, existing research appears to suggest that the fewer the veto points, the more ambitious the climate policy outputs, which is *Hypothesis 1* as detailed in Chapter 2.

The second condition is the role of a state's wealth in influencing climate policy. As all states in this investigation are already developed states to begin with, they are all, by definition, wealthy. Jänicke (2005: 136-137) argues that the most important characteristic of green states is their high economic development, which facilitates greater access to better technology and more financial resources to invest in environmental protection. According to the concept of post-materialism, once a certain threshold of wealth is reached, citizens are more likely to prioritise non-material issues, such as the protection of the environment (Inglehart, 1990). Moreover, the Environmental Kuznets Curve stipulates that as a state becomes wealthier, its environmental impact is lowered as the state formulates more environmental protection policies, or polluting industries move abroad where wages are lower, or newer technologies that lessen environmental damage can be more easily afforded, as discussed earlier (*see* Ekins 2000: 29). Therefore, by demarcating by wealth within the set of developed states, the threshold at which post-materialism or environmental protection is realised, may be identified. Thus, *Hypothesis 2* stipulates that the higher the GDP per capita, the more ambitious the climate policy outputs will be.

Thirdly, the European Union has assumed a leadership role in global attempts at mitigating climate change. Membership of the EU has been identified frequently as shaping a state's environmental policies (Liefferink *et al.*, 2009; Schreurs & Tiberghien, 2007; Wurzel & Connelly, 2011). All EU members are required to adopt the *acquis communautaire,* which features over 300 environmental directives (Kazakos, 1999: 384). With the EU increasingly developing its own policy competencies on climate change – facilitated in part by the specialised European Climate Change Programme (ECCP) – it may be no surprise that Liefferink *et al.* (2009: 696) found that "EU membership turned out to be the most powerful factor explaining a strong domestic environmental policy output" in their investigation. While the burden-sharing scheme for the Kyoto Protocol and the Emissions Trading Scheme have received mixed results, the existence of these programmes is likely to have facilitated greater ambition in domestic climate policy outputs. Thus, *Hypothesis 3* posits that if a state is a member of the EU, it will develop more ambitious climate policy outputs.

The final causal condition relates to the political makeup of the state's government (*see* List & Sturm, 2006). On the one hand, Neumayer (2003: 204) states that as left-wing parties "tend to be more interventionist in their economic policy making, they might find it easier to accept that governments need to install environmental protection instruments." Alternatively, in Germany, for example, the Christian centre-right holds strong links to environmental issues due to the perceived sacredness of nature (Dietz, Stern & Guagnano, 1998: 465), exemplifying why Jänicke (1992: 49) argued that there is little difference between the left and right regarding the environment. On the whole, however, the literature tends to favour finding association between left-wing party strength and environmental protection. Benton (1997: 43) argues that since the industrial revolution, environmental damage has affected the poorest within society, who are a core voting demographic of many left-wing parties. Neumayer (2003, 2004) finds that left-wing parties in government are associated with lower pollution levels, while Rohrschneider (1988) finds that 'Old Left' parties in many states have adopted environmental issues for fearing of losing voters to green parties on their left. Party competition can therefore be considered a potential factor in understanding why left-wing parties may be more supportive of strong climate policy. As such, *Hypothesis 4* posits that left-wing governments will develop more ambitious climate policy outputs than right-wing governments.

3.2: The fsQCA method

fsQCA is a burgeoning paradigm which has drawn most attention in the literature as a means of comparing welfare states (*see* Hudson & Kühner, 2009; Kvist, 1999; Pennings, 2005), but has also been used to examine subjects as diverse as educational achievement (Cooper, 2005), the great reversal in Spanish America (Katz *et al.*, 2005) and the relationship between political parties and gender (Lilliefeldt, 2010). The method has not previously been employed to further the understanding of climate change policy ambition however, although Never and Betz (2014) seek to explain climate policy implementation. fsQCA provides an innovative means for testing assumptions and selecting case studies due to its capacity for testing conditions in combination, rather than merely in isolation (Schneider & Wagemann, 2012: 296-297). fsQCA is able to analyse combinations of variables because it can isolate both necessary and sufficient conditions. The concepts of necessity and sufficiency are regularly encountered in the social sciences, despite challenges to their empirical existence (*see* Braumoeller & Goertz, 2000). A necessary condition or configuration will be present in all configurations that result in the outcome, while a sufficient condition or configuration will result in the outcome but may not be present in all configurations that do so (*see* Pennings, 2005: 319). However, as Ragin (2000: 222) warns, "when causation is complex, no single cause may be either necessary or sufficient". That is to say, it is likely in this investigation that conditions must be considered in combination in order to isolate how they influence an outcome. Moreover, there are likely to be more than one configuration that influences the outcome.

Building upon Boolean algebra – whereby cases are accorded scores of 0 to indicate full non-membership of a set or 1 for full membership – fsQCA enables cases to be graded, on either a categorised or continuous scale, from 0 to 1 (Ragin, 2000: 292-294). Once scores have been allocated to each of the cases, truth tables – also known as 'property spaces' elsewhere in social science literature (Kvist, 1999) – are generated by the fsQCA software. These truth tables list all of the possible unique configurations of variables which could result in the outcome variable. The total number of configurations can be expressed as 2^k, where k denotes the number of sets in the study, such that two causal conditions result in four causal configurations, three conditions lead to eight configurations and so on. The exponential increase in the number of possible configurations is fuelled by the influence of negation, in which the 'negative' of each causal condition – that is to say, weak membership in the set – is also considered. It is also recommended that the configurations resulting in the negation of the outcome are examined, as a means of understanding why a certain phenomenon may not take place (Schneider & Wagemann, 2010: 12). The results for the factors that result in not ambitious (which is *not* to say, 'unambitious', but rather everything except ambitious) climate policies are shown in *Tables 8* and *9*.

As a result of the large number of theoretical combinations of conditions, it can be expected that some configurations – or 'logical remainders' (*see* Ragin, 2000: 107, 198) – may not be found empirically, in a situation known as 'limited diversity' (Schneider & Wagemann, 2006: 757). However, this problem is not as significant in fsQCA as it is in regression studies. Regression studies have no means of isolating logical remainders and removing them, meaning that assumptions are created which are not reflected in reality (or, at least not in the cases under investigation). The units of analysis in fsQCA, on the other hand, are causal configurations, rather than independent variables, and as such, the causal configurations that are not observed empirically are removed from the investigation during the truth table stage of the analysis.

Once the variables are operationalised and the data tabulated, the fsQCA software (Ragin *et al.*, 2006) then determines the causal configurations that are necessary and sufficient to the outcome, as ‘solution terms’. These solution terms employ the principles of Boolean logic, whereby * denotes ‘and’, + denotes ‘or’, and ~ denotes ‘negation’. The solution produces scores for both the ‘consistency’ and the ‘coverage’ of each causal configuration. ‘Consistency’ refers to the degree to which the cases sharing a particular causal configuration (e.g. both EU membership *and* high GDP per capita) result in a given outcome (for example, strong climate change policy) (*see* Ragin, 2008: 44). Consistency therefore measures the extent to which a solution or solution term is a subset of the outcome. Perfect consistency is almost impossible in the social sciences, however, due to the sheer number of potential variables involved in determining an outcome. The benchmark recommendation by the literature for the consistency threshold is 0.75; anything lower than 0.75 would suggest a weak relationship between the configurations and the outcome (Ragin, 2008: 46). ‘Coverage’ assesses the extent to which the causal configuration accounts for empirical instances of an outcome. For example, a configuration with high consistency (over 0.75) may have a lower coverage value because significant configurations may only be found in a small number of cases, yet achieve strong consistency in those few cases. As Ragin (2008: 44) states, “[j]ust as it is possible in correlational analysis to have a significant but weak correlation; it is possible in set-theoretic analysis to have a set relation that is highly consistent but low in coverage.” Coverage is divided into two scores. The ‘raw coverage’ denotes the percentage of all of the cases in the outcome covered by a single sufficient path of an equifinal solution term; ‘unique coverage’ is similar, but only highlights the percentage of cases that are explained uniquely by the solution (Schneider & Wagemann, 2012: 332-334).

3.3: Operationalisation

fsQCA scales can be continuous or categorised, featuring many or few categories depending on the needs of the coder (Ragin, 2000: 292-294). There are one outcome variable and four conditions to be coded in this investigation. Each of the variables in this chapter has been coded on continuous scales, except EU membership, which is categorised. The coding is listed below, with the operationalisation of the outcome and each condition following.

Table 2: Data matrix of the twenty-three cases, their scores for the outcome and the four causal conditions.

Cases	**Outcome**	**Causal Conditions**			
State	**Ambitious climate policy (ambclimpol)**	**EU membership (eumember)**	**Political Discretion (poldisc)**	**Left-wing Government (leftgov)**	**High GDP per capita (highgdp)**
Australia	0.23	0.00	0.46	0.65	0.88
Austria	0.00	1.00	0.72	0.40	0.83
Belgium	0.30	1.00	1.00	0.35	0.69
Canada	0.00	0.00	0.00	0.00	0.90
Denmark	0.58	1.00	0.29	0.00	0.72
Finland	0.31	1.00	1.00	0.30	0.64
France	0.66	1.00	0.95	0.00	0.51
Germany	1.00	1.00	0.74	0.40	0.69
Greece	0.23	1.00	0.36	0.25	0.25
Iceland	1.00	0.50	0.82	0.50	0.82
Ireland	0.76	1.00	0.60	0.20	1.00
Italy	0.00	1.00	0.31	0.30	0.39
Japan	0.00	0.00	0.82	0.10	0.56
Luxembourg	0.30	1.00	0.83	0.50	1.00
Netherlands	0.29	1.00	1.00	0.30	0.93
New Zealand	0.23	0.00	0.00	0.55	0.25
Norway	0.75	0.50	0.93	0.75	1.00
Portugal	1.00	1.00	0.24	1.00	0.00
Spain	0.53	1.00	0.00	1.00	0.37
Sweden	1.00	1.00	0.86	0.15	0.74
Switzerland	0.41	0.50	0.42	0.25	1.00
United Kingdom	1.00	1.00	0.36	0.90	0.73
United States	0.00	0.00	0.37	0.00	1.00

3.3.1: The outcome: pioneering climate policy

Firstly, in order to score the highly complex and often fluctuating stances determining the ‘strength’ of climate change policy into an fsQCA scale, data are drawn from the Climate Change Performance Index (CCPI) developed by Germanwatch and CAN International, and kindly provided for use in this research with their permission. While the CCPI analyses emissions levels, emissions trends and climate policy, this fsQCA uses only the scores for national climate policy. The data used to create the reports for 2006-2010 are used for this investigation (Burck *et al.* 2007; 2008; 2009*a*; 2010; 2011). The raw data are listed in the appendices. The CCPI has been produced annually since 2006, using the advice of between 180 and 230 climate change policy experts. These climate policy specialists work for NGOs and score the policy performance of the states in which they are specialised via a questionnaire. This expert survey asks participants to grade states on a variety of topics, such as renewable electricity promotion, improvement of efficiencies regarding CO_2 emissions, and the manufacturing, construction, transport and accommodation sectors (Burck & Bals, 2013: 12-13). While the CCPI has been criticised by Bernauer and Böhmelt (2013: 197) because of the potential for inconsistencies that arise when gathering the opinions of many individuals based around the world, their suggested replacement, the Climate Change Cooperation Index, is unsuitable for this investigation as it only covers 1996-2008. As such, the CCPI is the most suitable source of data.

As each edition of the CCPI relates only to that year’s policy developments – rather than a cumulative understanding of policy in which one very strong piece of legislation may skew that state’s score, such as the Climate Change Act in the UK – an average score for the five-year period was taken to reflect the states’ sometimes fluctuating policy strength during that period. The states were graded such that 1 equalled ‘ambitious climate policy’ and 0 denoted ‘not ambitious climate policy’. When the cases’ scores were plotted in order of value, a clear grouping of low ranking states could be identified featuring Italy, Austria, the USA and Canada; these were graded 0. Similarly, another high scoring grouping involving Germany, Iceland, the UK, Sweden and Portugal could be seen; these were graded as 1. Thus, these five states may be identified as climate policy pioneers during 2006-2010. The states in between these values were then graded on a continuous scale. This condition was labelled 'ambclimpol'; for the scores, see *Table 2*.

3.3.2: Condition one: EU membership

Next, EU membership could be considered either as a crisp set or a fuzzy set. While coding 0 for non-members and 1 for members would be relatively unproblematic, I argue that certain non-members of the EU are influenced by the EU more than others and thus should be coded as neither a member nor non-member. Namely, there are three European states that are not members of the EU but are required to meet many of its regulations for trading purposes, via the European Free Trade Association (EFTA, 2014); Iceland, Norway and Switzerland. These three states were therefore coded as 0.5 on the fsQCA scale, reflecting neither membership, nor non-membership, of the EU. Thus, five states were coded with 0 as they are outside geographical Europe, three were coded as 0.5 as members of EFTA but non-members of the EU, and fifteen were graded with 1 as full EU members. None of the states' affiliations to the EU changed during 2006-2010. This condition was labelled 'eumember'; for the scores, see *Table 2*.

3.3.3: Condition two: political discretion

The second causal condition grades the different types of governance structure according to the degree of political discretion – that is to say, the absence of political constraints, or veto points and players (*see* Tsebelis, 1995) – during the period. These gradations were developed by building on Political Constraint Index (POLCON) dataset (NSD, 2011), which in turn built upon the work of Henisz (2002). The raw data are listed in the appendices. The dataset seeks to code the role of institutional veto points, such as the presence of an additional chamber in the legislative process, or the dominance of a rival party within a key feature of the legislative process, or the homogeneity of party preferences of those parties in opposition, amongst others. These obstacles present political constraints, the absence of which being the political discretion to pursue policies desired by the government of the time. Political discretion is coded as 1, while non-political discretion is 0. The mean scores for 2006-2010 were then determined. When the averages from the POLCON data were plotted, there were clear groupings again, as in the case of the CCPI data. The scores of Canada, New Zealand and Spain were distinctly lower from the rest of the states, and were thus coded as 0, reflecting non-political discretion on the part of the government to pursue its favoured policies. The scores of Belgium and the Netherlands were so much higher than the other states that they would have skewed the coding; as such, the highest score found within the majority of the states – that of France – was coded as 1, with a continuous scale formulated between the scores of Canada and France. This condition was labelled 'poldisc'; for the scores, see *Table 2*.

3.3.4: Condition three: government partisanship

In order to score the partisanship of states' governments, the coding by Armingeon *et al.* (2012) of OECD states from 1960-2010 as part of the Comparative Political Data Index (CPDI) will be used. These data use the Schmidt index to grade states' cabinets according to their political makeup, resulting in a 1-5 scale (*see* Schmidt, 1996). 1 represented a hegemony of right wing parties, 2 represented a dominance of right-wing (and centre) parties, 3 represented a balance of power between right and left, 4 represented a dominance of left-wing parties, and 5 represented left-wing hegemony. The raw data is listed in the appendices. The average score was found across the five years between 2006 and 2010, and then translated directly into an fsQCA score, whereby 1 represented left-wing government, and 0 represented non-left-wing government. It should be noted that Christian Democrat parties, such as the CDU/CSU of Germany, were coded by the CCPI as centre parties, rather than right-wing parties, which could be challenged depending on the state in question. Additionally, states that experienced a significant swing in their governing parties, for example, New Zealand's switch from a left-wing government to a right-wing government in 2008, were averaged out around the 0.5 mark, suggesting a balance of power on average rather than a swing from left to right. This averaging out is not problematic, but should be acknowledged. Thus, with these considerations in mind, the CPDI offers the strongest means of coding each of the states. This condition was labelled 'leftgov'; for the scores, see *Table 2*.

3.3.5: Condition four: GDP per capita

Finally, GDP per capita is included as a variable in order to ascertain whether high levels of wealth are sufficient to generate an ambitious climate policy as a result of extra funds being available for emissions reductions policies, or if a smaller economy enables a state to be more flexible in responding to the climate challenge. To do so, ‘GDP per capita, US $, constant prices, constant PPPs, reference year 2005’ data from the OECD (2014*a*) was used, with the data for 2006 to 2010 averaged to find a value for the five-year period. Careful coding was necessary here, as the states were originally selected for being ‘developed’, suggesting that each would be ‘wealthy’ by global standards already. There is no objective measure with which to distinguish between very wealthy states, and as such, skewed data by coding according to extremes needed to be avoided. As states with very high GDP but very low populations, such as Luxembourg and Norway, and the world’s richest country by total GDP, the USA, are included in the set, Switzerland’s GDP per capita average of $38,626 for 2006-2010 was selected as the threshold for 1, which was the highest figure below those of Luxembourg, Norway and the USA. This ensured that states’ GDP per capita scores would be graded in comparison to the very wealthy Switzerland, rather than super-wealthy Luxembourg, Norway and USA, which would have skewed the majority of states towards the lower end of the scale. Unlike the coding for political discretion and left-wing government, there was no separate grouping towards the bottom of the scale when the states’ values were ranked in order. As such, the state with the lowest GDP, Portugal was ranked as 0, with an average GDP per capita between 2006 and 2010 of $21,773. The other states’ scores were then calibrated along a continuous scale between these two thresholds. This condition was labelled ‘highgdp’; for the scores, see *Table 2*.

3.4: Findings and Discussion

Necessity and sufficiency are scored separately and given different scores. As can be expected when attempting to explain highly complex and equifinal conditions, none of the causal conditions or configurations was found to be necessary for strong policy, as will be seen shortly. As Schneider and Wagemann (2010: 8) state, “only under very peculiar empirical conditions does such an analysis of sufficient conditions also correctly reveal the presence or absence of necessary conditions.” The results of the test for sufficiency deserve further attention, and will be discussed following the analysis for necessary conditions.

3.4.1: Identification of configurations that are necessary for the outcome

Schneider & Rohlfing (2013: 7) have argued that a consistency score of 0.9 for necessity is as close to 1 as a condition is likely to achieve when scoring empirical realities, and so such a case should be considered as essentially being a necessary condition. EU membership came very close to such a definition, with a score of 0.89, and should be considered as almost necessary when considering the factors that influence the ambition of climate change policy. The scores for each of the conditions may be found in *Table 3.* Political discretion, left-wing government and high GDP per capita, as well as the negations for each of the conditions, received consistency scores much below the 0.9 threshold and so should not be considered necessary. As such, the relatively high score of 0.74 for the coverage of cases affected by left-wing government essentially becomes irrelevant, as the condition is not necessary anyway. Configurations of conditions could in theory be necessary for the outcome, but only if each of the conditions involved were individually necessary; as none of the conditions was individually necessary, no configuration of conditions can be necessary for the outcome. Similarly, as shown in *Table 4*, there were no necessary conditions for the negation of the outcome, that is to say, not ambitious climate policy. High GDP per capita and not left-wing government were the closest to being necessary conditions for not ambitious climate policy, at 0.80 and 0.82 respectively, but were not close enough to be considered necessary conditions.

Table 3: Scores when testing ambitious climate policy for necessity.

Condition	**Consistency**	**Coverage**
eumember	0.89	0.57
poldisc	0.70	0.56
leftgov	0.62	0.74
highgdp	0.78	0.52
~eumember	0.18	0.29
~poldisc	0.46	0.49
~leftgov	0.62	0.47
~highgdp	0.43	0.65

Table 4: Scores when testing 'not ambitious' climate policy for necessity.

Condition	**Consistency**	**Coverage**
eumember	0.63	0.47
poldisc	0.59	0.56
leftgov	0.39	0.55
highgdp	0.80	0.62
~eumember	0.43	0.81
~poldisc	0.54	0.68
~leftgov	0.82	0.72
~highgdp	0.38	0.67

Figure 1 plots the relationship between EU membership and ambitious climate policy when testing for necessity, because the condition was identified in *Table 3* above as almost necessary for climate policy ambition. As can be seen in *Figure 1*, while there is no true logical contradictory state that is not an EU member but achieved a score of 1 for climate policy, there

are two states which received the full score of 1 for EU membership, but a score of 0 for ambitious climate policy. These two states were Austria and Italy, and are therefore of particular interest, as it may have been expected that these states would have formulated more ambitious climate policies than they did.

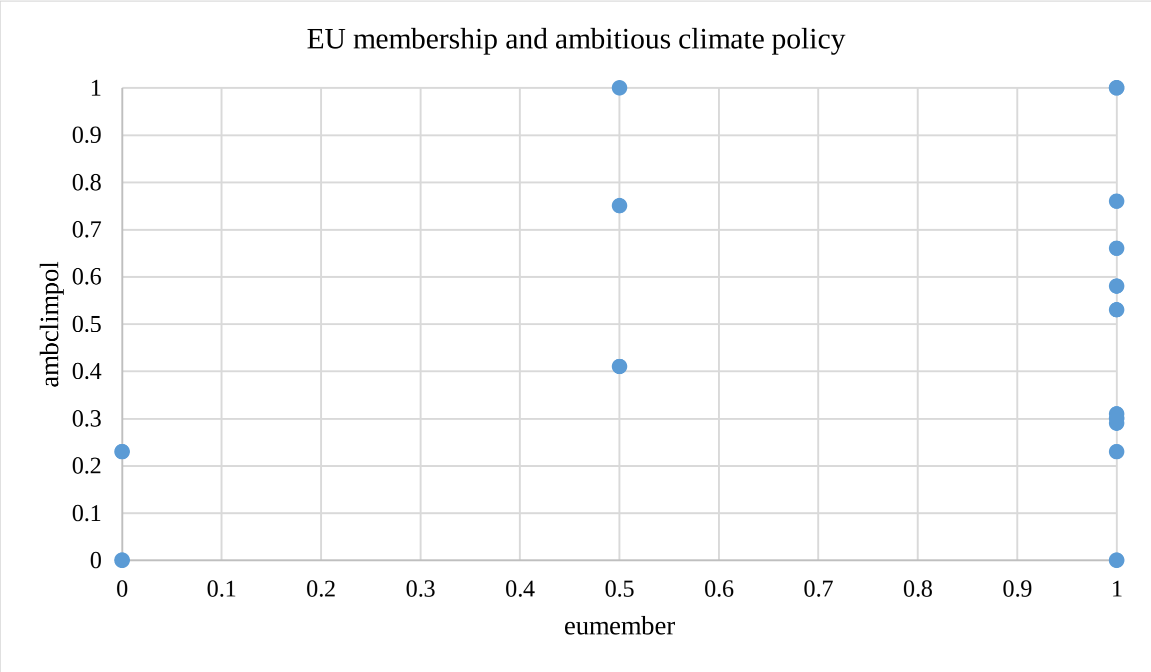

Figure 1: Graph showing the relationship between EU membership and ambitious climate policy, when testing for necessity.

3.4.2: Identification of configurations that are sufficient for the outcome

Having noted the almost necessary role of the EU, the following analysis relates to the causal configurations which were found to be sufficient for strong climate change policy. fsQCA software provides three solutions, based on differing assumptions regarding logical remainders. For each of the solutions, the frequency cut-off for each causal configuration was '1'. That is to say, all cases used to develop the solutions were found empirically, while logical remainders – hypothetically possible causal configurations which were not found amongst the twenty-three cases – were excluded (*see* Ragin, 2000: 107, 198). Of the sixteen possible causal configurations, seven were logical remainders, meaning that nine possible configurations were found empirically. The truth table is shown below in *Table 5*. The truth table lists each of the possible configurations of conditions, the number of times the configurations occurred empirically (including a cumulative percentage of the total), and the raw consistency of each configuration. Those configurations with a 0 in the Number column were logical remainders and did not occur empirically.

Table 5: Truth table for all possible configurations when testing for sufficiency.

Eumember	**Poldisc**	**Leftgov**	**Highgdp**	**Number**	**Raw consistency**
1	1	0	1	8 (42%)	0.71
1	0	1	0	2 (52%)	0.80
1	0	0	0	2 (63%)	0.51
0	0	0	1	2 (73%)	0.37
1	0	1	1	1 (78%)	0.81
1	0	0	1	1 (84%)	0.74
0	1	0	1	1 (89%)	0.57
0	0	1	1	1 (94%)	0.69
0	0	1	0	1 (100%)	0.56
1	1	1	1	0 (100%)	-
1	1	1	0	0 (100%)	-
1	1	0	0	0 (100%)	-
0	1	1	1	0 (100%)	-
0	1	1	0	0 (100%)	-
0	1	0	0	0 (100%)	-
0	0	0	0	0 (100%)	-

In the complex solution, the software does not make any simplifying assumptions about potential logical remainders, and thus, the solution is based purely on the truth table rows regarding configurations that were found empirically. The parsimonious solution features the fewest possible conditions and operators (such as AND or OR). The intermediate solution was deemed irrelevant as it provided the same results as the complex solution in this investigation when no directional assumptions were added, and the same as results as the parsimonious solution when directional assumptions in line with the assumptions from Chapter 2 were added (*see* Schneider & Wagemann, 2012). The consistency cut-off for each of the solutions was 0.80, ensuring that each of the solution terms was above the required consistency threshold of 0.75 (Ragin, 2008: 46). *Table 6* shows the complex solution, while *Table 7* shows the parsimonious solution.

The fsQCA software finds one causal combination that is sufficient for strong climate change policy for the complex solution, as shown in *Table 6*. Strictly speaking, the configuration is ‘usually sufficient’ because it has a consistency score of less than 1, but as the consistency cut-off was above 0.75, the sufficiency of the configuration can be considered significant. The overall solution coverage is 0.32 – an additional score for unique coverage is not possible for the overall solution, as all cases are included in the overall solution – and the solution consistency meets the 0.75 threshold, at 0.76. As there is only one solution, the scores for the overall solution are the same as those for the solution itself. Essentially, the complex solution finds that EU membership, in conjunction with left-wing government, but in the absence of political discretion, is sufficient for ambitious climate policy. This overall solution may be expressed more simply, however, by turning to the parsimonious solution, which relies on making simplifying assumptions.

Table 6: Complex solution for ambitious climate policy to two decimal places.

Causal configuration	**Raw coverage**	**Unique coverage**	**Consistency**
eumember*leftgov *~poldisc	0.32	0.32	0.76
Overall solution	0.32	-	0.76

The parsimonious solution provides a simpler perspective than the complex solution, and is shown in *Table 7*. This more parsimonious solution also provides one solution term, and again the overall solution passes the 0.75 consistency threshold with a score of 0.80, while the solution coverage is 0.55. Here, the complex solution has been simplified down to EU membership in conjunction with left-wing government. This solution does not challenge the findings of the complex solution, but instead simplifies the findings into a shorter, 'neater' solution. The solution is in keeping with *Hypotheses 3* and *4* as developed in Chapter 2 from the literature. These results will be explored in detail, following the statement of the results for the negation of the outcome.

Table 7: Parsimonious solution for ambitious climate policy to two decimal places.

Causal configuration	**Raw coverage**	**Unique coverage**	**Consistency**
eumember*leftgov	0.55	0.55	0.80
Overall solution	0.55	-	0.80

Having identified the causal configurations which are sufficient for the formulation of strong climate change policy, it is also prudent to consider the negation of the outcome (*see* Schneider & Wagemann, 2010: 12). As such, *Tables 8* and *9* show the complex and parsimonious solution formulae which are sufficient for not ambitious climate change policy. The term 'not ambitious' rather than unambitious is used in keeping with the existing literature, as the negation of an outcome does not necessarily mean the opposite of the outcome, but simply the lack of its presence. The results are very strong. The findings meet the 0.75 consistency threshold, with a consistency cut-off of 0.80. The complex solution created two sufficient solutions, and the parsimonious solution provided one. Firstly, the complex solution is scored at 0.35 for coverage and 0.90 for solution consistency and its results are shown in *Table 8*. Unlike the overall solution scores for the complex solution and parsimonious solution above, in which there was only one solution for each, here the overall solution score is different to the individual scores for the two complex solutions, because there more than one solution was generated, thus increasing both the consistency and coverage scores. The complex solution suggests the absence of EU membership plus the absence of political discretion, in conjunction with the presence of left-wing government is sufficient to result in not ambitious climate policy. The same outcome results in the absence of

EU membership plus the absence of left-wing government, in conjunction with high GDP per capita.

Table 8: Complex solution for not ambitious climate policy to two decimal places.

Causal configuration	**Raw coverage**	**Unique coverage**	**Consistency**
~eumember*~poldisc*leftgov	0.12	0.03	0.89
~eumember*~leftgov*highgdp	0.31	0.22	0.88
Overall solution	0.35	-	0.90

It must be noted that the findings outlined in *Table 8* contain a paradox, as left-wing government is found to be part of a configuration that is sufficient for not ambitious policy, but also for ambitious policy, as shown in *Tables 6* and *7*. The absence of left-wing government is also found to result in not ambitious climate policy, in *Table 8* above. Paradoxes are an inevitable part of fsQCA as the method tests for all of the configurations of conditions that result in both the outcome and its negation (Cooper & Glaesser, 2011). The paradox is only possible because the complex solution comprises a causal configuration featuring several conditions. As shown by the low raw and unique coverage score, the configuration is relatively trivial and, as a result, does not challenge the findings of the complex or parsimonious solutions for the outcome, as listed in *Tables 6* and *7*. As such, for the purposes of clarity and simplicity, the following parsimonious solution is preferred to the complex solution.

Table 9: Parsimonious solution for not ambitious climate policy to two decimal places.

Causal configuration	**Raw coverage**	**Unique coverage**	**Consistency**
~eumember	0.43	0.43	0.81
Overall solution	0.43	-	0.81

The parsimonious solution is scored at 0.43 for solution coverage and 0.81 for consistency and is shown *Table 9*. The solution finds that for the absence of ambitious climate policy, it is sufficient that a state is not a member of the EU. This finding achieves a very high consistency score of

0.81. There is a very strong relationship between not strong climate change policy and non-membership of the EU, which again highlights the significant role played by EU membership in determining ambitious climate policy. This finding is in line with *Hypothesis 3* in Chapter 2, and does not feature any paradoxes. In the same vein as the analysis for sufficiency of the outcome, the parsimonious solution will be taken forward to be critically evaluated in the discussion of the findings below.

3.4.3: Discussion of the findings

Returning to the results for the analysis of sufficiency for ambitious climate policy, the findings suggest that EU membership plays a strong role as it appears in the parsimonious solution, and also received a very high score when testing for necessity. As Blomgren *et al.* (2013: 7) summarise therefore, "'Europe' is no longer the dependent variable… instead it has become the independent variable, a way of explaining outcomes". EU membership was selected as a causal condition due to its strong presence within the existing literature (Jordan, 2002; Jordan *et al.*, 2011*b*; Kazakos, 1999; Liefferink *et al.*, 2009; Schreurs & Tiberghien, 2007; Wurzel & Connelly, 2011). The *acquis communautaire* plays a key legislative role in shaping member states' policies, while a normative desire for the EU to be an environmental pioneer suggests that EU members are more likely to be ambitious regarding climate change. The divergence of outcome scores for climate policy between EU member states suggests that policy is not completely dependent on the EU, and that states possess autonomy to choose their own policy formulations. While EU membership is close to being a necessary condition, it is not quite. Almost necessary by itself, the EU must be combined with other conditions in order to meet the requirements for sufficiency for ambitious climate policy.

These findings suggest that those states that are not members of the EU may struggle to formulate ambitious climate policy, or are not equally incentivised by a similar external organisation. Indeed, each of the five states that were graded as '0' for EU membership received very low scores for ambitious climate policy. The three European non-EU members fared better, however, with Iceland receiving a full score of '1' for ambitious climate policy, although Iceland's score is likely to have been influenced by the geographic location and small size of the state. The extent to which the low policy scores of non-members of the EU (both European and non-European) can be explained by the influence of the intergovernmental and trade-based organisations, or other factors innate to those locations, deserves further research. Most importantly, the finding that EU member states can range from a score of 0 in the outcome – suggesting full non-membership of the set of climate pioneering legislation, as in the case of Austria and Italy – to a score of 1, indicating full membership – in the case of Germany, Portugal and Sweden – suggests that the factors shaping climate policy in European states are of particular interest.

In conjunction with EU membership, the parsimonious solution states that left-wing government is sufficient for ambitious climate policy. Therefore, it appears that climate change policy remains a directional rather than valence issue (*see* Macdonald & Rabinowitz, 1998). This finding suggests that although some on the right appear favourable towards environmental and climate-related issues, overall they are less likely to develop more ambitious climate policies when in government. This argument is consistent with the work of Neumayer (2003) and Rohrschneider (1988) who argue that left-wing parties are more likely to formulate pro-climate policies as their core voting demographic – poorer citizens – are more likely to suffer negative environmental consequences, while the parties themselves are likely to be challenged by the rise of Green parties on the left. Neumayer (2003: 204) also states that "as left-wing parties tend to be more interventionist in their economic policy making, they might find it easier… to install environmental protection instruments." Climate change therefore remains a political – and party political – challenge. The states that formulated ambitious climate policy but received lower scores for the presence of left-wing government – namely Denmark, France, Germany, Ireland and Sweden – are worthy of further investigation.

Political discretion and GDP per capita figures were not included in the most parsimonious solution, suggesting that they only play a tertiary role, in comparison to the influence of EU membership and left-wing government. However, the absence of political discretion is included in the complex solution, because many of the states explained by the parsimonious solution also received low scores for political discretion. The role of political discretion was not clear in the literature; veto points and players could present obstacles to the formulation of ambitious policy (Tsebelis, 1995), or they could provide access points for actors seeking to introduce new policy solutions that could protect the climate (Baumgartner & Jones, 1993). The exclusion of political discretion from the parsimonious solution therefore does not further this debate in the literature. However, the omission of the condition from the parsimonious solution should be noted. Thus, this investigation has supported the findings of Christoff and Eckersley (2011: 444) who argue that "[t]he veto player thesis can illuminate why some states are climate laggards but it cannot explain why some states emerge as climate leaders". GDP per capita was included within the investigation as it was argued that post-materialist values (Inglehart, 1990) and the Environmental Kuznets Curve (*see* Ekins, 2000) could lead states to formulate more ambitious environmental policies. In neither the complex nor parsimonious solution did GDP per capita feature as a part of the solution, suggesting that the condition possessed limited explanatory power regarding climate policy variation. These findings demonstrate that strong climate change policy formulation is complex, in that the solution includes more than one condition in order to explain the outcome. The parsimonious solution provides the simplest solution and also the highest consistency score, and so will be taken forward as the primary explanation from the analysis.

Schneider and Wagemann (2012: 281) recommend that it is advisable to highlight which cases in particular may be explained by each of the solution terms. It must be borne in mind, however, that with scores of 0.5 implying both membership and non-membership, it can be difficult to determine which states should be considered as representing each of the solution terms. Thus, Iceland, Norway and Switzerland – due to their scores of 0.5 for EU membership – and Luxembourg and Iceland – due to their score of 0.5 for left-wing government – simultaneously both meet and do not meet the requirements of the parsimonious solution. The five non-European states all received low scores for their climate policies, and so they did not challenge the parsimonious solution for sufficiency. Austria, Belgium, Finland, Greece, Italy and Netherlands also met the requirements of the parsimonious solution, because although they were members of the EU, they did not have a left-wing government, and their climate policy scores were low. Portugal, Spain and the UK possessed both parts of the parsimonious solution – EU membership and a left-wing government – and resulted in ambitious climate policy. Therefore, fourteen states either support or do not challenge the parsimonious solution for sufficiency, and four are excluded due to scores of 0.5 for EU membership or left-wing government. Thus, five states out of the twenty-three cases have not been explained by the parsimonious solution. Denmark, France, Germany, Ireland and Sweden were all members of the EU and did not possess a left-wing government during 2006, yet did formulate ambitious climate policy. Why these five states were able to formulate ambitious policy is deserving of further investigation.

Regarding the negation of the outcome, the parsimonious solution states that in order for a state to formulate not ambitious climate policy, it was sufficient for a state not to be a member of the EU. Australia, Canada, Japan, New Zealand and the USA were all explained by this solution, as each state received a score of 0 for EU membership, and either 0 or 0.23 for climate policy ambition. Denmark, France, Germany, Ireland, Portugal, Spain, Sweden and the UK do not challenge the findings, as they were all members of the EU and did *not* develop 'not ambitious' climate policy. Again, the extent to which Iceland, Norway and Switzerland support the findings is uncertain, as they were each scored at 0.5 for EU membership. However, Austria, Belgium, Finland, Greece, Italy, Luxembourg and Netherlands received low scores for climate policy ambition but received full scores of 1 for EU membership. What explains climate policy in these climate policy laggards? Two of these laggard states that were not explained by the solution for the negation will be taken forward for the small-n case study analysis.

3.5: Case study selection

The configuration of conditions that is sufficient for ambitious climate change policy detailed above provides a strong understanding of how a combination of variables can intertwine to influence policy outcomes. When the parsimonious solution is compared with the fsQCA scores listed in *Table 2*, it is clear that the findings explain many of the states' policies. Either fourteen or eighteen of the states support or do not challenge the parsimonious solution, depending on how scores of 0.5 are considered. However, while the solution provides a useful means of explaining ambitious climate policy, there are five exceptions to the solution which challenge the findings. Indeed, although the solutions met the 0.75 consistency threshold, by not achieving a score of '1', it was impossible that all the cases would match the solution. For example, Germany achieved a full score of '1' for its climate policy, yet it possessed a right-wing government, as did Sweden. To a lesser degree, the same is also true for Denmark, France and Ireland, which also possessed right-wing governments, and developed relatively ambitious climate policies, but did not receive scores as high as Germany or Sweden for their climate policies. While the fsQCA provides a strong understanding of the broad patterns that influence climate policy, it is necessary to explore some case studies in greater detail to explain this variation. *Table 10* shows the five case studies that stand in contrast to the fsQCA parsimonious solution for the outcome.

Table 10: Five unexplained cases from parsimonious sufficient solution for ambitious climate policy.

	Outcome	**Conditions**	
State	**Ambitious climate policy (ambclimpol)**	**EU membership (eumember)**	**Left-wing Government (leftgov)**
Denmark	0.58	1.00	0.00
France	0.66	1.00	0.00
Germany	1.00	1.00	0.40
Ireland	0.76	1.00	0.20
Sweden	1.00	1.00	0.15

In the cases outlined in *Table 10*, all have scores above 0.5 for the outcome (ambitious climate policy) and EU membership, but have scored below 0.5 for left-wing government. The remainder of this thesis will seek to identify the factors that influenced climate policy in states such as these. As this thesis seeks to explain variation in climate policy, the cases of Germany and Sweden will be selected, as they scored the highest marks for climate policy and thus may be considered climate policy pioneers.

In order to select which cases will be compared with Germany and Sweden, there are two criteria that must be fulfilled. Firstly, the two additional cases must not have been explained by the parsimonious solution for sufficiency relating to the negation of the outcome. Here, not being a member of the EU was sufficient for a state to develop not ambitious climate policy. There were seven states that were not explained by this solution, which were Austria, Belgium, Finland, Greece, Italy, Luxembourg and Netherlands, as listed in *Table 11*. Two of these states will be selected as case studies to be explained in the small-n analysis.

Table 11: Seven unexplained cases from parsimonious sufficient solution for not ambitious climate policy.

	Outcome	**Condition**
State	**Ambitious climate policy (ambclimpol)**	**EU membership (eumember)**
Austria	0.00	1.00
Belgium	0.30	1.00
Finland	0.31	1.00
Greece	0.23	1.00
Italy	0.00	1.00
Luxembourg	0.30	1.00
Netherlands	0.29	1.00

Secondly, it is necessary to select case studies that possessed similar scores as Germany and Sweden for the four conditions in the fsQCA, but resulted in different outcomes, in order to ensure that the four cases are comparable. As Schneider and Rohlfing (2013: 20) state, “[i]n fsQCA, two cases are qualitatively identical if their fuzzy-set membership falls on the same side of the qualitative anchor at 0.5.” The approach used to identify which cases to explore is the set theoretic method known as Mill's (1884) Method of Difference, whereby the cases possess the same conditions, but different outcomes, such that when a further condition is identified in which there is divergence between the cases, this further condition must explain the outcome. As Mill's Method of Difference relies on keeping as many conditions the same across cases in order to find the condition(s) that influence the outcome, it is vital that the cases chosen from the seven states highlighted above are as similar to Germany and Sweden as possible. There are four cases that possessed identical conditions as Germany and Sweden, but different outcomes; Austria, Belgium, Finland and Netherlands. All four of these states were also not explained by the parsimonious solution for the negation of the outcome, meaning that any two of these four states could be selected to be case studies alongside Germany and Sweden.

Similar governance structures, shared language, comparable party systems and even geographical proximity can aid the comparability of case studies by ensuring that such issues are not considered as factors (Lijphart, 1971). When comparing the cultural, linguistic, geographical and political histories of the six states, three pairs become apparent; Belgium and Netherlands, Finland and Sweden, and Germany and Austria. Having already selected Germany and Sweden due to their full scores for ambitious climate policy, the pairing of Belgium and Netherlands is dropped. Indeed, Belgium and Netherlands both possess outcome scores below 0.5, making that pairing unsuitable for comparison, as there is no difference in outcome between the states to explain. Austria, Finland, Germany and Sweden are particularly comparable as they were four of five first states to liberalise their electricity sectors (Reiche & Bechberger, 2004: 845), were all members of the sextet of environmental pioneers in the late 1990s to early 2000s (Börzel, 2002; Liefferink & Andersen, 1998*b*), and Austria, Finland and Sweden joined the EU in 1995 together. As a result therefore, Austria, Finland, Germany and Sweden will be the four cases taken forward from this chapter for the in-depth case study analysis, as shown below in *Table 12*. When exploring the four cases, it will be necessary to identify causal explanations for climate policy that could not have been coded in fsQCA terms, otherwise they would have been included within the analysis in this chapter.

Table 12: Table highlighting cases selected and scores for the outcome and causal conditions.

Cases	State	Austria	Finland	Germany	Sweden
Causal Conditions	**EU Membership (eumember)**	Yes	Yes	Yes	Yes
	Political discretion (poldisc)	High	High	High	High
	Left-wing Government (leftgov)	No	No	No	No
	GDP per capita (highgdp)	High	High	High	High
Outcome	**Ambitious climate policy (ambclimpol)**	Low	Low	High	High

3.6: Conclusion

The literature surrounding environmental policy highlights a number of competing variables which are argued to shape policy formulation. Arguments have been made that both support and challenge the roles played by these variables when in isolation. However, little has been made of the empirical reality that such conditions do not operate in a vacuum, but instead exist in conjunction with other variables. Moreover, with states sharing common conditions but resulting in different outcomes, and possessing different conditions but resulting in similar outcomes, fsQCA is the ideal methodological tool with which to analyse states' complex and equifinal policies. In this chapter, fsQCA has been used to examine the significance of four causal conditions in shaping climate change policy in developed states between 2006 and 2010. The twenty-three states in question – identified by the UNFCCC as the Annex II states with the highest emissions and therefore greatest obligations for reductions – possessed climate change policies that ranged from targeted, financially-supported and legally binding goals to vague, under-resourced and voluntary aspirations (Burck, Bals & Ackermann, 2009). As such, it is necessary to ask why states with similar obligations to respond to climate change should respond so differently.

This chapter has sought to answer this question by firstly determining which states may be considered climate policy pioneers during 2006-2010. It was found that Germany, Iceland, Portugal, Sweden and the UK represented a clear grouping of pioneers with the highest scores for climate policy ambition, with the scores for France, Ireland and Norway not far behind. Austria, Canada, Italy, Japan and the USA, and to a lesser extent, Australia, Belgium, Finland, Greece, Luxembourg, Netherlands, and New Zealand, were the least ambitious of the Annex II states. From here, the patterns explain climate policy variation were identified. Tests were applied to combinations of EU membership, government partisanship, political discretion and levels of GDP per capita to see if any were sufficient to produce strong climate change policy. Each condition was tested for necessity, finding that EU membership came close to being necessary for ambitious climate policy, but not quite. There were no necessary conditions for 'not ambitious' climate policy.

Of the sixteen possible causal configurations of conditions, nine were found empirically amongst the twenty-three cases. Of these, only one remained in the complex solution when the consistency threshold for the relationship with strong climate policy was adjusted to 0.75. The complex solution found that EU membership in conjunction with left-wing government, but in the absence of political discretion, was sufficient for ambitious climate change policy formulation. The parsimonious solution simplified this finding, suggesting that EU membership in conjunction with a left-wing government was sufficient for the outcome. These findings are in keeping with *Hypotheses 3* and *4* as outlined earlier in this thesis, as both EU membership (Jordan, 2002; Jordan *et al.*, 2011*b*; Kazakos, 1999; Liefferink *et al.*, 2009; Schreurs & Tiberghien, 2007; Wurzel & Connelly, 2011) and left-wing government (Neumayer, 2003, 2004; Rohrschneider,

1988) were expected to result in ambitious climate policy. This solution was applicable to either fourteen or eighteen of the cases (depending on the inclusion of states coded with values of 0.5), but five did not follow the parsimonious solution, yet still resulted in the outcome. Of these five, Germany and Sweden were both given full scores of 1 for climate policy, making them pioneers and therefore of greatest explanatory interest to this thesis. In addition to examining the causal configurations associated with strong climate policy, the relationship between the conditions and not ambitious climate policy formulation was also assessed. Here, the absence of EU membership was sufficient in the parsimonious solution for not ambitious climate policy. Austria, Belgium, Finland, Greece, Italy, Luxembourg and Netherlands were not explained by this solution for the negation of the outcome, of which Belgium, Austria, Finland and Netherlands possessed similar scores to Germany and Sweden across all four conditions, but differed for the outcome. Austria and Finland were selected from these four states to be the other two case studies, due to their other similarities with Germany and Sweden.

In sum, this chapter has provided an original approach to explaining climate change policy ambition in developed states. In so doing, it has found that EU membership is almost a necessary condition for ambitious climate policy, and is a constituent part of both the complex and parsimonious solution for sufficiency. Yet, not every case that was a member of the EU during the period also received a high score for climate change ambition; Austria, for example, received a score of '0', suggesting a very low level of ambition towards climate change. Moreover, Austria possessed almost identical scores for each of the four conditions as Germany, except Germany received the maximum score of '1' for its climate policy ambition. Finland and Sweden were also very similar across the four conditions, and possessed shared histories, cultures and political practices, yet their climate policies differed markedly between 2006 and 2010. The remainder of this thesis will therefore seek to explain this variation. Despite the exceptions highlighted, the arguments put forth by the fsQCA remain valid. The causal configuration in the parsimonious solution term passed the 0.75 consistency threshold, suggesting that the findings can be considered as significant. Thus, EU membership plus left-wing government was sufficient for the development of ambitious climate change policy in developed states between 2006 and 2010.

Austria, Finland, Germany and Sweden, will now be explored in further detail to ascertain why there was significant variation of ambition between the states' climate policies.

Chapter 4: Politics and Policy Overview of the Case Studies

Four case studies were selected in the previous chapter; Austria, Finland, Germany, and Sweden. I will now seek to explain why these states exhibited significantly different degrees of ambition regarding their climate change policies, despite having all been environmental policy pioneers during the 1990s (Liefferink & Andersen, 1998*b*). The two chapters following this one will seek to explain the variation in ambition, but firstly, this chapter will provide an overview of each of the four cases' political structures, electricity portfolios and climate policies. In doing so, the similarity of the political systems will be noted, and therefore controlled for, as each state is a multi-party, corporatist, parliamentary democracy. The similarity of the states according to the four conditions in the medium-n analysis should also not be forgotten. The electricity make-up of each state will be detailed, explaining the economic demands and sources of electricity used to support each state. As the arguments made in Chapters 5 and 6 are based significantly around electricity policy, a thorough understanding of each state's electricity portfolios is crucial. Finally, the dissimilarity of climate policies will be confirmed and explained, highlighting Austria and Finland as climate policy laggards, while Germany and Sweden were pioneers, as argued in the fsQCA. While some pioneering pieces of legislation and innovative initiatives have arisen at the local level – such as the Klimp and LIP schemes in Sweden (*see* Friberg, 2008: 171; Zannakis, 2009: 125) – this chapter focusses on climate policy at the national level. Moreover, it focusses on those policies developed by the states, not those passed down from the European Union, as this variable was controlled for in Chapter 2. Each of the three sections of the chapter will be structured in the same order, exploring firstly Austria, then Finland, then Germany, and finally Sweden. This order – which enables the laggards to be explored first, and then the leaders, and is also alphabetical – is applied throughout Chapters 5 and 6 as well.

4.1: The case studies' political systems

The political systems of each of the four case studies will be examined in turn. Each state summary is broken into three sections. Firstly, in order to control for the political systems of each state, it will be demonstrated that each state is a multi-party, corporatist, parliamentary democracy, as shown in *Table 13* below.

Table 13: Table controlling for party system, corporatism and parliamentarism in each state.

State	Party System	Pluralist or Corporatist	Parliamentary or Presidential
Austria	Multi-party	Corporatist	Parliamentary
Finland	Multi-party	Corporatist	Parliamentary
Germany	Multi-party	Corporatist	Parliamentary
Sweden	Multi-party	Corporatist	Parliamentary

Second, the dominant values of each party are contextualised by placing them on the left-right spectrum in order to better understand the partisan structure of each state. The third part of each state summary details the salient national elections between 2006 and 2010. By highlighting the positions of each party on the left-right spectrum and then summarising the salient elections of 2006-2010, the scores accorded for the left-wing government condition in the fsQCA may be confirmed and explained. According to the aggregated scores given to the four states in the fsQCA, none of the states' average governments was on the left of the political spectrum during 2006-2010. Austria and Germany received scores of 0.4, however, indicating that both were very close to having neither a left- nor right-wing government on average. Indeed, as will be seen in this chapter, both states possessed Grand Coalitions for four years and a right-wing coalition for the other year, supporting the score of 0.4 given to both states. As such, this section will demonstrate that the scores accorded in the fsQCA for each state were accurate. *Table 14* below demonstrates the coalitions in office for each of the years under investigation. An asterisk indicates an election year, in which case the coalition that was in government for the majority of the year is listed in the table. Each state was governed by two coalitions over the five years; one coalition lasted one year, while the other lasted four years. The coalitions of parties were different across the states, as to be expected.

Table 14: Table showing the governing coalitions of each state for 2006-2010.

State	**2006**	**2007**	**2008**	**2009**	**2010**
Austria	ÖVP + BZÖ*	SPÖ + ÖVP	SPÖ + ÖVP*	SPÖ + ÖVP	SPÖ + ÖVP
Finland	SDP, Centre + Swedish	SDP, NCP, Greens + Swedish*	SDP, NCP, Greens + Swedish	SDP, NCP, Greens + Swedish	SDP, NCP, Greens + Swedish
Germany	CDU/CSU + SDP	CDU/CSU + SDP	CDU/CSU + SDP	CDU/CSU + SDP*	CDU/CSU + FDP
Sweden	SDP	Centre, Moderates, Liberals + Christian Democrats*	Centre, Moderates, Liberals + Christian Democrats	Centre, Moderates, Liberals + Christian Democrats	Centre, Moderates, Liberals + Christian Democrats

4.1.1: Austrian politics

The Republic of Austria has a population of around 8.4 million people and an area of 83,850km^2 (OECD/IEA, 2014: 17). Divided into nine provinces (*Bundesländer*), it possesses a bicameral Federal Assembly. The lower house, the *Nationalrat*, has 183 seats, which are distributed into three sets; electoral districts, the Länder, and nationwide (Müller, 2009: 514). The upper house is the *Bundesrat*, with delegates appointed by provincial parliaments in proportion to the population. Despite being a federation like Germany, power is located much more locally, such that environmental issues are shaped by the national government much less in Austria than in other federations (Lauber, 1997: 87; Wurzel *et al.*, 2003: 55). There is also a President, who does not intervene in quotidian politics and has not used the full powers available to the position (Müller, 1996*a*: 30). As such, Austria is considered to follow a parliamentary model, rather than a semi-presidential system akin to that of France. However, Austria's unique 'Social Partnership' (*Sozialpartnerschaft*) – which seeks to integrate specialist interests into the governance model in order to facilitate compromise and co-operation – is worthy of note. In the build-up to World War II, Austria endured a brief civil war in 1934 between its political left and right, ignited by increasingly close links to Nazi Germany. Following World War II, Social Partnership was designed as a means of ensuring co-operation within the governance model, and preventing extremism (Tálos, 2008). The model comprises three chambers; Agriculture, Commerce and Labour, with the Federation of Industry also a *de facto* member as a result of its powerful interest representation from the industrial sector. The Chamber of Commerce is strongly linked to the Conservative Party, while the Social Democratic Party dominates the Labour Chamber (Wurzel *et al.*, 2003: 56). The Chamber of Agriculture also has strong links to the Conservative Party as a result of the rural nature of its voter base. Siaroff's (1999) ranking of corporatism in states found Austria to be the most corporatist state out of 24 case studies. While the chambers are not officially linked to any parties, there are close bonds between them. Austria, therefore, is a multi-party, corporatist, parliamentary democracy.

During 2006 to 2010, there were five political parties in the Austrian Parliament. The parties are highly disciplined and membership remains unusually high at 17% of the population, which was the highest in Europe in 2008 (van Biezen *et al.*, 2012: 28). The parties – based on 'camps' (*Lager*) – have long reflected key social divisions (Pelinka, 1983: 253). The Socialist camp is represented by the Social Democratic – previously Socialist (*see* Müller, 1996*b*: 61) – Party of Austria, the SPÖ (*Sozialdemokratische Partei Österreichs*), while the Christian Conservative camp is embodied by the Austrian People's Party, the ÖVP (*Österreichische Volkspartei*). These two parties have long been the largest, and until 1994 they had always received at least two-thirds of the *Nationalrat* seats (Müller, 1996*a*: 25). The third traditional camp is the German Nationalist camp, which has been represented primarily by the Freedom Party of Austria, the FPÖ (*Freiheitliche Partei Österreichs*) since 1956. The FPÖ once contained a strong liberal element but was transformed into an extreme right-wing party under its populist leader, Jörg Haider, during the 1990s (Wurzel *et al.*, 2003: 56). The FPÖ has participated in coalition governments in 1983–86 and 2000–2005; the latter saw international sanctions imposed by other EU states, for allowing such a right-wing party into government (Lauber, 2004: 49). However, in 2005, during its second period in government, a splinter group from the FPÖ led to the creation of the Alliance for the Future of Austria, the BZÖ (*Bündnis Zukunft Österreich*). Despite replacing the FPÖ in government until 2006, the BZÖ struggled to carve an electoral niche for itself, before becoming a marginal force with the death of its charismatic founder, Haider, in 2008 (Fallend, 2009: 894). Finally, the Austrian Greens (*Die Grünen*), were established in 1982. Despite enduring infighting between its left and right, the party has become an established force in Austrian politics (Hausknost, 2007: 500).

There were three coalition governments between 2006 and 2010. The first was a centre-right coalition that built on the ÖVP-FPÖ coalition that had been in place since 2000. The coalition had seen a significant reduction in the popularity of the FPÖ, as it struggled to fulfil its pre-election manifesto stances. As McLaughlin (2013) argued, the FPÖ "actually found it difficult to maintain their populist, anti-establishment stance, and had no choice but to be associated with widely criticized legislation." As a result, its less ideologically-rigid representatives formed the BZÖ and replaced the FPÖ in government between 2005 and 2006. The 2006 election took place on 1st October, resulting in a grand coalition between the ÖVP and SPÖ (Fallend, 2007: 876). The Austrian Greens achieved their best national general election result with 11.05%, beating the FPÖ to third, while the BZÖ just met the 4% threshold in fifth place. However, the coalition would become the shortest parliamentary term in post-war Austria, with an election called in 2008 (Müller, 2009). Not only did the smaller parties fail to win any seats, but both of the main parties suffered as the electorate swung towards the Eurosceptic right. Never before had the strongest party's vote share fallen below 30 per cent, reflecting a more multi-party Austria (Fallend, 2009: 892). Yet, with all the winning majority combinations ruled out by at least one party, the only possibility was a repeat of the ÖVP-SPÖ grand coalition that had just failed. As such, this new government – with fewer seats than before the 2008 election – continued in office throughout the remainder of the period under investigation. The score of 0.40 accorded for left-wing government in the fsQCA therefore represents a five-year period that saw the conclusion of a right-wing government before the election of a Grand Coalition.

4.1.2: Finnish politics

Once one of the poorest European states, Finland enjoyed a remarkable increase in income level and educational provision during the 20th Century (Myllyntaus, 2012: 36-37). The home of the world's first unicameral parliament (the *Eduskunta*), and also the first European state to win votes for women in 1906, it was another eleven years until Finland achieved independence from Russia in 1917 (Bengtsson *et al.*, 2013: 19). However, the forceful desire for independence has remained prominent in the Finnish psyche ever since. Finland's governance structure has seen a limited number of significant changes over the past century. The Finnish system is described as relatively open, corporatist and consensual (Litmanen, 2009: 200). Electorally, as Raunio and Wiberg (2008: 588) describe, "Finland used to be characterised by short-lived and unstable governments living under the shadow of the president". A semi-presidential system since 1917, Finland's president was weakened substantially by constitutional changes in 1987 and 2000 (Aylott *et al.*, 2013: 88). Limiting presidential powers such that the president may only delay legislation, before subsequently removing the president's capacity to dissolve parliament, the position has become more of a figurehead and trade ambassador, and leads on international negotiations outside the EU. As a result, policy-making is the sole responsibility of the parliament. The Finnish parliament comprises 200 MPs, elected by proportional representation every four years (Aylott *et al.*, 2013: 89). As a result of this proportional system, Finland is dominated by coalition governments, which can feature up to six parties in office. Thus, Finland, like Austria, is a multi-party, corporatist, parliamentary democracy.

While Sweden is divided primarily according to a left-right axis, as will be seen, Finland features several such dividing lines; class, religion, language (Swedish is Finland's official second language), and rural versus urban (Bengtsson *et al.*, 2013: 33). Each of the eight parties will now be surveyed from left to right, broadly defined. The small Left Alliance (*Vasemmistoliitto*) was created from a merger between two hard-left parties at the end of the Cold War in 1990. The Social Democrat Party (*Suomen Sosialidemokraatinen Puolue*) has, like its equivalents in the other three case study states, been a dominant force in its state's domestic politics over recent decades. The Green League (*Vihreä liitto)* was founded in 1987 and is more centrist than many of its European counterparts, and is the most ambitious Finnish party regarding climate change. The Centre Party (*Suomen Keskusta*) was established as the Agrarian Union in 1906 and continues to champion agricultural views even since becoming the Centre Party in 1965 (Zilliacus, 2001: 28). The SDP and Centre Party dominate Finnish politics, and seek to avoid a coalition together, but nearly all other combinations are possible (Paastela, 2002: 20). The Swedish People's Party (*Suomen ruotsalainen kansanpuolue*) prioritise the needs of Finland's Swedish-speaking population, and, despite their few seats, have been a mainstay in coalition governments since the 1970s (Sundberg, 2008: 971). The Christian Democrats (*Kristillisdemokraatit*) are similarly small, and changed their name from the Finnish Christian League in 2001 to broaden their appeal beyond evangelical Christians (Arter, 2011: 1293). The National Coalition Party (*Kansallinen Kokoomus r.p.*) is one of the largest parties, and promotes European integration and market principles, but increasingly posited more libertarian views between 2006 and 2010. Finally, the True Finns (*Perussuomalaiset)* – more recently known as the Finns Party – were minor actors during the period of analysis in this thesis, but gathered almost a fifth of the seats in 2011 as Finland swung to the right. This Eurosceptic party is seen as the only real climate change denier in Finnish politics, with one politician (Interview 30) suggesting that "[w]e can see climate change, of course, but what is causing it? We may disagree." However, the party played little role between 2006 and 2010.

As the parliament features eight main parties, a variety of policy areas are reflected; consequently, consensus and compromise dominate Finnish policy-making. Yet, some of the biggest divisions exist between the 'wings' within each party, over issues such as the construction of new nuclear power. As a result of these internal splits, electricity policy is often neglected during elections (Ruostetsaari, 2010*a*: 207). Since 1995, Finland has featured a variety of government coalitions. A rainbow coalition of five parties governed between 1995 and 2003, followed by a three-party centre-left government that led until 2007. The leaders of the Centre Party were also Finland's Prime Ministers between 2003 and 2012, thus covering the whole period under investigation. The 2003-2007 government comprised the SDP, Centre Party and Swedish Democrats. The 2007 election saw Matti Vanhanen elected as Prime Minister. "The March election 2007 was disastrous for the socialist bloc… As a result, the Finnish parliament is one of the most non-socialist legislatures in Europe" (Sundberg, 2008: 969). The centre-right coalition government comprising Vanhanen's Centre Party, the National Coalition Party, the Greens and the Swedish Democrats remained in office in 2011, when it was replaced by a six-pack government. The headline of the 2011 election, however, was the shock placing of the climate-sceptic True Finns in third (Statistics Finland, 2011). In summary, the combination of a centre-left government that governed until early 2007, and a right-wing government that remained in place throughout the remainder of the period under investigation, explains the score of 0.30 accorded to Finland in the fsQCA.

4.1.3: German politics

Germany's Nazi past transformed the state's post-war political culture and political institutions. Split into two in order to assuage the victors of the Second World War, the two halves of Germany experienced dramatically different paths between 1945 and reunification in 1990 (Watanabe, 2011: 78). While the West was held as an example of the might of capitalism, the East faltered alongside its Soviet guardians, leaving 'two Germanys in one state' (Pehle & Jansen, 1998: 82). As in the case of the other three case studies featured in this thesis, Germany is a corporatist state (Michaelowa, 2008: 145) – what Dryzek *et al.* (2003) conceptualise as 'passively exclusive' – in which social influences are neither hindered nor facilitated when attempting to shape government decisions. Indeed, Dryzek *et al.* (2003) argue that of these 'passively exclusive' states, "the best example is Germany, whose traditionally corporatist government and Prussian-style bureaucracy allowed little representation from outside." The result, therefore, is a political process dominated by parties and consensus on the inside, and a large, radical, and marginalised civil society on the outside (Hatch, 2007: 57). Germany is also a federal parliamentary republic. As the president is merely a ceremonial figurehead, the bicameral legislature – comprising the *Bundestag* (the Parliament) and the *Bundesrat* (the representative body of the sixteen regional Länder) – is of paramount importance to German policy (*see* Michaelowa, 2008: 155). The *Bundestag* is more powerful than the *Bundesrat*, needing only the latter's consent for proposed legislation in those cases where regional budgets and responsibilities are involved, which occurs frequently (Poguntke, 2007: 960). The Chancellor is the Head of Government, and is typically the leader of the largest party in the *Bundestag*. With a proportional representation system of election, Germany is a multi-party democracy – or a 'polarised pluralist' state (Sartori, 1976) – ensuring that the Government is predominantly formed by a coalition of parties.

For the majority of the post-War years, (West) German politics was dominated by three parties, divided along ideological and theological lines. The oldest German party, the centre-left and Protestant Social Democratic Party or *Sozialdemokratische Partei* (SPD), has traditionally drawn most of its votes from the working class. Many of its voters derive from the large cities of northern Germany and the areas responsible for coal and steel production (*see* Wurzel, 2010: 464). Germany's other major party, the Christian Democratic Union or *Christlich Demokratische Union* (CDU) is a centre-right and predominantly Catholic party that is facilitated by the CSU, a populist and staunchly conservative partner of the party located in Bavaria (Der Spiegel, 2013). Traditionally, the third party, the Free Democratic Party or *Freie Demokratische Partei* (FDP), would be the junior coalition government partner and thus 'kingmaker' to whichever of the two parties had won the most votes in the last election (Der Spiegel, 2013). The FDP is a pro-business, free-market party and has been in government more than any other German party since World War Two. Yet, this cosy tripartite system has been shaken thoroughly in recent decades, particularly following German reunification in 1990, to the extent that the FDP failed to reach the required 5% threshold in the 2013 General Election, preventing it from featuring in the *Bundestag*. The Green Party (*Die Grünen)* was formed in 1980, with a view to being 'half party and half local action group' (*see* Dryzek *et al.,* 2003: 37-38). Electricity policy lies at the heart of the party, with "[t]he nuclear power conflict… a major reason for the establishment of [what has become] one of the strongest Green parties in the world" (Jahn & Korolczuk, 2012: 159). Finally, the Left Party was formed following a merger in 2007 between the old East German Communist Party and a group of trade unionists and former SPD members (Poguntke, 2007: 959). The Party has not been in Government, but is represented at the federal level, unlike some of the more niche parties (*see* Jungherr *et al.*, 2012). Although the parties can be easily distributed along the left-right political spectrum, each party features a breadth of views, reflected by party 'wings' that favour a variety of issues, such as business, the environment, or industry, amongst others.

When seeking to explain national climate policy, it is crucial to understand the party coalitions in government. After seven years of a red-green coalition government, the 2005 federal elections were earlier and closer than many had expected (Poguntke, 2007: 1110). Notably, the only potential party of government to gain votes was the FDP, yet, the FDP remained in opposition as the SPD shifted from its coalition with the Greens to become the junior partner with the CDU/CSU, resulting in a Grand Coalition of the two largest parties. Angela Merkel became the first female Chancellor and quickly achieved very high approval ratings despite tax increases (Poguntke, 2007: 1115). By the time of the next federal election in 2009, the political landscape had broadened, with polling suggesting a 'bourgeois coalition' of the CDU/CSU and FDP for the next government (Poguntke, 2009: 967). The CDU/CSU had become frustrated by the concessions needed to work with their traditional adversaries the SPD, and after surprisingly tense post-election negotiations between what had been presumed to be close ideological bedfellows, the CDU/CSU and FDP formed a government in October 2009 (Poguntke, 2010: 988). As such, in the space of five years, the Greens, SPD, CDU/CSU and FDP had all been in Government, underlining the culture of compromise, conciliation and competition that pervades German politics. As Germany remained a relative climate pioneer throughout those five years, government partisanship is not a crucial factor in German climate policy; a finding that was the very reason why Germany was selected as a case study from the fsQCA. Germany's score of 0.4 for the left-wing condition in the fsQCA is explained by the Grand Coalition and right-wing coalition highlighted above. In 2013, Angela Merkel – a former Environment Minister – led her party to a landslide victory that saw the FDP lose all of its Parliamentary seats.

4.1.4: Swedish politics

Although many of the governments led by the Social Democrats since World War II were coalitions or minority governments, of the seventy-four years between 1932 and 2006, 65 saw a Social Democratic government, enabling the Party's interventionist ideology to dominate Swedish political culture (Zannakis, 2009: 99). Since 1931, Sweden has sought to create a People's Home (*Folkhemmet*) in which high levels of employment are almost guaranteed (Blyth, 2001: 5). The result is a widespread acceptance of the need for state intervention to address societal problems. As Harris (2007: 144) states, "[i]n the case of Sweden, with its tradition of corporatist politics, it is particularly difficult to disentangle the state from society." The governance model of this corporatist state has been described as an 'ideal type' parliamentary democracy since power was wrested from the King in 1917 (Blomgren *et al.*, 2013: 151-152). Having abolished its upper chamber in 1971, Sweden features a unicameral legislature of 349 MPs (*Riksdagsledamoterna*) from which a cabinet is formed by whichever parties can achieve a majority (Blomgren *et al.*, 2013: 152). Thus, like the other three case studies, Sweden is a multi-party, corporatist, parliamentary democracy. Although Sweden has long possessed a multi-party system, the number of electorally significant parties has grown in recent years, demonstrating an expansion in the number of issues salient to the general population, such as the environment.

The former Communist Party, the Left Party (*Vänsterpartiet*), is the furthest to the left on the political spectrum and has struggled to influence the national agenda since the end of the Cold War, enduring splits between its 'traditionalists' and 'renewers' (Widfeldt, 2006: 1271). Next, the Social Democrats (*Socialdemokratiska arbetarpartiet*) are traditionally the heavyweights of Swedish politics and have dominated the political landscape of the last century (Friberg, 2008: 166). The SDP have increasingly lost votes, however, to the Green Party (*Miljöpartiet de Gröna*) that was formed in 1981, although the Greens have yet to be in government (although they have supported minority Social Democrat governments, from 1998 to 2006). The Greens are not the only party with environmental credentials; in particular, the Centre Party (*Centerpartiet*) has traditionally been the party of those working in agriculture, although these preferences have shifted to a more libertarian message since 2000 (Uba, 2010: 6678). The Moderate Party (*Moderata Samlingspartiet*) is the centre-right counterweight to the Social Democrats' dominance and has increasingly closed the gap on the centre-left party as the most popular party in Sweden. The Moderates achieved their best result since 1928 in 2006 (Aylott & Bolin, 2007: 621). The Liberal Party (*Folkpartiet*) is one of Sweden's oldest parties, but has struggled to make electoral gains in recent years, as have the Christian Democrats (*Kristdemokraterna*) who formed in 1991 (Aylott & Bolin, 2007: 623). In addition to these main parties, there are also a series of issue-specific parties which had until recently failed to meet the required 4% support needed to enter the *Riksdag* (Widfeldt, 2006: 1272); the far-right Swedish Democrats (*Svensk Demokraterna*) succeeded in passing this threshold in 2010, slightly too late to influence decisions under investigation in this thesis.

The Social Democrats had been in government for twelve years prior to the 2006 election, presenting an opportunity for those on the centre-right to challenge a fatigued government. Realising this opportunity, the four centre-right parties (the Centre Party, Moderates, Liberals and Christian Democrats) announced in 2004 that they would be running as an Alliance in the 2006 election. As Widfeldt (2007: 1120) states, "[t]here is a long history of untimely disagreements among the centre-right parties, and the purpose behind the creation of the Alliance was to minimise the risks of new splits." The Social Democrats refused to consider the possibility of entering into a coalition prior to the election, and thus appeared naïve about their electoral chances (Widfeldt, 2007: 1122). The price of coalition government for the Alliance parties, however, was loss of ideological rigidity. In June 2006, the Alliance agreed a common position on electricity policy, confirming a major concession by the Centre Party and Christian Democrats, which ended longstanding opposition to nuclear power (Aylott & Bolin, 2007: 626). Opposition to nuclear energy had reduced in salience with the Swedish electorate, and both parties sought to attract new demographics in order to increase their share of the votes. The Alliance won the 2006 election comfortably, becoming the first majority government in Sweden since 1981 (Widfeldt, 2007: 1118). The biggest winners were the Moderates, whose success translated into half of the seats in Cabinet, including each of the major offices, making the Party's leader, Fredrik Reinfeldt, Prime Minister for the remainder of the period under investigation (Aylott & Bolin: 2007: 631-632). The Centre Party, which is traditionally associated with rural and agricultural voters, took the Environment and Energy briefs. The 2010 election that bookends the period of investigation in this chapter followed a similar pattern to its 2006 predecessor. With the introduction of the far-right Swedish Democrats into the *Riksdag*, the four-party Alliance lost some of its votes, but still formed a minority government comprising the same four parties (Lindvall & Rueda, 2013). As such, the score of 0.15 accorded to Sweden for 2006-2010 in the fsQCA represents the dominance of the right-wing coalition government throughout most of the five-year period.

4.2: The case studies' electricity structures

Having controlled for shared multi-party, corporatist, parliamentary structures across the four states, explained the ideological positions of each case study, summarised the salient elections of 2006-2010, and confirmed the scores accorded to each state in the fsQCA, the electricity structures of each state will now be explored. As electricity policy plays a crucial role in the arguments made in both Chapter 5 and Chapter 6, it is important to outline the dominant industries and electricity portfolios of each state during the period. Thus, the noteworthy industries of each case study will be highlighted, before explaining why each state produces its electricity from its chosen sources. *Figures 2* and *3* show the electricity mix by percentage of the total for each of the four states in 2006 and 2010. This data is then translated into pie charts (*Figures 11-18*) for each of the states' individual electricity mixes for 2006 and 2010. The histograms and pie charts are sourced from the International Energy Agency (2014). The electricity mixes of 2006 and 2010 (*Figures 2* and *3*) are shown to demonstrate the change, or lack thereof, in the electricity mix during the period under investigation. While Austria and

Finland barely increased their provision of technological renewables, Germany and Sweden significantly changed their electricity portfolios across the short five-year period.

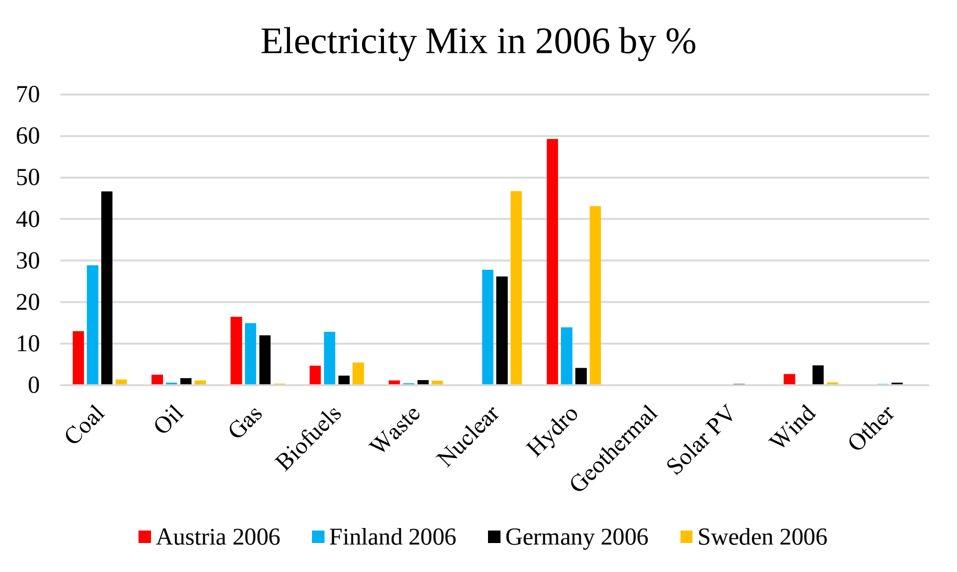

Figure 2: Electricity mixes of the four states in 2006 by percentage.

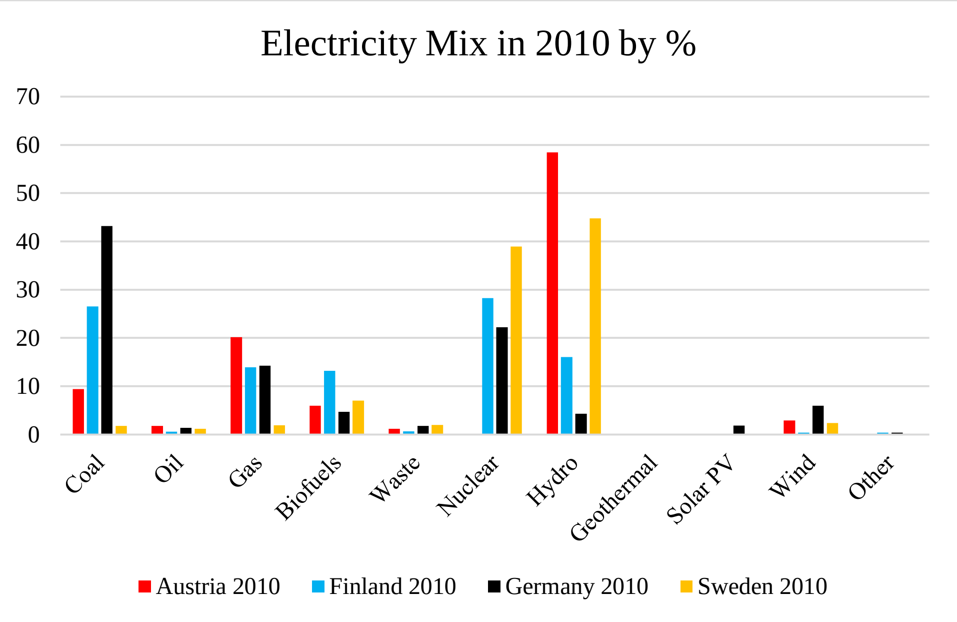

Figure 3: Electricity mixes of the four states in 2010 by percentage.

4.2.1: Austria's electricity structure

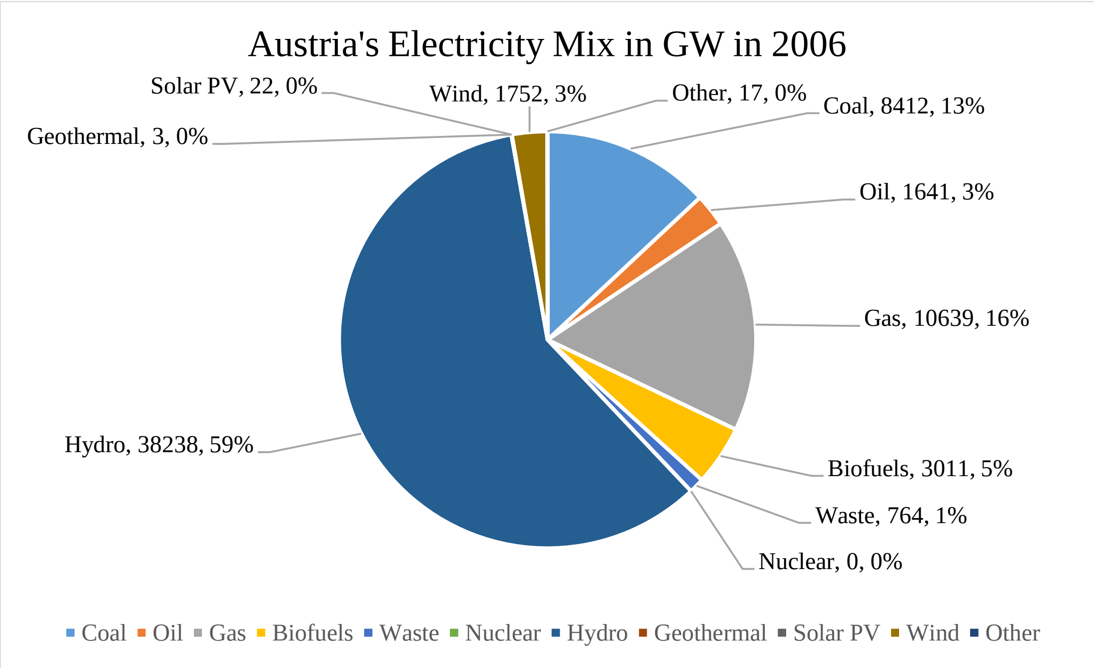

Figure 4: Austria Electricity Mix in GW in 2006.

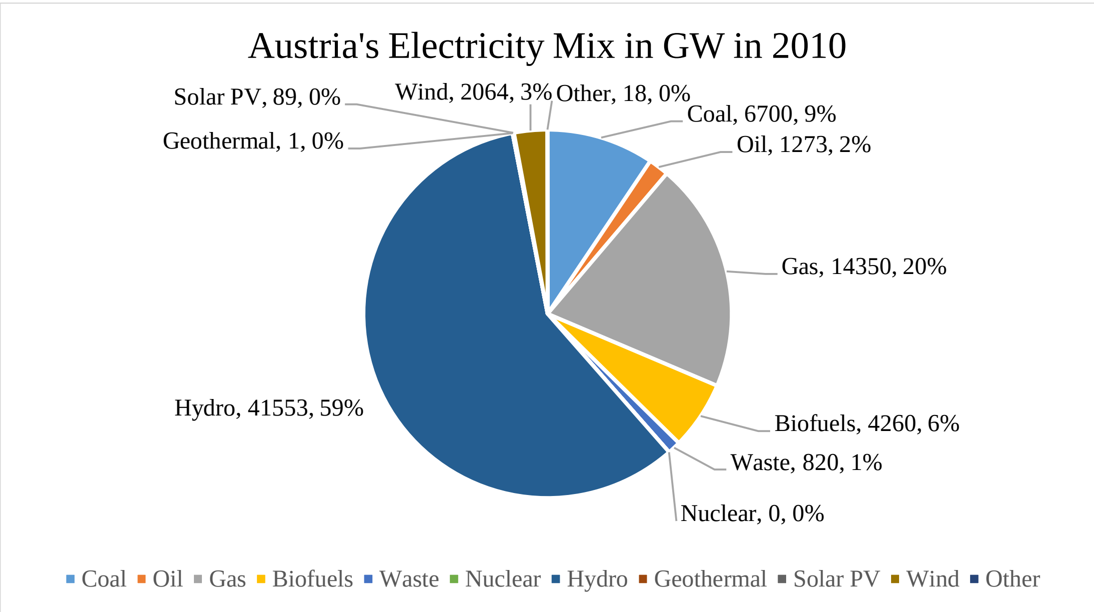

Figure 5: Austria Electricity Mix in GW in 2010.

Between World War I and World War II, Austria saw rapid economic decline, yet the *Anschluss* with Germany amended for much of this lost time, featuring rapid industrialisation (Lauber, 1997: 81). Although there was large-scale destruction of Austria during World War II, the period was again followed by rapid growth during the 1950s and 1960s. 'Austro-Keynesianism' – an economic model that relied on large amounts of deficit spending to fuel investment – enabled economic growth rates to be amongst the highest in Europe during the 1970s (Wurzel *et al.*, 2003: 56-57). As a result, Pope Paul VI called Austria the 'island of the blessed' because the state avoided unemployment, strikes and riots in the 1970s (Dolezal, 2008: 105). However, the 1980s saw severe budget deficits, struggling trade levels for key sectors, and the emergence of new social values, such as environmental protection, that looked beyond the traditionally growth-based corporatist model (Wurzel *et al.*, 2003: 57). Yet, despite these potential challenges to capitalist growth, Austria continued to possess much heavy industry – such as paper and steel production – regardless of its small size (Interview 14). While these heavy industry sectors are relatively efficient (Interview 18), energy intensity in Austria has increased in recent years, when many of Austria's neighbours have seen a long-term trend of decline (OECD, 2007: 8). Although carbon intensity in Austria declined by 26.9% from 1990 to 2012, the rate of decline was slower than the IEA Europe average (36.7% between 1990 and 2011) and there has been an increase in total CO_2 emissions since 1990 (OECD/IEA, 2014: 42). However, compared to some other IEA countries, Austria's energy-related CO_2 emissions per unit of GDP are relatively low, as a result of high energy efficiency and a very high share of renewables in Austria's electricity mix, particularly from hydro, as shown in *Figures 4* and *5* (IEA, 2014).

The electricity market in Austria is served by a number of companies that must be at least 51% state-owned (OECD, 2007: 16-17). None of Austria's electricity is produced by domestic nuclear power, in contrast with the other three case studies in this thesis. Following a 1978 referendum on the issue, the state is banned from producing nuclear energy, as will be explored in detail in Chapter 6 (*see* Martinovsky & Mareš, 2012: 349). A long-standing replacement to nuclear is the use of hydro power. Contributing around 59% of Austria's electricity in 2006 and 2010, hydro power is crucial to the Austrian electricity supply (IEA, 2014). However, the quantity of electricity provided by hydro power has decreased as a percentage of overall electricity production in recent decades. This reduction is due to the potential capacity for large dams having long been reached (Dell *et al.*, 1996: 1118), while the desire to protect local river sites means that smaller hydroelectric dams cannot be constructed either (Faninger, 2003: 182). Austria has also been a laggard in the field of wind electricity production. The lack of coastal regions with high wind velocities has played its part (Dell *et al.*, 1996: 1118). Similarly, photovoltaic (PV) systems have been neglected (Faninger, 2003: 185). As such, Austria is more similar to Finland than Germany or Sweden regarding its low levels of newer, more technologically-advanced forms of renewable electricity. The use of organic renewables in the form of biofuels explains Austria's growth in renewable electricity provision. Almost half of all renewable electricity consumed comes from biomass, with the town of Güssing powered entirely by biofuels (Guevara-Stone, 2013). While biofuels in transport was a burgeoning sector, biomass combustion for combined heat and electricity production was already crucial to the Austrian electricity portfolio prior to 2006-2010 (OECD, 2007: 51). Yet, despite successes related to biofuels, Austria continues to rely heavily on fossil fuels, severely damaging the state's potential reputation as a climate leader, and reducing Austria's electricity independence.

Whereas in the early 1970s, indigenous sources supplied some 80% of Austria's energy requirement, by 2004 the share of net primary energy imports was around 70% (Faninger, 1993: 1353; EC, 2007: 1). This transformation can be explained by an increasing reliance on imported fossil fuels in meeting growing electricity demand. While the majority of fossil fuel consumption takes place in the transport sector, small quantities of oil are also used for electricity production as well. Between 2006 and 2010, coal, oil and gas as a percentage of the electricity makeup fell marginally from 32% to 31%, including a surge in the consumption of gas (IEA, 2014). Around 85% of Austria's natural gas was imported during the period, primarily from Russia, demonstrating a significant dependence on a single exporter for a large and increasing percentage of the electricity mix (OECD, 2007: 71). Finally, although coal fell from 13% to 9% of the electricity mix between 2009 and 2010, it continued to play a significant role in Austrian electricity production despite its high GHG emissions. There are no subsidies for coal production, and much of Austria's indigenous supply comprises highly-polluting and inefficient brown coal, ensuring that mining ceased in 2004 (OECD, 2013: 1). With such a continued reliance on imported coal, there was a clear incentive to invest in other forms of electricity production between 2006 and 2010.

4.2.2: Finland’s electricity structure

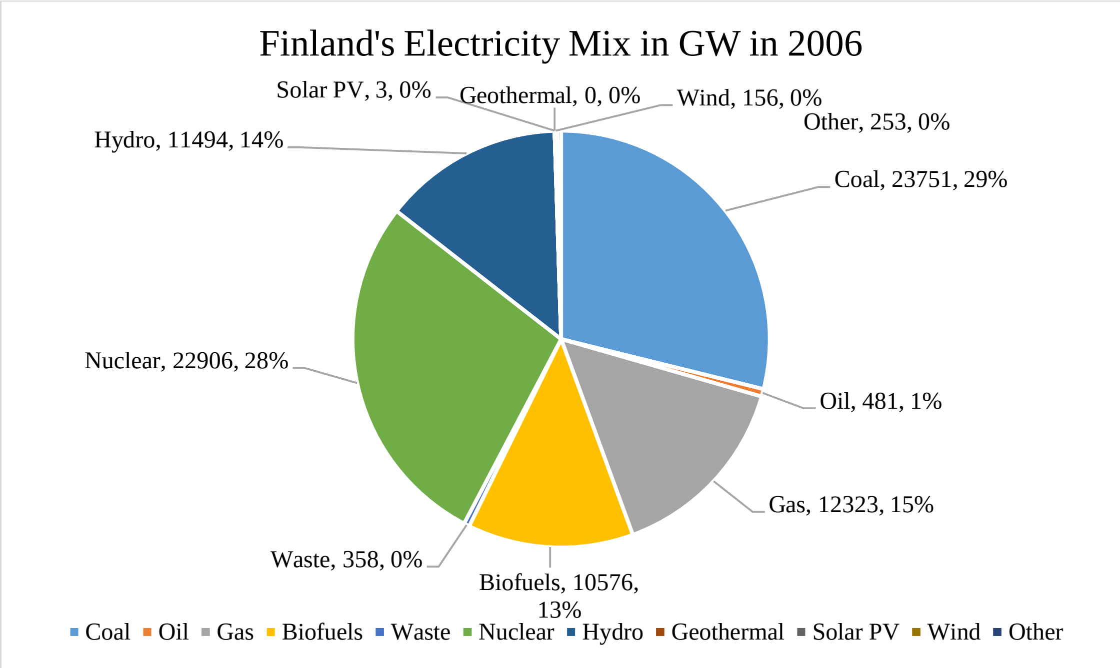

Figure 6: Finland Electricity Mix in GW in 2006.

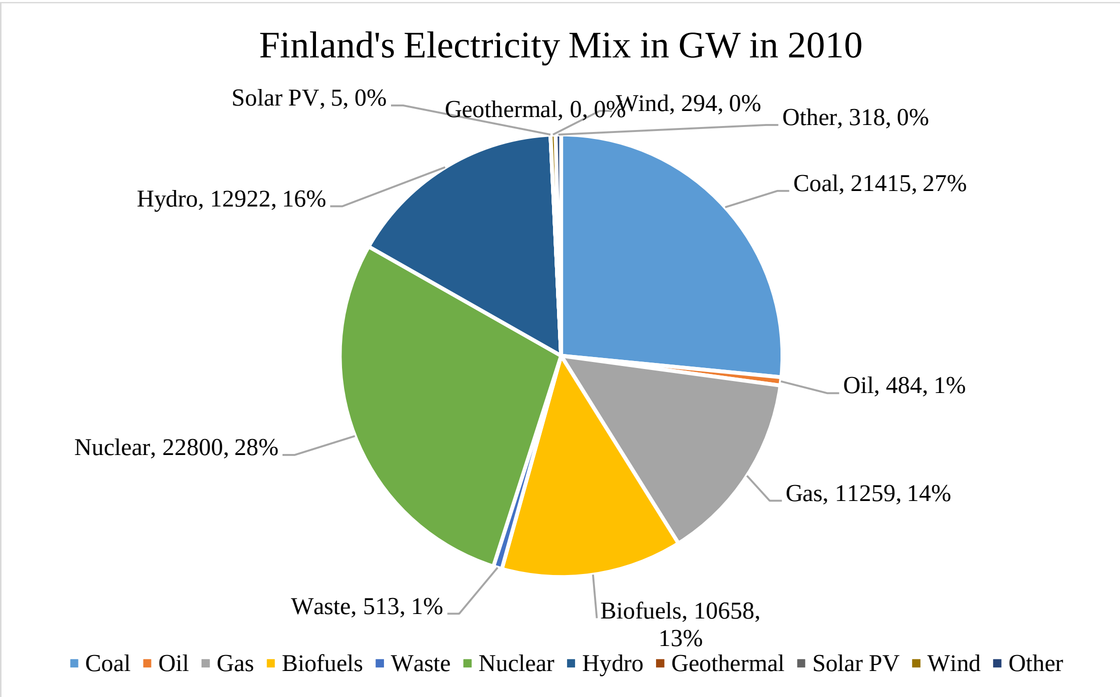

Figure 7: Finland Electricity Mix in GW in 2010.

Finland possesses a low population density – although it is much higher around the capital, Helsinki – with a national population of five million in an area that is twice the size of the UK (Joas, 1997: 119). The long distances traversed by transport, very cold climate and high standard of living have ensured that Finland possesses high electricity consumption per capita. Indeed, as Aslani *et al.* (2014: 759) argue, although "the population of Finland increased 12% during 1981–2011, energy consumption increased more than 90% from 202,712GWh to 385,554.7GWh." Unlike in Sweden, as will be seen later, there has essentially been no overall improvement in Finnish energy consumption per unit of GDP, as a result of Finland's reindustrialisation in the 1990s (Litmanen, 2009: 14). Finland's economy is highly electricity-intensive, with Pulp and Paper (P&P) and steel production both playing key roles in the state's exports profile. Indeed, Finland is more similar to the USA than Western Europe regarding its industrial history, as a result of its relatively late yet rapid economic growth at the expense of environmental interests (Myllyntaus, 2012: 33). Yet, unlike the USA, there is little oil and coal in Finland, with the state heavily reliant on its vast forest, wetland and river areas for supplies of biofuels, peat and hydro power, as will be seen shortly. As a result of its favourable attitude towards biofuels and hydro power, Finland has long been a leader in renewables, with its renewable electricity generation remaining at around 25-30% over the past four decades (Aslani *et al.*, 2014: 759).

Finland possesses a highly diversified electricity portfolio (OECD, 2013: 112). However, since 1980 only around 40% of Finnish energy has been sourced indigenously (Myllyntaus, 2012: 36-37). The 1960s were a period of cheap oil, and even since the 1973 Oil Crisis, most of the energy consumed in Finland has been produced by fossil fuels, such as oil, coal, and gas, with neighbouring Russia the primary exporter (Eduskunta, 2005: 18). That said, coal consumption has been decreasing steadily and no subsidies or incentives are applicable to the energy source. One indigenous resource Finland does enjoy, however, is peat, which is considered to be a 'slowly renewable biofuel'; a definition that has failed to find legitimacy elsewhere, as depletion far outpaces replenishment (OECD, 2013: 83). Yet, peat also provides thousands of jobs across Finland, thus garnering the support of several parties, especially the Centre Party which sees rural voters as a core demographic. This dispersal of voters into rural areas also partly explains a significant investment in biofuels – such as firewood, bark, sawdust, chips and pellets – which are distributed in 15 areas of Finland (Aslani, 2013: 507). As a result, Combined Heat and Power (CHP) has become a significant means of powering this cold and energy-intensive state, with ‘heat entrepreneurship’ by local actors further diversifying the Finnish electricity makeup (Huttunen, 2012: 174).

The roles played by nuclear electricity in Finnish climate policy will be examined in much further depth in Chapter 6, but it is important to note here that nuclear power is the most significant form of electricity in the state, and was responsible for 28% of electricity production in 2006 and 2010, as shown in *Figures 6* and *7* (IEA, 2014). Identified as a key method for maintaining energy independence rather than relying on fossil fuels imports, the ascendency of climate change to the top of the list of environmental threats has enabled nuclear to play a growing role as a result of its perception as a low-carbon electricity source. Second to nuclear power in the Finnish nuclear portfolio is hydro power, with around 205 sites responsible for approximately 15% of electricity production in 2009 (Aslani *et al.*, 2013: 508). However, as the OECD (2013: 103) notes, with nature conservation rules preventing new construction of large hydro projects, the potential for expanding the current 3,140 MW of installed hydro power capacity is limited. Ironically, the desire to protect the local environment has become a barrier to protecting the global environment from climate change. In the short term, solar could provide an answer, yet it is wind that has been identified as pivotal to reaching Finland’s renewables targets by the *Eduskunta* (2009: 89). However, such technologies have struggled to play a role, with the Ministry of Trade and Industry identified as a key protector of the status quo (namely biofuels, nuclear, and hydro) (Lampinen, 2009: 50-51). For Finland to be a climate policy pioneer in the near future, therefore, it is likely that investments in renewable electricity technologies will be necessary; “[e]nergy is the key driver of climate policy in Finland” (OECD, 2013: 36).

4.2.3: Germany's electricity structure

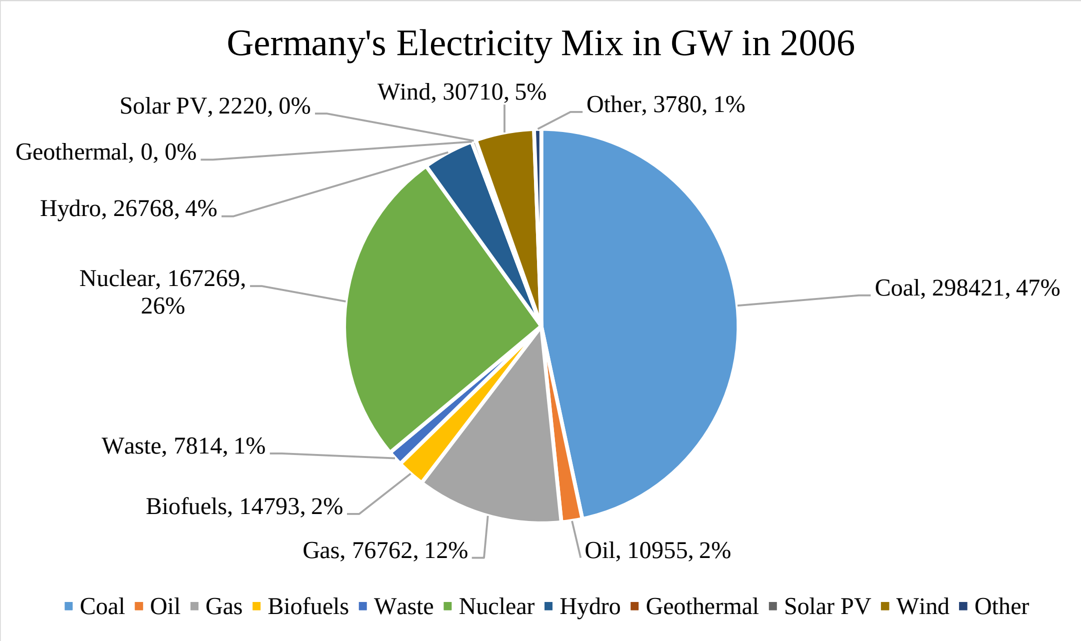

Figure 8: Germany Electricity Mix in GW in 2006.

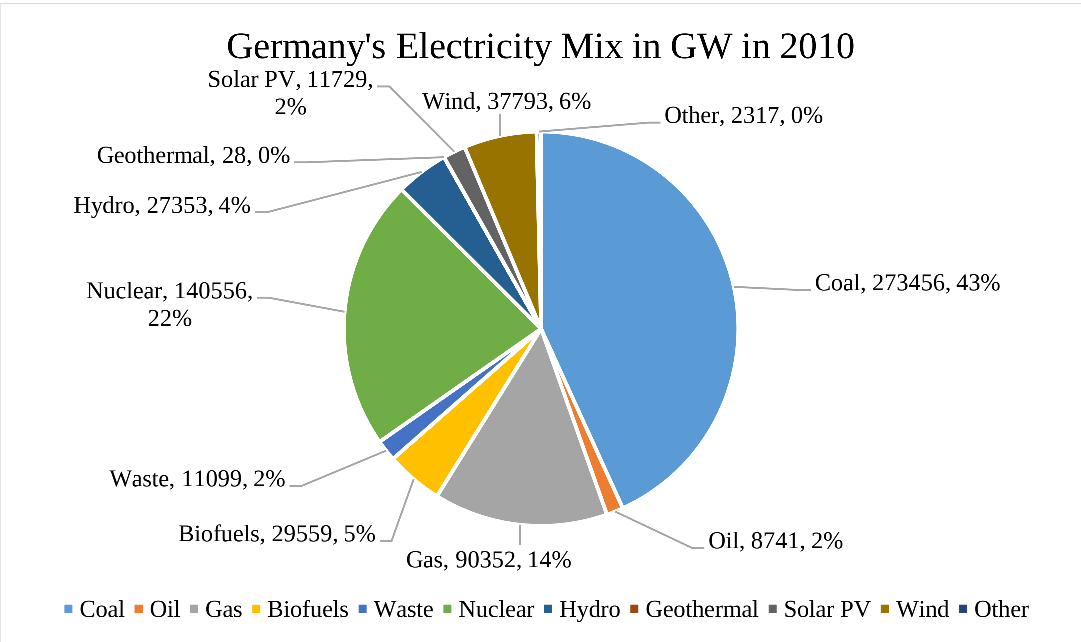

Figure 9: Germany Electricity Mix in GW in 2010.

Following reunification, Germany consolidated its position as Europe's wealthiest state (Schreurs, 2002: 157). Prior to 1990, coal and nuclear dominated German electricity consumption. Following the 1973 Oil Crisis, Germany invested significantly in nuclear energy as means of garnering greater independence from fossil fuel imports (Kitschelt, 1986). As will be explored in Chapter 6, nuclear power has remained a crucial cornerstone of German energy and economic policy ever since. As Hunold and Dryzek (2005: 87) argue regarding most of the 1980s, "[t]he state was closed; neither parliament nor the executive was eager to engage in a nuclear debate, and all the major political parties supported nuclear power." However, in 1986 the Chernobyl nuclear meltdown occurred, transforming German environmental culture instantly. Not only was radiation from Chernobyl a threat, but Germany's own nuclear power stations were perceived as dangerous. As a result of Chernobyl – and also *Waldsterben* (forest dieback) from acid rain – Germany was transformed into a victim of environmental degradation, thrusting the issue to the very forefront of the political agenda (Pehle, 1997: 190). The strength of opposition to nuclear power in Germany enabled the Green Party to become a powerful force in German politics. Having placed nuclear decommission at the top of the agenda during their time in Government, the Greens delivered decommissioning legislation by the end of their first term. As a result, while nuclear power dominated German electricity production between 2006 and 2010, there was a powerful incentive to diversify the electricity portfolio. German electricity consumption therefore changed significantly between 2006 and 2010.

As shown in *Figures 8* and *9*, in 2006, renewables (wind, solar PV, hydro and biofuels) accounted for 11% of the electricity mix, yet by 2010 this had jumped to 17%, reflecting significant investment in renewables research and construction (IEA, 2014). This jump is especially profound when the size of German energy consumption is considered. Of particular interest is the increase of solar PV, from 2220 GW in 2006 to 11729 GW in 2010, demonstrating the impact of the state's renewables policy, as explored in the next chapter. Oil, coal and nuclear consumption all fell as a percentage of electricity mix during the period, representing success in the dual challenge of phasing out simultaneously carbon-intensive fuels and nuclear power. However, despite making strides in renewable electricity technology during the period under investigation, coal, oil and gas equated to 61% of electricity generation in 2006, and 59% of electricity generation in 2010 (IEA, 2014). Indeed, subsidies for coal production continued throughout the period, representing "a notoriously outstanding example of misguided political intervention" (Frondel *et al.*, 2008: 4198). It must be remembered that at the heart of this issue lies the sheer scale of Germany's energy demands; in 2007, the state was the sixth largest consumer of energy in the world, and the largest consumer in Europe, due to the vast need for energy of its vast industrial sector and large population (IEA, 2014). As such, while Germany's electricity consumption was high between 2006 and 2010, the state was a pioneer because of the highly ambitious policies it developed during the period.

4.2.4: Sweden's electricity structure

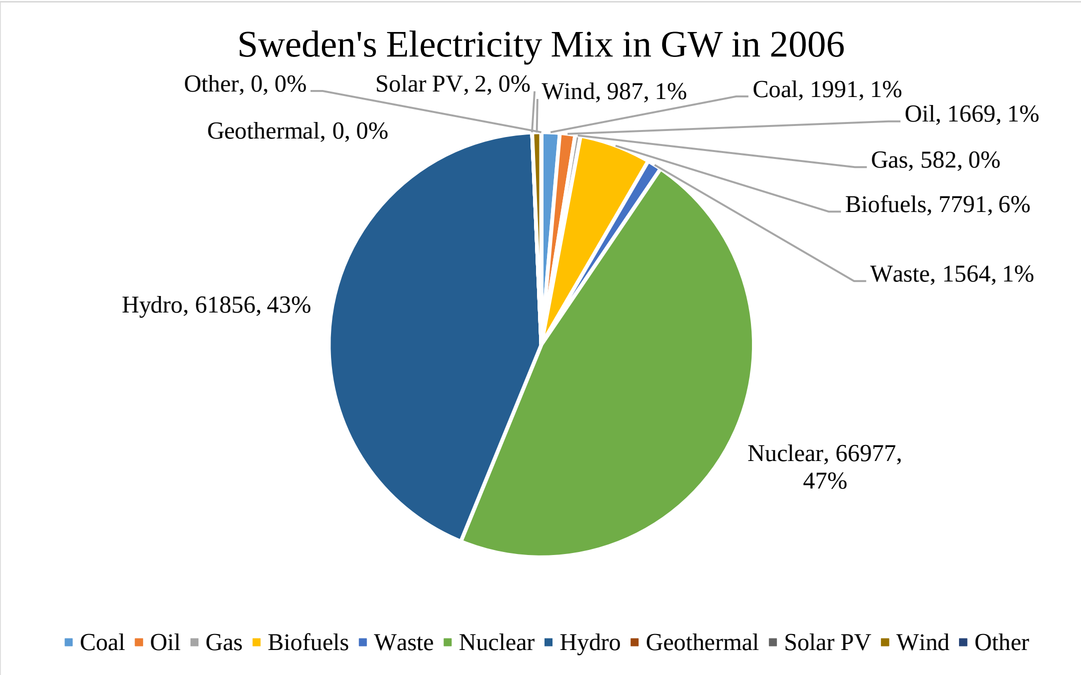

Figure 10: Sweden Electricity Mix in GW in 2006.

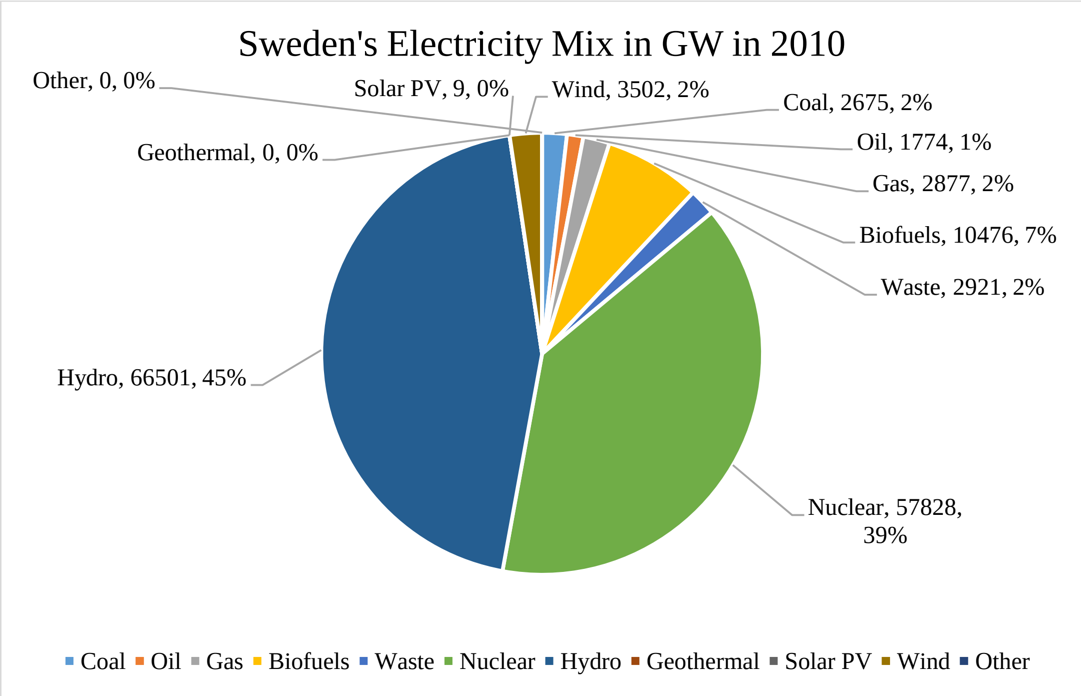

Figure 11: Sweden Electricity Mix in GW in 2010.

Industry accounted for just under 40% of final primary energy use in Sweden in 2007, with the iron and steel industry responsible for 14% of the state's CO_2 emissions (Regeringskansliet, 2009: 7). As such, Sweden required a large and steady supply of electricity to support its economy. Like many developed states, the policy decisions made by Sweden in response to the 1973 Oil Crisis shaped the state's energy provision for decades to come. As Nilsson *et al.* (2004: 72) summarise, "[o]il accounted for about 80% of primary energy supply in the early 1970s and reducing oil dependence was an early and important policy objective." Sweden had halved GHG emissions from electricity and district heating since the 1970s by 2006; the result was an electricity sector in which nuclear power accounted for 47%, hydro power for 47%, biofuels for 6% and wind power for 1% of generation (IEA, 2014). As a result, electricity production was almost carbon-free by the start of the period under investigation.

Marshall (2007: 146) states that "Sweden's low CO_2 profile is not simply the result of environmentally friendly taxes. Swedish reliance on nuclear is key". The importance of nuclear power will be explored in much greater detail in Chapter 6, but the decision in 1980 to phase out nuclear power by 2010 most be noted here (Parliamentary Resolution 1979/80: 410). While the phase-out did not occur and Sweden remained dependent on nuclear, the intention to phase out the energy source continued (Kitschelt, 1986). In addition to nuclear power, Sweden's geography enabled the state to draw almost half of its electricity from numerous powerful rivers, resulting in over 700 large hydro power stations, each with capacity over 1.5 MW (Wang, 2006: 1211). The outcome was that large-scale hydro power was at its maximum legislative limit by the period under investigation in this thesis, preventing further investment in the electricity source in order to protect 'untouched rivers' (Gan *et al.*, 2007; Zannakis, 2009: 138). Meanwhile, solar power offered little opportunity for growth in Sweden due to the comparatively low intensity of sunshine enjoyed by the country (Interview 11). As such, wind power offered the most significant means for the state to increase its renewables provision during 2006-2010, making the resource essential for Sweden's target of sourcing 50% of electricity from renewables by 2020, as demonstrated by *Figures 10* and *11*. Indeed, in a similar fashion to Germany, Sweden was able to decarbonise and phase out nuclear from its electricity sector simultaneously, with the percentage of electricity sourced from nuclear falling between 2006 and 2010 (IEA, 2014). Despite generating most of the state's electricity from nuclear and hydro, other electricity sources remained pivotal to Sweden's economy. Biomass grew in significance during the 1990s, to the extent that the energy source had replaced oil and coal as the dominant source of energy for district heating in Sweden (Fouché, 2008). Iron and steel production, however, were reliant on coal throughout the period under investigation. As such, while there were areas in need of improvement in Sweden – such as energy consumption in the transport and industrial sectors – these areas were neglected in other states too, meaning that Sweden was not a laggard, but simply as unambitious as everywhere else (Friberg, 2008: 171). Where improvements were technologically feasible, such as in electricity production, Sweden was far ahead of most other states in the world during the period.

4.3: The case studies' climate policies

The third section of this chapter details the climate change policies of each of the four states. As climate policy variation is the dependent variable of this investigation, it is crucial that a strong understanding of the case studies' policies is provided. An explanation of the states' climate policies is particularly useful, because, having selected the four case studies according to the fsQCA scores in the previous chapter by controlling the conditions and selecting on the outcome, it is vital that the states exhibited differing outcomes. The dependent variable in Chapter 1 was defined by the overall emissions reduction target of each state, and the difference demonstrated between the policies formulated during 2006-2010 and the Kyoto Protocol objectives for 2008-2012. As such, this section will detail the most significant climate policies formulated by each of the states during 2006-2010.

Firstly, however, *Tables 15* and *16* should be noted, as they show pre-existing assessments of the four states' climate policies. *Table 15* is sourced from the CCPI (Burck *et al.* 2007; 2008; 2009*a*; 2010; 2011), while *Table 16* is taken from WWF (2010; 2011) Climate Policy Tracker reports. For both sets of reports, the publication year provides data and analysis on policies made in the previous year. CCPI 2009, 2010 and 2011 are asterisked in *Table 15*, as their rankings began at 4th place, rather than 1st, in order to emphasise that no state in the world deserves to be in the top three, due to a lack of ambition. The scores have therefore been translated based on the 2007 and 2008 approach, such that Sweden's ranking of 4th became 1st, etcetera. Both reports highlight Germany and Sweden as showing much higher levels of ambition in their climate policies than Austria and Finland; a finding that will now be explained in detail. Most importantly, the dependent variable defines climate policy variation according to the state's emissions reductions goal for 2020 based on 1990 levels, and, as a means of comparison, the difference from each state's Kyoto emissions reduction goal. *Table 17* lists each of the state's Kyoto Protocol targets, targets for 2020 (both based on 1990 levels) and the difference between the two targets, highlighting much higher goals on the part of Germany and Sweden. While the difference between Finland's greenhouse gas emissions reduction targets is larger than Germany's, it must be remembered that Germany was seeking to reduce emissions by much more than Finland in absolute terms, and had already made significant reductions.

Table 15: Climate Change Performance Index rankings of the four case studies for 2006-2010.

State	CCPI 2007	CCPI 2008	CCPI 2009*	CCPI 2010*	CCPI 2011*
Austria	39th	37th	47th	39th	37th
Finland	36th	36th	45th	33rd	28th
Germany	5th	2nd	2nd	4th	4th
Sweden	1st	1st	1st	2nd	2nd

Table 16: Climate Policy Tracker grades for the ambition of climate policy in 2009 and 2010 for the four case studies.

State	CPT 2010	CPT 2011
Austria	E	E
Finland	F	F
Germany	D	D
Sweden	D	D

Table 17: Table showing Kyoto Protocol targets and 2020 targets for emissions reductions based on 1990 levels, and the difference between them.

State	Kyoto Protocol target	2020 target	Difference
Austria	-13%	-20%	-7%
Finland	0%	-20%	-20%
Germany	-21%	-40%	-19%
Sweden	+4%	-40% (including flexible mechanisms)	-44%

4.3.1: Austrian climate policy

As with the other three case study states, Austria was identified as an environmental leader during the late 1990s and early 2000s (Liefferink & Andersen, 1998*b*). As Lauber (1996: 210) noted in 1996, "[i]t seems to be a fact that in the European context, Austrian environmental policy is quite impressive." This section seeks to track Austria's policy development, from a period in which it was a 'fact' that Austria was an environmental leader in the mid-1990s, to climate policy between 2006 and 2010 that was "not ambitious at all", according to an Austrian Green Party politician (Interview 22). The data employed in the fsQCA was drawn from the national climate policy scores from the Climate Change Performance Index; for the overall ranking, Austria was placed between 37th and 47th place; Germany was placed between 2nd and 5th (Burck *et al.* 2007; 2008; 2009*a*; 2010; 2011). In the 2010 Index that referred to policy in 2009, Austria was singled out alongside Australia, China and Saudi Arabia for its particularly poor emissions trend (Burck *et al.*, 2010: 4). The WWF (2010; 2011) Climate Policy Tracker analysed 2009 and 2010 policies across Europe, giving Austria an overall score of E in both years, compared to a D each for Germany and Sweden, and an F for Finland. For Brand and Pawloff (2014: 7), too, Austrian climate policy lagged significantly behind its European neighbours. As a result, as discussed below, Austria failed significantly to reach its Kyoto Protocol target of a 13% reduction in emissions during 2008-2012 based on 1990 levels and instead increased its emissions by 6% (OECD/IEA, 2014: 43), while its emissions reductions goals during 2006-2010 barely built on the Kyoto target. Transport, industry and electricity emissions had all risen since 1990, by as much as 60% in the case of transport, making the state's impressively ambitious Kyoto goals impossible (Brand & Pawloff, 2014: 780).

Austrian environmental policy remained under-developed until the mid-1980s (Lauber, 1997: 86). Since then, however, environmental protection legislation has been formidable across a range of policy areas (Wurzel *et al.*, 2003: 51). The Energy Concept and Report of the Austrian Government, which was submitted to Parliament in December 1986, and its updates in 1987, 1990 and 1993, endorsed goals on increased energy efficiency, greater renewable electricity production and the integration of electricity policy with environmental and social goals (*see* Faninger, 1994: 1353). As such, by the time that the goals for the Kyoto Protocol were agreed, Austria was on a path to pioneering GHG reduction, stipulating a 13% reduction on 1990 levels, which was a more pragmatic goal than the 20% target developed in Toronto in 1988, based on 1988 levels by 2005 (*see* Lauber, 1996: 208). Unlike Sweden's ambitious Carbon Tax of 1991 (to be explored later in this chapter), political crisis prevented an ecological tax being passed in Austria in 1995 (Lauber, 1997: 85). The harsher economic climate of the 1990s reduced government willingness to adopt stringent unilateral goals (Wurzel *et al.*, 2003: 57). However, while the Austrian Strategy for Sustainable Development (*see* Martinuzzi & Steurer, 2003) was written in fairly vague language, the 2002 Green Electricity Act (*Ökostromgesetz*) included significant subsidies, worth around €260 million a year, enabling a rapid increase in the production of renewable electricity (Loftstedt, 2008: 2230). A 2002 Climate Change Strategy (*Klimastrategie*) sought to highlight how the 2008-2012 commitment period goals could be reached. However, despite these measures, by 2005, one year before the period under investigation, Austrian GHG emissions were a staggering 26% above 1990 levels, making a 39% gap between emissions levels and the Kyoto Protocol target for 2008-2012 (OECD, 2007: 25). As Schaffrin *et al.* (2014:867) note, "Austria tends towards symbolic policy innovations without 'real teeth'".

In stark contrast to the measures that would be needed to revitalise Austrian climate policy and meet the Kyoto Protocol goals, restrictive legislation was introduced in 2006, essentially forcing the expansion of renewable electricity to a halt (Rathmann *et al.*, 2009: 19-20). The ambitious FIT programme from 2002 that was worth €260 million a year was cut to just €17 million a year for all renewables investments, on a first-come-first-served allocation basis that severely undermined efficient allocation of funding (Interview 16; Rathmann *et al.*, 2009: 11). Although the tariffs were increased again in 2010, a more significant expansion of renewables provision was lost for several years through underinvestment. In 2007, due to the large gap between current emissions and the Kyoto commitment, a new Climate Change Strategy updated the 2002 policy to reflect the distance between Austria's existing emissions levels and its target (*see* OECD/IEA, 2007). Despite pushing for greater use of renewable electricity and a stronger willingness to employ flexible mechanisms, doubts still existed as to whether the Kyoto Protocol targets could be met (OECD, 2007: 15). In 2007, the government-owned and funded *Klima und Energiefond* (KLI.EN), or Climate and Energy Fund (*see* OECD/IEA, 2014) was established, which sought to help Austria reach its climate mitigation targets through the funding of climate- and energy-related projects. However, it was the financial crisis of 2008 that played the biggest role in reducing Austria's emissions (Interviews 17; 19). With production and consumption significantly reduced as a result of the crisis, GHG emissions plummeted. Yet, while emissions reduction was aided by the crisis, climate policy formulation was hindered. As one NEOS party employee (Interview 14) noted acerbically about many attitudes in Austria, "[c]limate policy is only something you do when there are no other priority issues", while a Chamber of Agriculture employee (Interview 15) argued that climate policy ambition had been increasing until being knocked off course by the financial crisis of 2008.

Throughout 2008 and 2009, readjustments to existing inadequate legislation were made in an attempt to rectify some of the lack of ambition highlighted previously, but the changes were not significant. It was not until 2010 that a new policy document was introduced – Energy Strategy Austria (*Energiestrategie Österreich*) – and FITs were raised back to a competitive level with a new Green Electricity Amendment (BMWFJ, 2010). The Energy Strategy Austria aimed to stabilise final energy consumption in 2020 at its 2005 levels, which were 2% lower than in 2011. Austria's emissions reduction goal was no greater than the EU target of 20% by 2020, demonstrating just a 7% increase from the Kyoto Protocol target. Thus, according to the dependent variable defined in Chapter 2, Austria's climate policy was very unambitious. When asked for an example of ambitious policy between 2006 and 2010, one Austrian Green Party representative could not think of anything to suggest (Interview 22). While small improvements to existing policy were made during the period, policy innovation had essentially plateaued by 2003 (Schaffrin *et al.*, 2014: 870). As a result of this lack of ambition, Austria was the third-largest buyer of flexible emissions permits (after Japan and Spain) during the Kyoto commitment period, allocating close to €500 million since 2007 towards buying CDM permits in order to meet its emission targets (OECD/IEA, 2014: 44).

4.3.2: Finnish climate policy

Finland has developed an ambitious environmental policy portfolio, even by European standards, since the 1980s (Sairinen, 2003: 73). Liefferink and Andersen (1998*b*) located Finland as one of six states – including Austria, Germany and Sweden, as well as Denmark and Netherlands – in the 1990s that were environmental pioneers. The *Eduskunta* (2009: 12) argued in 2009 that "Finland has all the prerequisites for becoming a leader in climate protection"; however, this sentiment was also an implicit acknowledgment that Finland was not yet a leader. Although more ambitious than most states in the world regarding climate policy, Finland lagged behind its fellow environmental leaders. This lack of ambition was noted in the fsQCA in Chapter 3, in which Finland's national climate policy was graded as weaker than comparable states according to the data collected for the Climate Change Performance Index. This index ranked Finland as between 28st and 45th most ambitious in the world between 2006 and 2010 (Burck *et al.* 2007; 2008; 2009*a*; 2010; 2011). The WWF (2010; 2011) Climate Policy Tracker similarly graded Finland with an F for climate ambition in 2009 and 2010. Other studies have made similar findings (Mickwitz *et al.*, 2011; Valkila & Saari, 2010). Finland's behaviour internationally reflects a domestic lack of ambition. Regularly arguing that the cold climate means that the state deserves relief from international electricity consumption targets, whilst arguing that its forests are carbon sinks which reduce the need to cut emissions, Finland was somewhat of an international obstacle at international climate negotiations during the period (Teräväinen, 2010*a*: 207). So what policy decisions have led to Finland developing this reputation as an environmental leader, yet also a climate laggard?

Finland began to develop its environmental legislation earlier than most states, with the introduction of a Water Act in 1961 (Joas, 1997: 123). Rather than concentrating its environmental policies into one comprehensive law, such as in Sweden, Finland's measures are divided into over 300 ordinances and cabinet decisions (Joas, 1997: 131). These regulations make Finland home to some of the most ambitious air, forest and water policies in the world. While certain Finnish municipalities and cities are globally pioneering (*see* Mickwitz *et al.*, 2011: 780), Finland's national policy is less ambitious despite promising beginnings. The Finnish Government established a Carbon Dioxide Committee in 1990 to monitor greenhouse gas reductions, producing reports in 1991 and 1994 (Wilenius & Tirkkonen, 1998: 296). While Finland also introduced a carbon tax in a similar vein to that of Sweden's crucial equivalent of 1991 (which will be explored further in Chapter 5), Finland's tax was weakened throughout the 1990s such that it failed to offer the same springboard for leadership as its Nordic neighbour's (Petola, 2012: 161). Voluntary agreements came to dominate the policy process in Finland (Sairinen, 1999), while politicians neglected electricity policy as civil servants provided technocratic, incrementalist solutions (Ruostetsaari *in* Litmanen, 2009: 10). As such, it was the Kyoto Protocol and the subsequent pressure it garnered that re-politicised the carbon policy process and led to more ambitious targets once more. The Action Plan for Energy Efficiency, released in 2000 and updated in 2002, and the National Energy and Climate Strategy, which was first released in 2001 and updated most recently in 2005, set a clear path for Finnish leadership in climate policy (OECD, 2007: 41). These roadmaps were not Europe's most ambitious, but neither were they inadequate, and Finland agreed to return its GHG emissions production to 1990 levels as part of the Kyoto Protocol burden-sharing agreement. This target was relatively ambitious due to a rapid increase in emissions during the early 2000s, from below the 1990 level in 2000, to 4.8% higher in 2001 and 9% higher in 2002 (OECD, 2003: 27).

By 2006, Finnish GHGs were 10% higher than in 1990, yet Finland was able to meet its Kyoto goal of a 0% increase on 1990 levels as a result of the worldwide economic crisis of 2008 (Salo, 2012: 116). Manufacturing and consumption dropped markedly as economic constraints gripped the state, which in turn reduced emissions levels. Were it not for the crisis, it is unlikely that Finland would have met its Kyoto targets, and it would have been forced to buy emissions credits in the same manner as Austria (Berghäll & Perrels, 2010: 41). For one Green League politician (Interview 29), interviewed as part of this research, the inclusion of the Greens in the Government in 2007 marked an improvement in climate ambition. The 2001 Climate Strategy was updated again in 2008 to call for an 11% reduction in energy production by 2020, while a Foresight Report on climate change (Eduskunta, 2009) called for emissions reductions of 80% by 2050 on 1990 levels, but this document was merely a report and not legally binding. Finland's first National Energy Efficiency Action Plan (Eduskunta, 2007) in 2007 featured a target of 9% energy savings across the state by 2020, and a follow-up Plan was released in 2011 (Eduskunta, 2011).

Crucially, and like Austria, Finland elected to assume an emissions reduction target of 20% by 2020, the minimum target of the EU. While this goal is a significant increase on the 0% Kyoto goal, it falls behind Germany and Sweden, as will be seen. Sairinen and Lindholm (2004: 68) note that "Finland has a reputation for aiming at more ambitious policy goals, ideas and programmes, but is much less ambitious (and successful) at pushing specific issues." Indeed, it was not until 2011 that Feed-In Tariffs (FITs) for renewables were implemented, having been the only state in the world to have FITs for a fossil fuel (peat) since 2007 (Salo, 2012: 122). As a result, the share of RES-E in the total electricity demand amounted to just 25.9% in 2007 compared to 24.7% in 1997 (Rathmann, 2009: 81). Finland's approach to climate mitigation during 2006-2010 can therefore be characterised as relying on organic renewables, such as biofuels, for its high renewables targets, but making average overall emissions reductions targets and subsequently failing to implement the necessary measures to reach those goals. This perspective was echoed by each of the parties interviewed as part of this research (Interviews 28; 29; 31; 32), with only the climate-sceptic Finns Party (Interview 30) arguing that Finland had been a pioneer in the field.

4.3.3: German climate policy

Germany possesses a long-held reputation as an environmental pioneer (Knill *et al.*, 2012: 40). This tradition has continued into climate policy, with the state having becoming a global leader in renewable energy technologies, especially wind and photovoltaics (Michaelowa, 2008: 151). The CCPI ranked Germany 5th, 2nd, 2nd, 4th and 4th during 2006-2010, placing the state at the very forefront of ambitious climate policy formulation (Burck *et al.* 2007; 2008; 2009*a*; 2010; 2011).

According to the WWF (2010; 2011) Climate Policy Tracker, Germany was graded with a D for climate ambition in 2009 and 2010, which was the highest grade awarded and higher than Austria's E grades and Finland's F grades. This section will track the development of climate and electricity policy in Germany from the 1970s until the period under investigation, before assessing Germany climate policy between 2006 and 2010. As will be seen, the most pivotal policy was the introduction of a FIT for renewable electricity technologies. "Few anticipated the impact the FIT would have in Germany, but because of its success in terms of installed capacity, manufacturing and job creation, it has survived three changes of government" (Lipp, 2007: 5488).

With reunification in 1990, the stricter West German regulations became the new national standard, resulting in the closure of many older, less efficient industrial plants in the East (Watanabe, 2011: 78). These windfalls enabled Germany to develop ambitious targets internationally and to assume an early-mover stance at the first UNFCCC conference, held in Berlin in 1995 (Michaelowa, 2008: 146). However, these reductions necessitated a massive redistribution of wealth from West to East, resulting in an economic slump for much of the 1990s (BMU, 1997: 104). The most crucial policy in German climate and electricity history was the *Stromeinspeisungsgesetz* (StrEG) or 'Electricity Feed-In Act' which came into force on 1st January 1991 (Lipp, 2007). As Laird and Stefe (2009: 2622) state, "[t]he StrEG led to an explosion of newly installed wind turbines", by providing a Feed-In Tariff that paid producers above the retail rate of electricity, thus incentivising investment. As will be seen in Chapter 5, this single piece of legislation transformed German renewables policy.

The Red-Green government (1998-2005) consolidated Germany's strong environmental record. "After 1998 the concept of ecological modernisation (*ökologische Modernisierung*) became central under a Social Democratic Party (SPD) and Green Party coalition government" (Jänicke, 2011: 129). Firstly, the introduction of an eco-tax as part of the Ecological Tax Reform in April 1999 increased electricity costs but reduced companies' social security contributions, with the dual aim of reducing emissions and promoting employment (Bailey & Rupp, 2005: 392). While the eco-tax's impact on emissions reduction was modest (Karapin, 2012: 18), the policy should be seen as a break from Germany's self-regulatory traditions and as a bold move by the Red-Green government (Bailey, 2007: 538). The second development, the Renewable Energy Act, or *Erneuerbare-Energien-Gesetz* (EEG), counteracted flaws in the StrEG and added geothermal power, mine gas and offshore wind to the list of supported energy sources (Jacobs, 2012: 45). Thirdly, the 100,000 Roof Programme sought to build on the success of the original 1,000 Roof Programme of 1989 by supporting research in PV, with the result that the German PV market became the largest in the world in 2004 and double the size of the previous leader, Japan's (Lauber & Mez, 2006: 110-112). Finally, the plan for nuclear phase-out was agreed under the Red-Green coalition (Dryzek *et al.*, 2002: 672).

Germany was a climate policy pioneer during 2006-2010. Indeed, one BMU employee (Interview 3) argued that the FIT policy was almost too successful in Germany. Starting with the policies of the Grand Coalition of 2005-2009, nuclear power was the most salient area of disagreement amongst the coalition, necessitating action on other areas of electricity policy instead. In April 2007, "Climate Agenda 2020" was issued as the German plan for achieving 40% CO_2 emission reduction targets without relying on nuclear energy, while in December, Chancellor Merkel reiterated the German goal of a 40% reduction in CO_2 emissions by 2020 (Schreurs, 2008: 349). This also served as Germany's pledge at the 2009 Copenhagen UNFCCC Conference of the Parties, and was a significant increase on Germany's 21% reduction goal for the Kyoto Protocol. Merkel assumed a personal role as the main driver behind EU climate ambition, earning her the moniker 'the Climate Chancellor'.

To further encourage offshore wind, a super-shallow connection charging approach was established in 2007 (Jacobs, 2012: 92), while the Renewable Energy Sources Act 2008 – prompted by the EU's renewables target – sought to increase renewables to 30% by 2020 (Townshend *et al.*, 2013: 187) and policy amendments that reduced renewables prices dramatically were introduced in 2009 (Jacobs, 2012: 178). As a result, it was argued in 2010 (Wurzel, 2010: 474) that "[t]he Grand Coalition's record in environmental, climate and energy policy has been overall a positive one. There have been important achievements (in climate and energy policy in particular)". By 2008, 15% of electricity was sourced from renewables and Germany created the second largest amount of electricity from wind in the world (Frondel *et al.*, 2010: 4049-4050). While the policy outputs of the CDU/CSU-FDP Government that followed the Grand Coalition were solid but not spectacular, the policy outcomes of the period continued to transform the German electricity structure.

The CDU/CSU-FDP coalition government was fortunate to enter office at the peak of investment in renewable electricity technologies in Germany. In 2009 alone, solar PV installed capacity increased from 1.8 GW to 3.8 GW (Jacobs, 2012: 175). Although the CDU/CSU-FDP Government's climate and electricity policy discourse was dominated by the issue of nuclear energy because Merkel was a key proponent of re-introduction, some new policy measures were introduced. The most significant of these policies was the Energy Concept for an Environmentally Sound, Reliable and Affordable Energy Supply (BMU, 2010). This policy outlined the need for a long-term electricity strategy until 2050, and featured emissions reductions targets of 40% below 1990 levels by 2020, 55% by 2030 and 80-95% by 2050, placing Germany at the very forefront of ambition regarding emissions reductions (BMU, 2010: 5). Thus, Germany's increase of 19% on its Kyoto Protocol target was ambitious considering how much had already been achieved. Renewables investment during the period continued to grow and by 2012 renewables accounted for a staggering 25% of electricity production, placing Germany at the forefront of climate-friendly electricity production (Reuters, 2012). Path dependence enables a clearer understanding of how Germany was locked into ambitious renewables policy following the StrEG of 1991, and will be explored in detail in the next chapter, where it will be crucial to note that "Germany is unique… In no other country in the world is the feed-in tariff payment not limited by any sort of program-size cap" (Jacobs, 2012: 61).

4.3.4: Swedish climate policy

Sweden has been identified frequently as a pioneer across a variety of environmental policy areas (Börzel, 2002; Jänicke, 1992; Liefferink and Andersen, 1998*a*; Liefferink and Andersen, 1998*b*;

McCormick, 2001: 90). Sweden was the first state in the world to launch an Environmental Protection Agency, in 1967 (Granberg & Elander, 2007: 539), but it was many years before climate change reached the political agenda. From 1975 to 1987, scientists and other epistemic communities sought to frame climate change as a political issue, starting with Bert Bolin's (1975) report 'Energy and Climate' (*see* Knaggård, 2009: 293). However, it was the 1991 introduction of a price on carbon that transformed the state's emissions growth (Friberg, 2008: 169). As a result, in 2008 the Swedish Environment Minister, Andreas Carlgren (*in* Fouché, 2008), stated that "[o]ur carbon emissions would have been 20% higher without the carbon tax". As will be seen in greater detail in Chapter 5, once the carbon price had been established – apparently as an innocuous by-product of wider tax changes – Sweden was placed on a path of climate leadership. By the time of Sweden's presidency of the EU in 2001, the state was already willing and able to take a strong position internationally during the Kyoto Protocol negotiations, driving forth the principles of a European 'bubble', or burden-sharing agreement (Dessai and Schipper, 2001). Thus, during the period under investigation, the CCPI ranked Sweden as either 1st or 2nd in the world for its climate policies and emissions reductions every year (Burck *et al.* 2007; 2008; 2009*a*; 2010; 2011). The WWF (2010; 2011) Climate Tracker graded Sweden the same as Germany, with a D for climate ambition in 2009 and 2010, making the two states the European leaders in climate policy ambition.

The dominant policy in place prior to 2006 that was designed specifically to address climate change was the Swedish Climate Strategy (2001:02: 55) which had been passed in 2002. The headline objective of the Bill was a 4% reduction of emissions from 1990 levels by 2010 (Regeringskansliet, 2002). According to the EU Bubble under the Kyoto Protocol, Sweden was entitled to *increase* emissions by 4% in that period, demonstrating that Sweden was acting beyond expectations (*see* Harris, 2007: 23). The Green Certificate Scheme introduced in 2003 and the investment subsidy programme developed by the Swedish Energy Agency offered the two primary means of incentivising wind power (*see* Statensmyndighet, 2010: 34). Decision-making on turbines in Sweden was highly decentralised, essentially giving veto power to those affected locally by the installations, reducing the likelihood of construction (Söderholm & Petterson, 2011: 523). Thus, at the time, "the legal preconditions for offshore wind power development are more favourable than those applying to onshore installations" (Söderholm & Petterson, 2011: 523). The 2002 Bill was updated in 2006 – prior to the centre-right government coming to power but at the start of the period under investigation – and renamed the National Climate Policy in Global Co-operation (2005/06: 172). While the 2010 target remained the same, a new target for 2020 was introduced – a 25% reduction on 1990 levels – signalling the start of increased medium-term planning on the part of the government (Regeringskansliet, 2006).

The standout piece of energy legislation passed during the five-year period in Sweden was the 2009 Integrated Energy and Climate Policy, which comprised two separate bills (2008/09:162 and 2008/09:163). This policy was the first time energy and climate change had been linked together in one Bill in Sweden, demonstrating the elevated political significance of climate change (Interview 7). The Policy featured four headline targets to be reached by 2020: at least 50% of electricity to be sourced from renewables, a 40% reduction in GHG emissions, 20% more efficient energy use and at least 10% of energy in the transport sector to be sourced from renewables (Regeringskansliet, 2009: 2). The 40% reduction in emissions target – a world-leading goal – is of particular interest. The 40% emissions reduction target relates to emissions produced outside the EU Emissions Trading Scheme (ETS), in sectors such as housing, transport and waste (Regeringskansliet, 2009: 2). The previous target under the Social Democrat government for 2020 was a 25% reduction in emissions, suggesting that the Alliance was demonstrating great ambition with such an increased target. "The former opposition, now in government, here seemed to have higher ambitions (40 percent vs. 25 percent) than the former Social Democratic government" (Zannakis, 2009: 118). Yet, the comparability of the targets is not so clear-cut. While the 25% target of the Social Democrat government referred to GHG reductions in Sweden, one-third of the 40% target could be met by flexible mechanisms such as the Clean Development Mechanism (CDM) and Joint Implementation (JI) (Zannakis, 2009: 118). The ability to use CDM or JI to meet this goal was not well-received by opposition parties or environmental groups, despite the goal being slightly more ambitious than its predecessor overall

(Fouché, 2008; Zannakis, 2009: 119). However, in comparison with Austrian and Finnish GHG reductions goals – and indeed, targets around the world – the objective was highly ambitious.

On the other hand, the Alliance overturned the 1980 referendum on decommissioning Sweden's nuclear portfolio (2009/10: 172) (*see* Sarasini, 2009: 639). While this decision did not enable an expansion of the number of nuclear power station sites, it allowed replacement reactors for the pre-existing plants to be commissioned, thus facilitating 'safer' and more efficient stations, whilst also marking a sea change regarding public opinion towards nuclear power (Statens Energimyndighet, 2010: 11). Although the decision could be seen as pragmatic and necessary considering the pressure to act on climate change (*see* Wang, 2006), it was still seen as a surprise by some. With the Centre Party and Christian Democrats having previously expressed opposition to nuclear power, their support for the Bill highlighted a willingness to facilitate low-carbon energy decisions, even if energy security and electricity prices were also factors in the decision (*see* Zannakis, 2009: 141; Löfstedt, 1994: 1106). Furthermore, while nuclear power is often described as a low carbon electricity source, by facilitating the replacement of existing reactors, the Alliance government reduced the pressure to construct new renewables. The role of nuclear electricity will be explored in further detail in Chapter 6, as the energy source played a vital role in explaining Swedish climate ambition for most of 2006-2010. Crucially, though, the large increase in emissions reduction target from +4% as part of the Kyoto Protocol to -40% shows ambition on the part of Swedish climate policy-makers, despite the inclusion of flexible mechanisms to meet the goal.

4.4: Conclusion

This chapter has outlined the political systems, energy portfolios and climate policies of the four case study states selected in the previous fsQCA chapter. The four states were firstly shown to be multi-party, corporatist, parliamentary democracies – thus controlling for these conditions – before the scores accorded to the states for the fsQCA were confirmed by noting the party makeup and relevant electoral histories of the states. Each of the states was governed by a coalition of parties, which averaged out towards the political right of the spectrum over the five-year period (despite Grand Coalitions in Austria and Germany). The summaries of each state's political structures also contextualised the case studies in preparation for the deeper analysis in Chapters 5 and 6.

With the arguments detailed in both Chapter 5 and 6 pertaining to energy policy, the industrial and electricity portfolios of the states were then detailed in the second section of this chapter. Although Germany and Sweden were both heavily reliant on nuclear power, both states have invested heavily in renewable electricity technologies, such as wind and solar, with the result that renewable electricity – particularly in Germany – grew rapidly as a percentage of overall electricity production. Austria and Finland, on the other hand, were less ambitious. Austria's total ban on nuclear energy production resulted in a strong reliance on imported fossil fuels, especially natural gas from Russia, while Finland was dominated by its nuclear energy provision and biofuels.

The final section of the chapter then explored the climate policy ambition of the four states, which began by detailing the salient environmental and climate policies prior to 2006, before exploring the policies introduced during the period under investigation. This chapter explained in the detail the reasons for the scores allocated by the CCPI that were used to code the outcome scores in the fsQCA. Germany's Climate Agenda 2020 placed the state at the very forefront of climate policy development, with strong FIT subsidies designed to revolutionise the German electricity portfolio. Indeed, renewable electricity as a percentage of overall electricity production jumped from 7.2% in 2000 to 22% in 2011 in Germany (IEA, 2013). Similarly, Sweden's 2009 Climate and Energy Bill set out a similar goal that stipulated highly ambitious goals to be met by 2020. On the other hand, while Austria and Finland introduced reasonably ambitious goals, these were not as ambitious when compared to Germany and Sweden. For example, in Austria, while a weakened FIT was resuscitated in 2010, the bulk of the late 2000s saw a deafening silence regarding ambitious climate policy. Although Finland's 2008 Foresight Report referred to cutting emissions by 80% by 2050, the commitment was not legally-binding and there were concrete proposals as to how such a reduction could be achieved. The overall emissions goals for 2020 (based on 1990 levels) of 20% for Austria and Finland, and 40% for Germany and Sweden, demonstrate the gulf in ambition across the states. As such, having explained the rankings made by the CCPI and Climate Policy Tracker regarding the four states' relative climate ambition, the following two chapters will seek to explain why Germany and Sweden consolidated their environmental leadership status with strong climate ambition, while Austria and Finland dragged their heels.

Chapter 5: Renewable Electricity Policy

Jänicke (2005: 136) has argued that the principles of Ecological Modernisation – in which pro-market, pro-growth strategies are used to foster technological solutions to environmental problems – are crucial for a state to be an environmental pioneer. However, EM has been described as ineffective in responding to transboundary issues, such as climate change, because polluting industries are often exported abroad as a result of stricter environmental legislation, thus moving the site of GHG production elsewhere rather than removing the emissions altogether (Schnaiberg *et al.*, 2002: 21). This thesis thus makes an original contribution to the literature by arguing that between 2006 and 2010, those states that exhibited the primary principles of EM – a trust in capitalist growth and technological innovation – as part of their approach to electricity policy were more ambitious regarding their climate policies.

Renewables offer a low carbon solution to one of – if not the – biggest sources of greenhouse gases within a state's economy, namely electricity consumption. I posit that if a state possesses a strong renewables industry within its borders, it is incentivised to reduce its own GHG emissions and encourage other states to do likewise as a means of fostering economic growth. EM incentivises high-tech electricity approaches as an opportunity for growth; while this reliance is unlikely to be adequate in mitigating climate change in the long-run, in the short-term, this chapter finds that its presence was sufficient to drive forward ambitious renewable electricity policies. Path dependence enables the long-term processes that resulted in ambitious policy to be identified, which were shown to be crucial for a state to be a pioneer during the period.

Even if EM enables a state to become a pioneer, however, climate policy gains for economic reasons should not be confused with making a lasting commitment to mitigating climate change. This chapter uses empirical findings to support its claims, by examining each of the four case studies in turn, surveying their renewable electricity policies and the impact these had on the states' electricity portfolios, before ascertaining why each state chose to prioritise renewables or not. A distinction is drawn between 'technological renewables', such as wind and solar, and 'organic renewables', such as biofuels. Support for technological renewables is identified as a crucial part of EM, which in turn engenders ambitious climate policy.

In Austria and Finland, Feed-In Tariffs were not used to support technological renewables adequately. In Austria, an effective FIT scheme was dismantled in 2006 by a co-ordinated group of powerful interests. Renewables were subsequently only favoured in the form of biofuels, as these were championed by powerful agricultural interests, whose powers were institutionalised in the Social Partnership model. Austria weakened a previously EM-based approach to renewables during the time of the period under investigation, inhibiting the development of renewables significantly. In Finland, for much of the period under investigation, FITs were only available to support peat, rather than renewable electricity sources. Thus, the EM principle of market-based incentives was pursued, but not for a climate-friendly electricity source. In Germany and Sweden, renewable energy technologies, such as wind power and solar power, were deliberately encouraged through market-based mechanisms, such as tradable certificates and FITs. As Jacobs (2014: 766) finds regarding the German EEG mentioned in the previous chapter, "[t]he impact of the amended EEG was overwhelming… [solar photovoltaic] installed capacity increased from 76 MW in 2000 to about 2000 MW by 2005 and 32,000 MW at the end of 2012." As a result, investment in renewables created an 'enormous boom' for the German economy by 2006-2010 (Jänicke, 2011: 130). Each of the four states will now be examined closely in detail, before applying the concept of path dependence in the Discussion to explain how Germany and Sweden became locked into a path that began in 1991 and led to ambitious climate policy during 2006-2010.

5.1: Renewables Promotion in Austria

Austria was distinctly different to the other three case studies in this thesis regarding its support for renewable electricity, as its policies favoured one form of renewable electricity to the detriment of all others. Austria possessed one of the highest percentages of renewables in its electricity mix in the world during the period due to its large hydro power electricity supply (OECD/IEA, 2007). Already at maximum capacity for hydro power, Austria invested heavily in biofuels, because of the institutionalisation of vested interests in the state's unique Social Partnership. As a result of the pre-existing high levels of renewables, Austria was somewhat complacent towards the incentivisation of technological renewables during the period, according to an employee at the Austrian climate mitigation funding body, *Klimafonds* (Interview 16). This sentiment was strengthened by a highly protective populace that opposed the construction of renewables in areas of natural beauty. However, "[a]fter its adoption in 2002, finely tuned feed-in tariffs caused a particularly strong deployment of wind energy, biomass and biogas" (Rathmann *et al*., 2009:10); indeed, these FITs were so successful that the policy was deliberately undermined four years later to reduce costs.

As such, this section charts the introduction of an ambitious FIT scheme in 2002 only for it to be weakened dramatically in 2006, ensuring that construction of new renewables almost ceased entirely for the duration of the period under investigation (Brand & Pawloff, 2014). Thus, while Austria possessed ambitious policy goals regarding both climate change and renewables, its policy measures to implement such targets were severely lacking. While Germany and Sweden were locked into supporting technological renewables, such policies did not become established in Austria. Technological renewables were not perceived as an export opportunity for Austria, but instead created a new competitor to some of the most powerful vested interests in the Austrian decision-making process.

5.1.1: Austria's policies

Before discussing the role of FITs in Austria, some of the other developments in renewables policy should be noted. Austria was already a global pioneer regarding the presence of renewable energy within its electricity portfolio at the start of the period under investigation. As Faninger (2003: 177) notes, "[r]enewable energy sources have a long tradition in Austria, which is amongst the leaders when it comes to using renewable energy sources", with the Austrian Energy Research Programme having supported certain electricity sources up to full economic competitiveness. Throughout the 1990s especially, Austria invested large amounts of money into electricity Research and Development (R&D) with a view to reducing emissions (Faninger, 2003: 178). Austria's 'Energy Systems of Tomorrow' project (Energie Systeme der Zukunft, 2003) was introduced in 2003 and sought to improve the performance of renewables whilst favouring climate protection, while the *Klima:Aktiv* programme – overseen by the Ministry of the Environment and managed by the Austrian Energy Agency – was set up in 2004 to support the state's Climate Change Strategy Goals. However, although the mid-2000s saw the prioritisation of energy efficiency and renewables within electricity R&D (OECD/IEA, 2007: 103), funding lagged. It was not until 2007 that an improvement emerged, with the formation of the government-owned and funded *Klima und Energiefond* – 'Climate and Energy Fund' – (Fallend, 2008: 909; OECD/IEA, 2014: 40), which saw overall public funding for electricity R&D increase rapidly until 2010 (OECD/IEA, 2014: 121). Thus, although this thesis seeks to explain why Austria was less ambitious than Germany or Sweden, from a global perspective Austria was by no means a laggard: government spending on electricity R&D as a share of GDP was slightly above the IEA median by 2011, and appeared higher if spending on nuclear was excluded (OECD/IEA, 2014: 122).

With regards to the dominant form of renewables incentivisation, however, the state's incentive scheme was lacking. Having failed to agree a carbon tax in 1995 (Lauber, 1997: 85), Austria did manage to introduce an energy tax in 2000, but with a ceiling in order to protect competitiveness, and an eco-tax has not been introduced at all (Hausknost, 2007; Wurzel *et al.*, 2003: 70). Although Austria experimented with a tradable permit quota system for small hydro power stations under the Electricity Management Act between 2002 and 2004 (Wurzel *et al.*, 2003: 64), the state agreed a Feed-In Tariff in 2002 as part of the Green Electricity Act (GEA), or *Ökostromgesetz* (*see* Brand & Pawloff, 2014). FITs can be used to employ market principles to incentivise investment in burgeoning technologies; such sentiments epitomise the principles of EM. Crucially, no limits were placed on the volume of subsidies to be given, or on the total number of installations for which it was possible to apply within a given time frame (Brand & Pawloff, 2014: 788). When it came into force, the Act included significant subsidies, worth around €260m a year (Lofstedt, 2008: 2230). As will be seen shortly, the FITs were exceptionally successful, dramatically increasing investment in renewables.

However, costs also increased as a result of such an ambitious FIT, such that in early 2004, an 'Alliance of Payers' comprising the Federation of Industry, Chamber of Commerce, Chamber of Labour, and the Federation of Trade Unions demanded a significant reduction in the value and quantity of FITs, arguing that the international competitiveness of Austria was being jeopardised (Brand & Pawloff, 2014: 788-790). Austria cut back on the funding for FITs in 2006, having already reached its 2008 target. Thus, in 2006 the GEA was reformed significantly, whereby a fund was set up to give direct support to renewable electricity investments, running from 2007 to 2011 with a total value of €17 million per year for investment across all renewables, compared to €260 million per year during 2002-2006 (OECD/IEA, 2007: 55; Rathmann, 2009: 11). This funding was split by technology, with 30% reserved for wind, biomass and biogas each, and 10% for photovoltaics. Funding was reduced for both the FIT per MWh generated and by a ceiling that capped all new projects to receive just €5.1m a year in direct investment capital (OECD/IEA, 2007: 58). Moreover, there were only two days each year on which companies could apply for FITs. As a result of this limitation, and the cap on funding, the system crashed each year between 2007 and 2010 as providers sought to obtain the limited funding available for renewable electricity (Interview 16). With the FITs seen as too low according to both a NEOS employee and a Chamber of Agriculture employee (Interviews 14; 15), the price was increased in 2010. Energy Strategy Austria (*Energiestrategie Österreich*) sought to decouple economic growth and energy consumption. Thus, there was a highly unpredictable policy approach towards renewables during 2006-2010, with high investment until the FIT price dropped in 2007, only to be raised once more in 2010.

5.1.2: The Impact of Austria's policies

As may be surmised from the above section, Austria's R&D policies were of average ambition, but poor regarding mechanisms for encouraging change (namely, FITs). In 2007, Austria was ranked 14th out of 26 IEA member countries in total spending on energy R&D (OECD/IEA, 2007: 103). Austria remained a pioneer, and, indeed, consolidated its position with regards to biofuel research during the period (Schmidt *et al.*, 2011: 3261); however, the significant restructuring of the FITs in 2006 ensured that Austrian investment in renewables was inadequate between 2007 and 2010, rendering the state a laggard regarding technological renewables energy construction (Interview 22). Following the amendment to FITs in 2006, production stagnated for four years. For example, whereas annual additionally installed wind electricity capacity averaged 208.3 MW between 2003 and 2006, between 2007 and 2010 it stood at just 12.7 MW a year (Brand & Pawloff, 2014: 790). This paltry rise set Austria back several years on its EU renewable electricity target, reaching just 64.7% rather than the goal of 78.1% (Statistics Austria, 2013). Thus, by 2011, bioenergy was the most important renewable energy source for GHG mitigation and fossil fuel replacement in Austria, just as it had been prior to 2006 (Kalt & Kranzl, 2011: 3678).

Before the period under investigation, renewable electricity was an area in which Austria was a global pioneer. Yet, as the state remained dependent upon coal for 13.5% of electricity production (OECD/IEA, 2007: 79) and possessed little domestic coal production, further investment in renewables could have made Austria more energy secure as well as a climate leader. However, Austria's significant weakening of its FITs in 2006 ensured that the state missed an opportunity to be a global leader, and instead increased its own dependence on energy imports, such as Russian gas. Thus, as Lauber (2009: 442) noted in 2009, "Austria is dragging its feet on domestic emissions reduction and renewable energy deployment".

5.1.3: Why Austria pursued its chosen policies

Thus, Austria's unambitious policy approach between 2006 and 2010 ensured that "Austria [w]as dragging its feet on domestic emissions reduction and renewable energy deployment" (Lauber, 2009: 442). This section will seek to explain why the state scuppered its own FIT policy when the policy had enabled the state to meet its objective of increasing renewables provision. An increase in domestic provision was particularly important when it is remembered that, unlike the other three case studies, Austria could not rely on nuclear power and so was dependent on fossil fuel imports. This section will argue that the pre-existing high levels of renewables (particularly hydro power and biofuels) engendered complacency, while a desire to protect areas of natural beauty further weakened the cause of new renewables construction, such as solar and wind. As a result, there was little desire for a high-tech solution to Austria's energy shortfalls. With regards to the economic gains to be achieved from investing in new renewable electricity technologies, I argue that the unique Social Partnership in Austria inhibited the ability of new actors, such as those favouring new forms of renewable technology, to influence the policy process. While Finland, Germany, and Sweden are also corporatist states, it was the unique tripartite structure of the Social Partnership that weakened calls for short-term investments in both research and construction, which could reap long-term economic rewards. Thus, while FITs were introduced in 2002, they did not become 'locked in' in Austria as was the case with the long-standing FITs of Germany, as will be seen later.

Firstly, Austria already possessed large quantities of renewable electricity provision at the start of the period under investigation. In 2007, Austria's electricity-related CO_2 emissions per unit of GDP were relatively low when compared to other IEA countries, as a result of the high quantities of hydro power and biofuels in the TPES (OECD/IEA, 2007: 25, 98). Indeed, while Austria's overall percentage of renewables may have been higher than Germany's during the period under investigation, Austria did not improve anywhere near as significantly as its neighbour, according to one *Klimafonds* employee (Interview 16). Austria's Alpine location ensured that abundant hydroelectric resources had already been tapped, offering limited areas for expansion.

Meanwhile, with fuel price stability, large forested areas and a long and positive history of investment in biofuels, the state had become a world-leader in the organic renewable electricity source (OECD/IEA, 2007: 59).

However, while Austria was a world leader in renewables rankings, if biofuels were removed from the data the state could be seen as a veritable laggard (Interview 15). One Green Party politician (Interview 22) argued that Austria's strong renewables portfolio was a result of previous policy decisions, and offered limited scope for improvement between 2006 and 2010, as both biofuels and hydro power had already received high levels of support and were close to maximum production already. As a result, one Economic Chamber employee (Interview 21) stated that "[w]e aren't seeing technological solutions. Sitting back and hoping industry will innovate is naïve." Austria failed to incentivise investment in technological renewables because its status as a world leader in renewables created complacency on the issue, despite continued dependence on energy imports. Thus, Austria's high-levels of existing renewables provision inhibited its investment in new technological renewables development.

Secondly, in addition to this complacency, the role of NIMBY (Not In My Back Yard) sentiments were a significant barrier to renewables development in Austria when comparing the state to the other case studies (Interviews 14; 16). A caveat must be made, however; it was not so much NIMBYism that inhibited Austrian energy policy as opposition to the construction of electricity production facilities in areas of outstanding natural beauty (Interview 14). Similar to Sweden, because Austria's river areas were already heavily dammed, the maintenance of untouched rivers, such as those in Styria, was an issue of significant importance to the Austrian media. However, unlike Sweden, Austria failed to respond to the constraints on future hydro power expansion by turning to nuclear energy, or technological renewables. For example, while public opposition to the siting of wind turbines was a big issue (Interview 14), opposition was relatively limited in less aesthetically-pleasing areas, such as Burgenland in Eastern Austria (Interview 16).

While renewables expansion took place unabated in less attractive areas, the construction of technological renewables in locations in the Alps was vehemently opposed, despite the high levels of wind and sunshine present there (*see* Dell *et al.*, 1996: 1118). The fear of mountain collapse, reduced appeal for tourists, protection of biodiversity and destruction of local beauty ensured that the construction of renewables anywhere near Austria's mountain areas was almost impossible (Interviews 16; 17; 18; 19). Thus, it may be argued that Austria's high levels of awareness regarding the local environment stymied policies that could protect the global environment, namely the climate. By opposing the construction of high-tech energy solutions due to concerns over their appearance, technological renewables were impeded, thus necessitating continued reliance on pre-existing energy forms, such as biofuels, hydro power and imported fossil fuels.

Finally, and most significantly, while in Germany and Sweden, as will be argued below, new renewable electricity technologies offered new export opportunities, in Austria the vested interests institutionalised within the Social Partnership interpreted such industries as competitors to existing industries. The Social Partnership is at the heart of all Austrian policy-making, and all businesses must be a member (Tálos, 1996: 114-118). However, as the system was created to reflect the distribution of power following World War II, the model did not represent all of the relevant interest groups during 2006-2010. An 'Alliance of Payers' representing industry, unions, labour and commerce perceived themselves to be negatively affected by technological renewables and the FITs used to encourage them (Brand & Pawloff, 2014). This powerful conglomeration of interests had never united before, highlighting the unique 'threat' posed by incentivising technological renewables. While those affiliated to the unions or SDP perceived FITs as increasing electricity bills to poorer Austrians (Interview 16), the Commerce Chamber and ÖVP saw technological renewables as an extra cost for business (Interview 21). The only pro-climate voice in the Social Partnership was the Chamber of Agriculture, but, again dominated by the ÖVP, they favoured subsidies for biofuels rather than FITs for wind or solar power. Technological renewables therefore represented a competitor to the only pro-climate part of the Social Partnership.

While it may be accurate to argue that "Austria has made wide use of subsidies in the environmental policy field… [which] partly explains the high percentage of renewable energy in Austria" (Wurzel *et al.*, 2003: 69), such policies disproportionately favoured organic rather than technological renewables. Thus, Brand and Pawloff (2014) argue that the dominance of such voices to the Austrian policy process highlights the 'epistemic selectivities' (*see* Brand & Vadrot, 2013) of the Austrian state. While all four of the case study states are corporatist in political structure, only Austria possesses a Social Partnership that explicitly institutionalises commerce, labour and agriculture, but not other viewpoints in society. Although this model favoured renewables in the form of biofuels as a result of the subsidies directed towards farmers, none of these voices supported the development of technological renewables, as such industries represented a threat to biofuels, thus explaining why the U-turn on FIT funding in 2006 was able to pass so easily. As such, Austria failed to expand its technological renewables significantly between 2006 and 2010.

5.2: Renewables Promotion in Finland

The Nordic states are often seen as 'high tech', with large investments in R&D that drive their economies and provide impressive standards of living (Järvelä & Juhola, 2012: 2). Finns have long seen their society as technologically-advanced, and as Ruostetsaari (2009: 107) suggests, "[i]t is evident that… the success story of Nokia in mobile electronics has something to do with Finnish confidence in technology." Indeed, this section begins by highlighting Finland's ground-breaking carbon tax and its strong support for technological innovation. However, I argue – against existing assumptions (*see* Dryzek, 2005) – that despite Finland's pro-technology reputation, the state underperformed regarding technological renewable energy sources between 2006 and 2010. As will now be seen, mechanisms normally associated with supporting technological advancement – such as FITs – were applied instead to electricity resources that were not climate-friendly; namely peat (Salo, 2012: 123). Meanwhile, the forms of technology that were supported were predominantly industry-specific end-of-pipe innovations, rather than new products – for example, wind turbines and solar panels – that could be exported more widely. Thus, EM principles were applied to dated technologies that would be very difficult to make climate-friendly, rather than investing in renewables which could be climate-friendly from the start. I argue that these policies affected negatively Finland's technological renewable electricity provision. Finally, the reasons behind the state's unambitious approach towards technological renewables will be explained. Finland was not as well-positioned to support its renewables technologies as Germany and Sweden, due to a faltering economy and smaller population. As a result, while biofuels performed well as they were already well established, the development of technological renewable sources lagged significantly (Teräväinen, 2010*b*: 413). Although technological development is a pivotal narrative in Finland, the development of climate-friendly technology clashes with even more significant narratives in the form of the cultural affinity towards forests, and, as discussed in the next chapter, a preference for nuclear power as a means of ensuring independence from Russia.

5.2.1: Finland's policies

Finland's carbon tax, agreed in 1990, is widely credited to have been the first of its kind in the world (Mickwitz *et al*, 2011: 1780; Petola, 2012: 161; Sairinen, 2003: 83; Wilenius & Tirkonnen, 1998: 300). The rationale for the introduction of the policy was a perception of forthcoming economic strife in the late 1980s. For the first four years of the carbon tax in Finland, the policy represented pioneering climate legislation. The policy featured very few energy sources or industrial exemptions and the price per ton of $CO_2$was raised in 1993 (Sairinen, 2003: 83). The first exogenous shock took place in 1994, however, with the decision of the Ministry of Trade and Industry and the Ministry of Finance that the EU was unlikely to adopt a European carbon tax in the near future (Sairinen, 2003: 83). By maintaining such an ambitious tax, therefore, Finland was placed at a competitive disadvantage against its neighbouring states which would be able to produce electricity and industrially-intensive goods for cheaper prices. Thus, the first change to the model was introduced, in which the price was restructured such that 75% of the tax was based on carbon content, while 25% was based on the electricity content of the primary energy source (Sairinen, 2003: 83). Without the presence of the Green Party inside the government at the time, it is unlikely that such a large percentage of the tax would have remained connected to the carbon levels.

The second exogenous shock was the liberalisation of the electricity sector. Having become a member of the EU in 1995, Finland was compelled to liberalise its electricity sector in order to comply with EU regulations (European Commission, 2012). Thus, in 1997, the energy tax model was changed towards a normal consumption tax, with a much lower carbon tax component (Sairinen, 2003: 83). Moreover, the carbon tax was lifted entirely for fuels that were used in electricity generation as part of the liberalisation process (Helynen, 2004: 45). While a tax subsidy was introduced for renewables in 1997, the overall effect was again to weaken the carbon tax. As a result, Finland failed to make significant reductions in its energy and carbon consumption (WWF, 2011).

Finland held the hallmarks of a modernist state during 2006-2010. In 2007, Finland was in the top five of the EU 27 regarding number of patents per capita (Berghäll & Perrels, 2010: 61). With the *Eduskunta* (2009: 69) arguing that "[t]he climate should be protected without compromising competitiveness", and a Finnish Environment Institute employee (Interview 25) stating during an interview that EM was part of the national agenda, it appeared that the foundations were in place for a marketised, technology-driven narrative to lead climate policy decisions. Funding was supported through *Tekes* (the Finnish Funding Agency for Technology and Innovation), while the Technical Research Centre of Finland enjoyed an energy research branch featuring over 350 people in 2007 (*see* OECD, 2007: 19). The Government developed a range of strong programmes for targeting certain sectors with new and technologically advanced methods. Indeed, energy and climate change research was a focal area in public research funding in Finland, reaching a peak in 2010 with approximately €270 million in public expenditure, equivalent to 0.16% of GDP, ranking first among its OECD peers (OECD, 2013: 147). Crucially, however, much of this funding was applied to nuclear power, rather than renewable electricity technologies. In addition to the technological dimension of EM, the pro-market assumptions of the concept were also strong in Finland, with thousands of businesses committed to developing solutions to climate change (Mickwitz *et al.*, 2011: 1782). With these foundations, a significant upturn in technological renewable electricity provision may have been expected, but its application of FITs to a climate-damaging electricity source significantly weakened the entire sector.

Feed-In Tariffs played a crucial role in Germany's support for development of new renewable electricity technologies, as will be seen, yet, in Finland, a significant benefit of FITs was that they could be targeted towards the needs of rural voters, who would prosper from the consumption of peat, which is a partially decayed organic matter. Firstly, Finland was relatively late to incentivising energy production, failing to have any form of electricity support mechanism until 2007. As a result, in 2007, Ernst and Young found Finland to be the least attractive site for investment in renewable electricity out of 25 states (*see* Salo, 2012: 126). As such, the critical juncture which may lead to Finland becoming locked into ambitious renewable electricity policy was not established until the period under investigation had begun. FITs use capitalist, market-based assumptions to incentivise technological development, and were the most dominant support mechanism for renewables in developed states during the period (Jacobs, 2012). For a considerable time it had been considered that renewable electricity technologies could only play a marginal role in Finland (Peura & Hyttinen, 2011: 928).

When FITs were finally introduced in 2007, only peat was supported by the scheme. When the high carbon content of peat is considered along with its ten thousand-year lifecycle, the energy source is friendly neither to the environment nor the climate (WWF, 2011: 71). Thus, during the period under investigation, Finland was the only country in the world to have Feed-In Tariffs that encouraged non-renewables (peat), whilst also possessing no FITs for technological renewables, such as wind or solar (Lampinen, 2009: 53). Following the introduction of the Green League to the Government in 2007, FITs garnered support, with a working group for FITs established in November 2008 (Salo, 2012: 125). It was not until 2011, however – after the period under investigation here – that FITs were introduced for certain renewable energy technologies, and even then, these were targeted towards large-scale energy production, not individuals, houses or SMEs (Salo, 2012). Thus, while Finland possessed the institutional capacity to facilitate renewables development – such as *Tekes* – the state's reluctance to support new technologies inhibited renewables provision significantly.

5.2.2: The impact of Finland's policies

As a result of its lacklustre attitude towards technological renewables, Finland's electricity portfolio remained broadly unchanged throughout 2006-2010. As may be expected, consumption of peat had only dipped slightly by 2011 as a result of the price stability provided by the FIT (Statistics Finland, 2012). Technological renewables, such as wind and solar, were constructed at a much slower rate than in Germany or Sweden, despite showing some increases in output (Motiva, 2013). Lampinen (2009: 53) argues that the history of FITs in Finland has been a missed opportunity. Indeed, even by 2015, the energy content tax on heat will remain lower for peat than for other hydrocarbon fuels, aiding peat's continued role in the Finnish electricity mix (OECD, 2013: 85). As a result, "development of RE [Renewable Energy] particularly in areas such as wind power has lagged behind that of other European countries" (Aslani *et al.*, 2014 758).

In 2007, biomass amounted to about 40% and hydro power about 58% of renewable electricity production in Finland, but wind electricity was almost negligible (Rathmann *et al.*, 2009: 81). By 2011, only 2% of renewable electricity was sourced from wind in Finland; a figure significantly below that of Germany (OECD, 2013: 100). Yet, because of Finland's reputation as a technological pioneer, it was argued by one Greenpeace employee (Interview 26) that many citizens assumed Finland to be a pioneer in renewable technology construction too. As a result, many Finns failed to appreciate the need to change their lifestyles in order to reduce emissions, as they perceived their electricity source as climate-friendly already (Interview 25). Thus, Finland continued to produce significant quantities of biofuels from its vast forested areas, maintained peat consumption despite EU attempts to make the electricity source uneconomic, and sought to increase its nuclear energy provision. However, regarding advancements in technological renewables, Finland was a significant laggard during the period.

5.2.3: Why Finland pursued its policies

Given that Finland invested in R&D throughout 2006-2010, why was the state so ineffectual at introducing new renewables into its policy mix? I argue that there were three main reasons explaining Finland's apathetic approach to new technological renewables: a prioritisation of 'Cleantech'; a small domestic market that was struggling with an economic crisis; and urgency to consume peat during the late 2000s, before EU regulations prevented such possibilities. Rather than seeking to introduce new wind or solar technologies which could have provided jobs, Finland focussed on other research areas instead. Cleantech received investment in Finland much more than in the other case study states. The concept of Cleantech has a particular definition in Finland. As one interviewee from Greenpeace (Interview 26) argued, the concept relates more to filters and purification devices – essentially end-of-pipe solutions – than new products that produce few emissions in the first place. End-of-pipe solutions are outside the bounds of EM thinking, as they are associated with more command-and-control approaches, rather than a reliance on the innovative power of the market, and they can only reduce the pollution of existing, inefficient technologies, rather than providing newer, cleaner technologies from the start (Christoff, 1996: 101; Zannakis, 2009: 67). As a result, according to one National Coalition politician (Interview 28), when trading internationally, Finnish delegations often targeted their exports on developing states that were already high polluters, such as China.

Firstly, Finland focussed on investing in end-of-pipe technologies because of the structure of the Finnish economy. As Aslani *et al.* (2013: 505) note, the "Finnish economy is highly dependent on industrial products. The industrial sector represents more than half of the primary energy use and energy-related carbon dioxide emissions." In order to protect the jobs associated with these sectors, Finland sought to make these industries as environmentally friendly as possible, rather than introducing entirely new industries which would have taken investment money away from research areas already reliant on government support. The Prime Minister's Office (2009 *in* Teräväinen, 2010: 417) hoped that Cleantech could create new 'green Nokias' which could join metal, forest and IT industries as a supporting pillar for the economy. However, the scale of the metal and forest industries for a small population and economy meant that there was only so much that can be done to reduce Finnish emissions as long as these industries were protected. Any innovations which could achieve significant reductions were in the medium-to-long term, meaning that per capita emissions continued to stay high in Finland during the period (Järvelä *et al.*, 2012: 20). As such, while technological investment did take place between 2006 and 2010, it was to prop up older technologies, rather than innovating entirely new solutions that could have provided the biggest reductions and wider export opportunities. Modernisation, rather than Ecological Modernisation, was the dominant paradigm.

Secondly, the focus on more end-of-pipe solutions was not only borne from the industrial make-up of Finland, but also from the state's limited domestic market for solar and wind products. Finland's geography – featuring limited sunlight during winter and the long-standing (although increasingly dispelled) perspective that wind power was ineffectual – ensured that if Finland were to find a comparative advantage in a product it could put to use domestically, it would be end-of-pipe solutions rather than new products (OECD, 2003: 59). Moreover, with such a small population, Finland possessed a limited domestic market for new products, meaning that new companies were likely to struggle to establish themselves before seeking a more global audience (Interviews 26; 29; 31). A lead market is the core of the world market, where local users are early adopters of innovations (Beise, 2001); while mobile phone were an example of a lead market in Finland (Jänicke, 2005: 135), renewables technologies were not.

This challenge was further exacerbated by the ability of local homeowners to veto the construction of neighbours' solar panels, and the highly complex procedures involved in building wind turbines; these obstacles were not present in pioneer states, such as Germany or Sweden (Interview 23). As such, while energy production was diversified regarding organic renewables in rural areas, in urban areas – where large numbers of the population were increasingly based – it was difficult to utilise any form of renewable electricity technology. As a result, Helsinki, Finland's biggest city, remained highly dependent on a mountain of coal situated within its city borders to provide its electricity supply. During one interview with two Finnish Energy Ministry employees (Interview 23), the interviewees noted that it was difficult to think of any major Finnish companies working in the energy or climate sector, other than small companies or start-ups. While there is a perception that Finland exports a great deal due to its reputation in certain industries (Florida, 2011) – for example, IT or telecommunications – low carbon technologies were not a part of this export opportunity, due to the difficulty companies faced in selling products in the domestic market.

Thirdly, peat offered several significant advantages over new technological renewables, but only in the short-term, hastening support for the 'slowly renewable' energy source. While the Finnish state considered peat to be 'slowly renewable' (Eduskunta, 2005: 22), the energy source is actually as carbon-intensive as coal (WWF, 2011: 71). The most significant explanation for the support of peat was its domestic location, which meant that the energy source provided an easy means of fostering energy security, and the rural jobs created by the energy source. Due to increasingly ambitious international climate targets and EU efforts to end electricity production from peat, Finland needed to consume as much peat as possible, as quickly as possible. During the period, the EU ETS had significantly affected the affordability of peat already, making imported coal more appealing to electricity producers (Salo, 2012: 124). Thus, the FIT on peat was introduced in 2007 as a means of stabilising the price and consumption of the electricity source. With around 89,000km^2 of peatlands (Montanarella, 2006: 7), much of the energy supply would never be consumed unless exploited as rapidly as possible, before the energy source was banned (Interview 30).

Peat also offered electoral benefits. With Finnish politics highly regionalised, the location of peat specifically in rural areas ensured that supporting peat meant supporting agricultural voters; key demographics for several of the parties, but especially the Centre Party (Salo, 2012: 122). Thus, policy mechanisms that supported peat financially were identified as a vote winner with the rural electorate. Moreover, those industries both directly and indirectly reliant on peat were a powerful lobbying voice; a voice Bättig & Bernauer (2009) argue can become a veto player where acting collectively. The outcome was that peat was incentivised while new technological renewables were not, making Finland significantly less ambitious regarding its pro-climate policies than other developed states. Thus, as Teräväinen (2010*b*: 417) noted, "[a]lthough Finland has plenty of low-carbon technologies available, their utilisation has remained at a relatively low level."

5.3: Renewables Promotion in Germany

Boasson (2013: 56) argues that in Germany, climate policies are essentially part of an energy system transformation project. The term *Energiewende* or 'energy transition', dominated German electricity policy during 2006-2010 and was shaped by a faith in the role of new technologies and a desire for growth via exports of new products (Interview 2). *Energiewende* was first conceptualised in the mid-1970s as a response to the 1973 Oil Crisis, highlighting how values that favour technological development and capitalism have underpinned German electricity policy for decades (Interview 4). As such, a long-term approach to electricity policy has become engrained in the German political psyche, such that investments which create future exports are often seen as the actions of a responsible Government, rather than an expensive waste of money by current taxpayers, as may be the case in other states (Wurzel, 2010: 472). As Christoff and Eckersley (2011: 443) note, Germany has enacted "stringent climate regulation to force greater efficiency, environmental productivity, and environmental technological innovation as a new competitive strategy." In turn, as a result of long-standing previous policies, Germany has become locked into favouring ambitious renewables electricity policy, from which it would be difficult to change direction without an exogenous shock.

This section explores German renewables policies during the period, noting how the 1,000 and 100,000 Roofs Programmes set important precedents, before the introduction of one of the most ambitious FITs in the world. The FIT was passed as an 'accident', both due to the distraction of the run-up to a general election, and the expectation that the cost of the policy would be very low (Jacobs, 2014: 764). It will be argued that Germany's electricity policies during the period stimulated a revolution in the state's electricity portfolio, resulting in a dramatic increase in the amount of electricity produced from climate-friendly sources in just five years between 2006 and 2010. Finally, the factors that shaped Germany's highly ambitious approach will be detailed, noting the incremental policy culture that enabled Germany to build on previous ambitious policies, the desire of parties across the spectrum to be associated with the *Energiewende* paradigm, and the aspirations of individual policy-makers to be seen as climate friendly. Thus, investment in renewables in Germany became locked into policy-making, and was continuously consolidated by parties and individuals via positive feedback mechanisms. While the phase-out of nuclear energy also played a crucial role in encouraging renewable energy, as explored in the next chapter, the influence of EM in German policy-making was a vital component of German electricity policy.

5.3.1: Germany's policies

To explain Germany's policies during 2006-2010, it is necessary to understand the path that led to their creation. Even in the early 1990s, there was a federal energy research programme that committed over €1 billion to renewable electricity technology (Lauber & Mez, 2006: 108), which was led by an inter-ministerial working group, *Die Interministeriellen Arbeitsgruppe* 'CO_2 Reduction' (IMA), comprising five subject-specific groups and several different ministries (Watanabe, 2011: 75). The 1,000 Roofs Programme of 1991 was a broadly successful example of this programme and resulted in over 2,000 PV plants, but its expiration in 1995 led to an exodus of many of Germany's biggest PV manufacturers (Bechberger & Reiche, 2004: 50). However, having established the precedent for such campaigns, the 100,000 Roofs Programme established by the Red-Green Coalition sought to facilitate German PV manufacturing with a grant of €510 million that was expected to produce investments of around €1.3 billion (*see* Bechberger & Reiche, 2004: 50). Thus, prior to the period under investigation, Germany was investing in electricity policy as a means of providing medium- and long-term economic growth. As

Environment Minister Trittin (*in* Jaggard, 2007: 333) argued in 2002, "[w]ith the Government's help, solar power stations will become Germany's export hit of the future. This will benefit both climate protection and the economy." As the number of jobs in the 'eco-industrial complex' swelled throughout the 2000s (Weidner, 2002: 153), and Germany's international leadership in the area became consolidated, Environment Minister Sigmar Gabriel was able to point to the economic success of the 'climate protection industry' as a means of enabling Germany to play a more influential role at the global level (*see* Wurzel, 2010: 475). By demonstrating the positive effects of ambitious renewables policy, other states may have been encouraged to follow Germany's lead.

The single most important method for incentivising renewables provision in Germany was the introduction of Feed-In Tariffs as a support mechanism. This policy decision possessed a long legacy in Germany, having first arisen out of the 1991 StrEG outlined in Chapter 4, which compelled utilities to remunerate producers of green electricity at 90% of the retail rate (*see* Frondel *et al.*, 2010: 4049). The decision to introduce the StrEG was facilitated by its reading in the final session of the German Parliament before the next election, meaning that the normal consultation process was not followed in full and many politicians were busy campaigning in the election (Jacobs, 2014: 764). Pioneering and the first of its kind to be become a law in Europe, a number of weaknesses in the StrEG were addressed by the EEG in 2000, in which geothermal power, mine gas and offshore wind were added to the previous list of supported electricity sources (Jacobs, 2012: 45; 2014: 758). Crucially, a fixed tariff was introduced, guaranteeing prices for a twenty-year period, while renewable sources were given a priority purchase obligation by local grids (Bechberger & Reiche, 2004: 52).

Since 2000, the FIT has been built upon incrementally by three more amendments in 2004, 2009 and 2012 (Jacobs, 2012: 40). The governments of 2006-2010 had already been set on a path to ambitious renewables policy by the actions of previous policy-makers. As Garud *et al.* (2010: 760) argue, "[o]nce locked in [with a policy], actors cannot break out unless exogenous shocks occur." No such 'shock' occurred – as was the case with Austria's 'Alliance of Payers' – so

Germany built upon its FITs year on year. Indeed, the policy became so ‘fixed’ that by the late-2000s, investment in renewables and the associated twenty-year price guarantee ensured that Germany may be paying more than market rate for its electricity until the late 2020s (*see* Frondel *et al.*, 2010). However, with the cost of the FIT to each monthly household bill around just €1.01 a month in 2008 (Landler, 2008), Germany, one of the richest states in the world, could afford to pay for such innovative practices in exchange for the resultant impacts of the policy on the German electricity portfolio. As such, while it must be acknowledged that German policy was not flawless – federal subsidies for hard coal were still €1.9 billion a year in 2008 (Karapin, 2012: 19) – Germany became a global pioneer in renewables policy, as will now be seen.

5.3.2: The impact of Germany’s policies

The effects of the FIT were significant; annual photovoltaic installation increased from 850 MW in 2006 to 7,400 MW in 2010 (Mayer, 2013). Such a dramatic increase not only challenged long-standing German assumptions that renewables could ‘never’ contribute significantly to the energy mix (Interview 2) but placed Germany at the forefront of global renewables policy, with a PV market that became the largest in the world in 2004 and double the size of the previous leader, Japan’s, (Lauber & Mez, 2006: 110-112). As a result, Germany’s FIT soon became best practice and was copied extensively across Europe (Jacobs, 2012: 80). One BMU official (Interview 3) suggested that other states felt that Germany may have been seeking economic advantage as well as environmental protection through its ambitious FITs. However, the development of renewable electricity technology to around 20% of the German energy supply in the space of just over a decade, in conjunction with the creation of hundreds of thousands of jobs, demonstrates the success of the model (*in* Wurzel, 2002: 10-11). Germany was at the forefront of climate policy globally, both for policy outputs and also outcomes. Indeed, one Green Party official (Interview 5) argued that although FITs were the tool that enabled the German renewables revolution, no-one knew the FITs would be so successful at the start.

The downside to the policy, however, was also its defining feature; the inclusion of a price guarantee over a fixed, twenty-year period. With renewables expected to become cheaper and more efficient over time with the improvement of technology, by building so much renewable capacity while prices were high, Germany became locked-into large annual electricity costs (Umbach, 2014). With investment in renewables taking place potentially at the peak of their price in the mid-2000s, Germany may have increased the likelihood of creating electricity poverty and inflicting the adverse effects of high prices on smaller businesses. At the very least, representatives from the CDU/CSU, SPD, Greens and environmental think-tanks all agreed that the policy was much more successful than had been anticipated (Interviews 1; 2; 3; 5; 6). Two civil servants (Interviews 3; 4) suggested that the continuation of FITs despite their high cost was Germany's gift to the world; an act of benevolence as well as effective policy-making. As such, it can be argued that FITs transformed Germany's electricity infrastructure, but by 2006 to 2010 it had become an almost unstoppable measure that was politically more difficult to restrain than to continue. Germany was locked into ambitious renewables policy, despite the high costs that would result.

5.3.3: Why Germany pursued its policies

In Germany, the original FIT of 1991 was built upon incrementally over time, unlike in Austria, where ambitious policies were reversed after having been introduced. This policy development can be understood with greater clarity through the application of path dependence as a concept (Garud *et al.*, 2010; Magnusson & Ottosson, 2009). Unlike in Austria where the institutionalised vested interests of the Social Partnership were powerful enough to oppose the FITs once these interests realised how effective the FITs were, in Germany, those who did oppose the policy were limited in both number and capacity to affect change. Indeed, by 2010, over 367,000 jobs were dependent on the renewables sector (Hillebrand, 2013: 668); any opposition to the development of renewables (especially in the context of a state that was seeking to phase-out nuclear power) would have been unpopular with significant numbers of voters. The paradigm of Ecological Modernisation and concept of path dependence explain Germany's climate policy ambition and are explored in turn. Unlike in Austria and Finland, where the concept of EM was neglected or misapplied respectively, in the case of Germany, narratives similar to EM, such as ‘ecological industrial policy’ (*see* Wurzel, 2010: 471), ‘energy transition’ (Umbach, 2014), and the concept of EM itself (Hillebrand, 2013) became recognised conceptual frameworks around which elite policy-makers based policy decisions. Thus, EM principles became locked into German policy-making over a twenty-year period, and were reinforced by positive feedback mechanisms, ensuring that Germany was a pioneer in renewables technologies by 2006-2010, and stood to benefit from reducing GHG emissions significantly.

The themes of technological innovation and economic growth underpinned Germany’s renewables policy throughout 2006-2010. Klaus Töpfer is credited as being the first Environment Minister to advocate explicitly the use of the concept of Ecological Modernisation as an action-guiding norm during his term in office between 1987 and 1994, which included the introduction of the StrEG in 1991 (Jänicke, 2011: 133; Wurzel, 2010: 463). By 1999, the need for innovative energy technologies to drive the German economy was being voiced across the highest echelons of Government and across parties, with Chancellor Schröder (*see* Bang Søfting, 2000: 13) arguing that “if we do not embark upon climate protection now, we will lose the markets of the next century.” Indeed, by 2002, even the trade unions – in sharp contrast to their attitude in the 1970s – generally supported the principles of EM, expecting positive synergies of environmental protection and job creation (Weidner, 2002: 180).

According to two CDU employees (Interview 1), during 2006-2010, the CDU’s Bavarian counterparts, the CSU, were particularly supportive of EM principles as their agrarian voters were likely to benefit from investment in renewables that would most likely be allocated to their regions. For supporters of the SPD, Sigmar Gabriel was responsible for transforming high-tech economic growth into a mass concept (Interview 6; Jänicke, 2011: 129). More specifically, Gabriel’s (2008) book – which argued in favour of ‘ecological industrial policy’ – catapulted EM principles into the mainstream. From 2008, renewables installation increased dramatically in Germany (Mayer, 2013). The technological preferences of this ecological industrial policy matched well with the SPD's coal- and industrial-heartland as it offered a means for their supporters to keep their jobs whilst also reducing emissions via technology, such as Carbon Capture and Storage (Interviews 1; 6). Yet, while it may be expected that the two main parties would seize the catch-all concept of EM, the support shown by the Greens highlights the popular status of the paradigm by 2006. With the battle between Realos and Fundis in Germany long since over in favour of the former wing, the Greens of 2006-2010 were as pro-market and pro-technology as any of the other parties, as one Green Party employee acknowledged (Interview 5). Even under the centre-right coalition government of 2008-2013, the CDU Environment Minister, Norbert Röttgren (*in* Jänicke, 2011:135), argued in his first speech in the *Bundestag* that through the use of "ecological modernisation we want to be the most modern national economy". As such, policies favouring high-tech economic growth were supported across the political spectrum, ensuring that policy decisions founded upon EM were sure to be successful in the German legislative process.

As well as supporting and increasing the jobs that were dependent on investment in renewables, Germany also sought to act as a pioneer (*Vorreiterrolle*) as a means of encouraging other states to make significant reductions. By unilaterally cutting emissions, German policy-makers sought to encourage neighbouring states to reduce emissions without fear of being exploited by free-riders, or losing competitiveness internationally. In 2007, Germany exploited its roles as President of the EU G8 to push for greater commitments to GHG reductions across developed states (Jänicke, 2011: 135). Having built up a world-leading renewables sector, Germany stood to benefit significantly from more GHG emissions reductions in other states (Jänicke, 2011: 137). With first mover-advantage, Germany would be able to export technology, trained experts and products to other states, thus providing significant economic growth to the staff. As a result, the dominance of EM principles in German renewable electricity policy necessitated that the state reduce its own GHG emissions as a means of encouraging other states to do so, in order to create an export market for its pioneering renewables sector.

Due to the long-term nature of electricity policy – in which large investments and infrastructure periods are required before outcomes can be felt – it would be almost impossible for policies implemented during 2006-2010 to have been so successful without having built on previous policy decisions. As Weidner and Mez (2008: 357) have concluded, by 2008 there had been "20 years of positive path dependency… [during which time] Germany has sustained a climate leadership role." The critical juncture that catalysed these twenty years of positive path dependency was the 1991 StrEG detailed above. Interviewees across the German political parties (Interviews 1; 5; 6) agreed that the introduction of FITs was crucial to the leadership Germany expressed between 2006 and 2010. Yet, at the time, opponents to increased technological renewables, such as other energy industries, failed to take the policy seriously, as it was widely perceived that renewables would never generate more than 1% of German electricity demands (Interview 2). The path-breaking EEG of 2000 under the Red-Green coalition would not have been possible were it not for the introduction of the StrEG a decade earlier. As such, although the CDU/CSU criticised the continuation of the FIT when it was in opposition, the mechanism was retained when the party re-entered Government because of the job creation it enabled, highlighting the extent to which FITs had become locked into German policy-making (Lipp, 2007: 5488).

As a result, path dependence provides an effective analytical concept for understanding the long-term relationship between EM and renewables policy in Germany (Interview 4). The 1991 StrEG was only passed because policy-makers were distracted by the forthcoming general election, and perceived that the costs of the policy would be minimal (Jacobs, 2014: 764). This event acted as a critical juncture, upon which incremental policy developments were built. These policy developments received cross-party support because the renewable electricity sector had become a burgeoning and world-leading industry. Germany relied upon the renewables sector as a source of jobs, and Germany's climate programme was estimated to have generated a net surplus of €5 billion by 2011 (Jänicke, 2011: 1390. As Jänicke (2011: 137) states, in Germany, "climate change policy has become an economic success story." Meanwhile, with membership of environmental NGOs in Germany standing at around five to six million people, a pioneering renewables industry was a vote-winner for many German citizens. These conditions acted as positive feedback mechanisms which locked Germany into a policy approach that continued to favour investment in renewable technologies. Safe in the knowledge that ambitious climate policies would not only create jobs in Germany but also act as a reassurance for other states to formulate their own ambitious climate policies, it was in Germany's interests to become a climate policy pioneer in order to support its own economy. Thus, path dependence can be used a concept to trace how EM was introduced in 1991, steadily reinforced through positive feedback mechanisms, and resulted in Germany being incentivised to develop more ambitious climate policies.

5.4: Renewables Promotion in Sweden

By 2006 Sweden had halved GHG emissions from electricity and district heating compared to the levels produced in the 1970s, as a result of an electricity portfolio dominated by hydro power (45%) and nuclear (44%) (Regeringskansliet, 2009: 20-21; Sarasini, 2009: 639). Electricity production was thus almost carbon-free by the start of the period under investigation. The intention to phase out nuclear power, as explored in the next chapter, partly explains why Sweden sought to increase production of electricity from renewables. However, the desire to create jobs, increase exports (of both technology and electricity) and improve domestic electricity security made powerful incentives for investing in renewables. This section on Sweden is broken into three parts. Sweden exhibited a variety of policies with which to improve renewables provision, of which the Electricity Certificate System (ECS) stands out as the most crucial for encouraging renewables (Bergek & Jacobsson, 2014). However, the ECS would not have been as ambitious or necessary without the pioneering Carbon Tax, which had incrementally increased the cost of producing a ton of CO_2 since its creation in 1991, yet had only been introduced originally as a means of reshaping the tax system. The introduction of the Carbon Tax was thus the critical juncture in the development of Swedish renewables policy. The second section details how these policies influenced renewables provision, finding that the expansion of wind provision was a particular success for Sweden. Finally, the reasons why Sweden favoured a significant increase in renewables provision will be explained, looking at the role of EM as an influential concept in the policy process. Although Sweden did not develop FITs like those of Germany, Sweden's equivalent – tradable certificates – were introduced in 2003 and were crucial to the encouragement of technological renewables development during the period under investigation. Path dependence will then be employed to trace the development of Swedish renewables policy, from the critical juncture of the Carbon Tax, the positive feedback mechanisms of economic growth and job creation, and the impact of Sweden's strong renewables sector on its climate policy.

5.4.1: Sweden's Policies

Prior to the period under investigation, Sweden had introduced a Carbon Tax, in 1991, which sought to redistribute Sweden's existing taxation system during one of its heaviest recessions (Lundquist, 1998: 237). Perceiving the need to address inflation, income taxation was cut significantly (IEA, 2004: 7). "To cover the losses in state income following the radical cuts in direct income taxation, the government began to tax fuels and products posing potential hazards to environmental quality" (Lundquist, 1998: 237). This 'green tax exchange' (*skatteväxling*) was more to do with reducing the tax burden than protecting the climate. Indeed, Fisher and Berglund (1994: 316) argue that there was no Swedish study suggesting the imposition of such a tax, further supporting the argument that the tax was introduced as a stop-gap whilst seeking to lower taxes. The result was the Carbon Tax, introduced in 1991 (SFS 1990: 582). With the election of the centre-right coalition in 1991, there was a further tax reform in 1993 within the critical antecedent of the economic crisis that reduced the ambition of the carbon tax (Sarasini, 2009: 649). The tax rate per tonne of CO_2 grew steadily (except for a brief reduction in 1993), from 250 Krona in 1991 to 910 Krona in 2005 (Friberg, 2008: 169). Thus, by the period under investigation, production of GHG was a highly costly process in Sweden, with much having already been done to avoid the emission of CO_2, particularly in the electricity sector.

By 2006, Sweden possessed over 700 large hydro power stations (Wang, 2006: 1211). Therefore, it was almost impossible to expand hydro power generation into ‘untouched rivers’ (Zannakis, 2009: 138). Similarly, Sweden’s geography ensured that solar panels would be ineffectual in the state (Interview 9). As such, biofuels and wind turbines offered the greatest potential for renewables development in Sweden, in order to avoid costs through the Carbon Tax, and create domestic jobs and export opportunities. As Zannakis (2009: 104) argued regarding the mid-2000s, “Sweden more and more constructs climate change as an Opportunity rather than a Sacrifice.” Wind power was encouraged through a variety of policies between 2006 and 2010. These policies can be categorised into two; smaller policy decisions designed to improve the existing renewables infrastructure, and the tradable certificates programme that underpinned much of the Swedish renewables sector.

Firstly, decision-making on turbines in Sweden was already highly decentralised prior to 2006, essentially giving veto power to those affected locally by the installations. As Söderholm & Petterson (2011: 523) argue, decentralised decision-making made offshore wind production much more favourable than onshore installation. Therefore, relying on the market to determine whether people would choose to pay for wind-power and accept the construction of turbines in their local area would not be effective for increasing wind provision; state intervention was a necessity (Ek, 2005: 1688). The 2009 national planning framework sought to increase wind-power to 30 TWh by 2020 (20 TWh onshore, 10 TWh offshore) in order to support municipal planning. Without subsidies, however, the Swedish wind market was perceived as too unstable to be worthy of investment (Wang, 2006: 1217). The Alliance government met this challenge by investing SEK20 million directly into a network for wind producers each year (Rudberg *et al.*, 2013: 3). Bills aiding the connection of wind-power to the national grid (2009/10: 51) and simplifying the concession granting process (2008/09: 146) further introduced stability into the domestic wind market. However, the Electricity Certificate System was the most crucial component of the development of renewables in Sweden between 2006 and 2010.

Sweden pursued a different approach with regards to incentivising renewables when compared to the other three case studies; unlike the FITs of Austria, Finland and Germany, Sweden employed a quota-based Electricity Certificate System, in a similar manner to Belgium, Poland and the UK (Interview 9; Fouquet & Johansson, 2008: 4080). There are numerous pieces of research seeking to determine which method is more ambitious (Bergek & Jacobsson, 2010; Fouquet & Johansson, 2008; Haas *et al.*, 2011; Van der Linden *et al.*, 2005). However, I argue that it did not matter which of the two methods was employed; the extent of the funding available and breadth of electricity sources supported by the mechanism were of much greater importance. The Swedish ECS came into force on 1 May 2003, as a result of an inter-party agreement between the governing Social Democrats, the Centre Party, and the Left Party (Van der Linden *et al*., 2005: 34). After a first assessment by the Swedish Energy Agency in November 2004, the scheme was revised in 2006 with regard both to goals and design.

Throughout the period, the system relied on two main components; the right of certain electricity producers to receive certificates, and a quota obligation creating the demand for such certificates (Bergek & Jacobsson, 2010: 1258). Electricity production was thus divided into two groups: certified production included peat (as in Finland, but unlike Finland, with the addition of other energy sources), biofuels, geothermal, solar, wave, hydro power and wind; while the non-certified categories were fossil fuels, nuclear and even some pre-existing large-scale hydro, which received certificates for the part of production stemming from capacity upgrades (Fridolfsson & Tangerås, 2013: 58-59). These certificates could be traded on a certificate market, thus creating an income stream for those with excess certificates, while those that did not meet their obligation paid a penalty to the state. Each year by 1st April, all obligated buyers were required to submit certificates corresponding to a certain quota. Originally, this quota referred to the electricity consumers' consumption, but in the 2006 revision, it was moved to the electricity suppliers' production (Bergek & Jacobsson, 2010: 1258). The 2006 revision also increased the target amount of renewable energy production in comparison to 2002, from 10 TWh by 2010 to 17 TWh by 2016, with certificate validity extended to 2030 (Sarasini, 2013: 484). From here, the ECS was further expanded in 2009, such that consumers were required to buy renewables certificates corresponding to 15.1% of their electricity use (*see* Regeringskansliet, 2009: 42). Furthermore, the 2010 Bill (2009/10: 1335) extended the existing System until 2035, in line with the EU's 20/20/20 targets and Renewables Directive (*see* Söderholm & Petterson, 2011: 521; Statens Energimyndighet, 2010: 10). Thus, regardless of relative strengths of FITs and the ECS, Sweden ensured that its ECS was highly ambitious and supported adequately.

5.4.2: The impact of Sweden's policies

The above policy process – from inception in 2003 until the end of the period under investigation – shows that the Swedish ECS was reliant upon pre-existing policy prior to 2006-2010 for its success, yet the System continued to be improved as the state was already locked into supporting renewable technologies (Garud *et al.*, 2010; Magnusson & Ottosson, 2009). While it must be acknowledged that there were some windfall profits during the first two years of the scheme (Haas *et al.*, 2011: 1023), overall, the System was effective in encouraging renewables provision. While the ECS favoured biofuels most of all – thus resulting in a significant increase in biomass-based Combined Heat and Power (Uba, 2010: 6675; Van der Linden *et al.*, 2005: 34) – wind power still saw significant increases throughout the period. Wind electricity production stood at 936 GWh in 2005, but grew dramatically to 3,502 GWh in 2010, and 6,078 GWh in 2011 (Energimyndigheten, 2012); such an increase marks an incredible rise in wind provision in a short period of time. The System was seen as being cost-effective, as a result of its market-based foundations and the wide variety of energy sources that it supported. Thus, the ECS has been widely identified as the key method for shaping electricity development during the late 2000s in Sweden (Regeringskansliet, 2009: 40; Sarasini, 2013: 484). As the primary weakness of the Finnish use of FITs was the inclusion of peat, it must be noted that Sweden also included the energy source for its ECS from April 2004 onwards (Van der Linden *et al.*, 2005: 39). However, unlike Finland's FIT, which solely supported peat for several years, the wide range of other electricity sources supported by the Swedish ECS ensured that technological renewables provision increased significantly during 2006-2010.

5.4.3: Why Sweden pursued its policies

I argue that policy-makers in Sweden were encouraged to invest in renewable technologies as a means of facilitating capitalist economic growth, in line with the principles of EM. The 1991 Energy Policy Bill that saw the introduction of the Carbon Tax was designed to create a long-term platform for sustainable political decisions regarding energy policy (IEA, 2000: 19) and laid the foundations for what would become the 1997 Energy Act (Wang, 2006: 1212). Yet, the legacy of the Tax continued significantly beyond 1997. As such, path dependence will be used to isolate the processes through which ambitious renewables policies were incentivised, from the critical juncture of the Carbon Tax in 1991 and via positive feedback mechanisms. As a result of the strong renewables industry, especially regarding wind turbines, Sweden was encouraged to formulate more ambitious climate policies, both as a means of supporting its own domestic industries, and also encouraging other states to develop their own climate policies.

Sweden is a social democratic state, yet its economy is dependent upon an open and ambitious approach to international trade (Blyth, 2001: 7). Renewable electricity technologies and electricity were both potential exports with which to support the Swedish economy. Indeed, one Swedish Energy Agency employee (Interview 9) noted the 'huge surplus of electricity in future' that could be exported or sold as part of Nord Pool as a key factor in explaining Swedish renewables ambition. Underlining his support for technological investment, Moderate Prime Minister Reinfeldt stated alongside European Commission President Barroso that climate change could be a 'profit machine' for Sweden and Europe more generally (Sarasini, 2009: 645). Such statements emphasise the pro-market foundations of Sweden; the state invested in renewable energy technology prior to and throughout 2006-2010, which in turn supported the state's exports across the world (Regeringskansliet, 2011). Wind power was thus incentivised significantly within Sweden, with the view that technological advances would enable export-led growth in the future. *Vattenfall*, for example, Sweden's largest wind turbine manufacturer, was owned by the Swedish government, enabling the state to use the company as both a means of driving domestic renewables provision and increasing exports (Vattenfall, 2012). During interviews with policy-makers, this requirement for both ambition and cost-effectiveness was highlighted explicitly. One Moderate (Interview 8) politician argued that "[i]t's an obligation for us as policy-makers to set ambitious goals, but the cost must be acceptable." Thus, the argument that constructing greater numbers of renewables would not only be cost efficient (Bergek & Jacobsson, 2010: 1257) but actually serve as a source of growth was pivotal in the support felt for renewables, particularly under the pro-business agenda of the Centre-Right Coalition.

Having created a strong first-mover renewables sector – particularly with regards to wind turbine development – Sweden stood to benefit not only from developed its own ambitious climate policies, but also from encouraging other states to pursue a similar path. Firstly, having developed a pioneering renewables industry, by formulating ambitious climate policies, Sweden could assume the role of 'good international citizen' (Zannakis, 2009: 159) and also profit from investing in renewables in the knowledge that it would be creating jobs within its own borders by doing so. Furthermore, one of the most significant barriers to climate policy ambition is a concern on the part of policy-makers that other states will not seek to reduce emissions in any significant manner, thus potentially harming their own economies. By assuming a pioneer position, Sweden could encourage other states to reduce emissions by formulating highly ambitious policies of its own. In doing so, Swedish policy-makers were confident that Swedish renewables technologies could be exported to states seeking to reduce their emissions (Friberg, 2008: 170; Regeringskansliet, 2009: 19; Statens Energimyndighet, 2010: 12; Zannakis, 2009: 246). As a result, by developing pioneering climate policies, Sweden stood to gain financially as a result of its technologically-advanced, pro-capitalist renewables sector.

During 2006-2010, Sweden was already locked into a path that favoured ambitious climate policy, as the Carbon Tax had enabled the state to meet previous goals comfortably, such as the Kyoto Protocol targets, whilst also creating an incentive to reduce further emissions in future. Thus, the Carbon Tax may be seen as a critical juncture which facilitated the development of ambitious renewables policies. The Carbon Tax was introduced as a means of recalibrating Sweden's tax system, rather than being a world-leading climate policy; however, path dependence enables the process from which this modest beginning led to pioneering climate policy to be understood. The ECS was introduced in 2004 in order to facilitate investment in renewables, which could enable the economy to grow and avoid carbon production that would be costly as a result of the Carbon Tax. By 2006-2010, the production of CO_2 was highly disincentivised, because of the Carbon Tax, while renewables were encouraged strongly, due to the ECS. Thus, policy mechanisms that had the potential to be unpopular or expensive had already been introduced; the formulation of stringent emissions reductions goals during 2006-2010 maintained the path that had already been set for the Alliance government. Indeed, positive feedback mechanisms ensured that Sweden was locked into formulating ambitious renewables regardless of the parties in government. By creating tens of thousands of jobs, developing an export opportunity and satisfying the demands of an environmentally-aware populous (Eurobarometer, 2009: 8), Sweden was incentivised to continue investing in renewable technologies. Similarly, environmentalists who favoured ambitious climate policy for environmental reasons strengthened Sweden's ambitious position (Interview 13). As a result of the world-leading renewables sector by 2006-2010, Sweden was incentivised to formulate pioneering climate policy not only as a means of creating a market for its own products, but also to encourage other states to develop their own ambitious climate policies, which could act as new export markets for Sweden's world-leading renewables sectors.

5.5: Discussion

In order to understand the impact of the principles of EM on renewable electricity policy, it is beneficial to apply the concept of path dependence. Application of path dependence enables the identification of critical junctures, from which states can be locked into a certain policy approach. Positive feedback mechanisms then consolidate this approach, and strengthen it incrementally as time passes. Over time, the policy approach becomes consolidated to the point that it is almost impossible to reverse the original decision. I argue that path dependence is a particularly useful concept for considering how EM principles can influence renewables policy, and in turn encourage a state to become a climate policy pioneer. Path dependence will now be employed to explain ambitious climate policy in Germany and Sweden, before showing how Austria and Finland were not locked into such approaches (if anything, Austria and Finland were locked into preferences for biofuels and peat, respectively). In this chapter, I argue that path dependence may be used to see how states can become locked into paths that *facilitate* climate policy ambition, while Chapter 6 demonstrates how states can become locked into paths that *hinder* climate policy ambition.

In Germany, the introduction of FITs via the StrEG in 1991 was a critical juncture. The policy agreement was only possible because politicians at the time were both distracted by the upcoming general election and also perceived the costs of the policy to be insignificant. With the creation of jobs, the production of potential exports, the possibility of increased energy security, and the support of one of the world's largest environmental movements, the German state was shaped by positive feedback mechanisms that encouraged the FITs to be strengthened over time. As a result, by 2006-2010, "EM was in all aspects of society" (Interview 4). As such, the FITs became stronger and more ambitious, resulting in the construction of more renewables, thus creating more jobs, more exports, more energy security and more support from the environmental movement (Jänicke, 2011: 137-138). Thus, by 2006-2010, Germany had transformed its electricity sector, and decoupled economic growth from energy consumption. The state was able to formulate more ambitious climate policies, knowing that by doing so, these positive feedback mechanisms would continue. Moreover, Germany could act as a pioneer state (*Vorreiterrolle*), thus encouraging other states to reduce their emissions, creating a larger export market, which in turn still further strengthened the development of renewable technologies. As noted by German civil servants (Interviews 3; 4), Germany's FIT policy had become so ambitious it was almost uneconomical, demonstrating the extent to which the policy had become locked in.

A similar situation occurred in Sweden; the introduction of a Carbon Tax locked Sweden into a path that encouraged significant expansion of renewables, which in turn facilitated more ambitious climate policy (Interview 10). The 1991 Carbon Tax was only passed as a small detail in a tax reform, and like the FIT in Germany, it was expected that the policy would not create significant costs for the state. The policy necessitated emissions reductions, while the ECS was subsequently introduced to facilitate the construction of renewables with which to reduce these emissions. As a result, the Swedish renewables sector was encouraged to grow, creating jobs and exports – particularly wind turbines – and garnering the support of an environmentally-conscious electorate, which acted as positive feedback mechanisms. As a result, the Carbon Tax was incrementally increased, while the support for renewables via tradable certificates was also strengthened (Interview 11). By 2006-2010, Sweden had expanded its renewables portfolio and also created a comparative advantage in a potentially lucrative sector. Moreover, by 2005, the Swedish economy had grown by around 36% on 1990 levels, suggesting that the state was able to decouple emissions from the economy via a policy that was calibrated to a highly efficient level; the tax was not so high as to damage the economy significantly, and not so low as to have no effect on emissions (Regeringskansliet, 2007). By creating ambitious emissions reductions targets, Sweden sought to encourage other states to reduce emissions in the knowledge that its renewables sector would be likely to benefit from such policies. As a result, Sweden was locked into a path that facilitated renewables development via improved technology and capitalist growth, whereby it was in the state's interests to reduce emissions and encourage other states to do likewise.

Austria and Finland were not locked into paths that facilitated investment in renewables according to the principles of EM. Austria introduced a FIT in 2002 but then reduced the amount of funding available, thus weakening renewable electricity expansion significantly. Regarding a carbon tax, as Lauber (1997: 85) states, "[i]n 1995, all political parties discussed the ecological tax reform intensively; however, the subsequent political crisis over the budget buried this discussion." An electricity tax was introduced, but with a ceiling in order to protect competitiveness, while an eco-tax has not been introduced in Austria (Hausknost, 2007; Wurzel *et al*., 2003: 70). In Finland, a Carbon Tax was introduced in 1990, but it was steadily weakened, with the Finnish government losing confidence that the EU would introduce a Europe-wide tax, meaning that Finland's competitiveness would be damaged if it acted unilaterally. In addition, Finland failed to introduce a FIT until 2007, and even then, the mechanism only supported peat rather than renewables. As a result, neither state became locked into paths that facilitated investment in technological renewables, and thus, neither state would benefit economically in the short-term by encouraging other states to develop ambitious climate policies. Therefore, neither state was encouraged to develop ambitious climate change policies as a result of their renewable electricity sectors.

The presence of EM as a dominant discourse in electricity policy is difficult to code in fsQCA terms, hence its omission from the fsQCA in Chapter 3. Indeed, without in-depth research of the other nineteen states in the UNFCCC Annex II, it is difficult to hypothesise how far EM was a contributing factor to climate policy in other developed states during 2006-2010; this area merits further research. However, it may be argued that this thesis makes an original contribution to the literature by positing that although EM may be unable to prevent catastrophic climate change in the long-term – technological dependence and increasing levels of consumption are significant weaknesses (*see* Gouldson & Murphy, 1997; Pearce & Barbier, 2000) – at the first (yet belated) stages of concerted responses to climate change, such as 2006-2010, EM offered a means of fuelling ambition by facilitating significant structural changes in the energy sector. With the electricity sector one of the largest producers of GHGs, such success enabled – or indeed necessitated – policy-makers to develop even more ambitious climate policy goals, such as Sweden’s 2009 Climate and Energy Bill, and Germany’s 2010 *Energiewende* programme. Having already succeeded in transforming a crucial part of the economy – electricity production – German and Swedish policy-makers could more confidently aim to reduce further emissions in the future, while Austria and Finland continued to be shaped by older paradigms favouring organic renewables and either nuclear power or fossil fuels. Although it is unknown how effective EM would be as a means of mitigating climate change in the long-term, the paradigm was an effective means of creating pioneers during 2006-2010, which then could seek to encourage other states to formulate more ambitious policies. Thus, the principles of EM may be considered as potential catalysts for locking developed states into paths that facilitate climate change mitigation policies in the future.

5.6: Conclusion

This chapter has examined each of the four case study states' approaches to renewable electricity promotion. I argue that if a state is able to develop a large and increasing share of technological renewables in its energy portfolio, it is more likely to formulate ambitious climate policy. In so doing, it has been found that in Austria and Finland, technological innovation regarding energy policy was not pursued successfully. In Austria, it was difficult to identify any form of modernisation approach during 2006-2010, with an effective FIT scheme rolled back in 2006 despite (or indeed, as a result of) being successful in dramatically increasing the provision of high-technology renewables. Austria's Social Partnership was a particularly significant factor in this retrograde step, with none of the institutionalised interests favouring technological renewables. As one Greenpeace climate policy spokesperson (*in* Brand & Pawloff, 2014: 788) has been quoted as saying, "[t]here is no environmental representative in the social partnership". The only voice that supported renewables in Austria was the Chamber of Agriculture, but primarily this support was manifested through the use of subsidies to support farmers' biofuels; a group that, in reality, was more of a competitor to renewable electricity technologies than a facilitator. As such, support for technological renewables was a hallmark of ambitious states with regards to climate policy, but the pursuit of organic renewables represented a less ambitious approach to energy policy, and even facilitated the weakening of technological renewables policy.

In Finland, the desire to support cheap and domestically plentiful peat ensured that FIT support throughout much of the period under investigation was only available to one climate-damaging energy source. Meanwhile, end-of-pipe technologies were favoured over wholly new electricity forms, such as wind turbines or solar, due to the nature of the Finnish economy, which relied significantly on heavy industry and lacked a significant domestic market for renewables technologies due to its small population and inhospitable geography. Thus, Finland may be argued as having pursued Modernist, but not Ecological Modernist, policies, challenging the argument of Dryzek *et al.* (2013: 98) that the Nordic states were climate policy pioneers due to their preference for policies based on EM.

Germany and Sweden were particularly effective in encouraging the development of high-tech electricity solutions between 2006 and 2010, with the benefits of economic development a key factor in both states. In Germany, FITs provided an effective means for Germany to incentivise renewable electricity provision and also become a world leader in renewable electricity technology, thus creating hundreds of thousands of jobs. FITs had played a key role in German electricity policy since 1991, enabling the governments of 2006-2010 to build on existing legislation. As Hillebrand (2013: 677) noted in 2013, "[f]or more than 20 years, successive German governments have been committed to an EM strategy as a means of addressing the problem of climate change." Between 2006 and 2010, German renewable electricity provision increased significantly, and was so locked in that investments in renewables became almost inefficiently expensive (Umbach 2014).

In Sweden, climate change was identified as an opportunity for growth, both in terms of renewable electricity technologies that could be exported – such as wind turbines produced by *Vattenfall* – and surplus electricity that could be sold in Nord Pool. The legacy of the 1991 Carbon Tax incentivised a robust approach to emissions reduction, which facilitated the creation of the 2004 ECS. Thus, by 2006-2010, the production of GHGs was taxed heavily, while investment in renewables technologies was financially encouraged. Sweden was already on a path to ambitious renewables policy, and the dominance of pro-growth attitudes towards renewables ensured the existing policies remained 'locked in'. Thus, both states dramatically increased their provision of technological renewable electricity, particularly through new technologies which could also serve as a means of providing economic growth.

Having obtained these empirical findings, it was necessary to theorise a common explanatory variable that could be used to explain why Swedish and German renewables provision increased so significantly when compared with Austria and Finland. I argue that the principles of Ecological Modernisation were crucial in influencing attitudes towards renewables in Germany and Sweden, engendering a cross-party desire for high-tech energy solutions with a view to facilitating economic growth. Indeed, according to one German Green Party official (Interview 5), "[f]or us,

[EM] was the defining feature – it led all our politics.” For both Germany and Sweden, however, it was crucial that EM had influenced policy-making for a number of years. Both states were locked into supporting new renewables technologies as a result of previous ambitious policies; while Germany’s FITs incentivised solar power, Sweden’s ECS was particularly effective in encouraging wind power. Thus, pioneering policy outputs during 2006-2010 must be viewed through the concept of path dependence, whereby the pioneers became locked into policy approaches that facilitated more ambitious climate policy. In Austria and Finland, however, such values did not dominate the states’ approaches to electricity policy, such that Austria maintained the status quo by supporting biofuels with subsidies, but barely strengthened its technological renewables provision, thus leaving the state dependent on imported fossil fuels for electricity, while Finland continued to favour domestically-sourced but environmentally damaging peat. After the period under investigation, Finland (Interview 30) and Austria (Interviews 17; 20) sought to address their weaknesses in this field, and ‘Green Growth’ began to provide a new, more forward-looking and ambitious narrative. During 2006-2010, however, Finland’s otherwise pioneering approach to technological advancement was poorly applied to climate change mitigation, while Austria almost entirely lacked such modernist values. Thus, this chapter makes an original contribution to the literature by arguing that while the effectiveness of EM for mitigating climate change is unknown in the long-term, by employing its tenets during the specific period of 2006-2010 with regards to renewable electricity policy, states were more likely to formulate ambitious climate policy.

Chapter 6: The Influence of Nuclear Power

For the vast majority of states, and certainly the twenty-three developed, energy-intensive states of the UNFCCC Annex II, electricity production is a key source of GHG production. Moreover, CO_2 emissions from the electricity supply sector are projected to double or even triple by 2050 compared to 2010 (IPCC, 2014: 21). Nuclear power provides a significant source of electricity to twelve of the twenty-three states, and has been increasingly found to play a positive role in combating climate change, as the energy source does not produce greenhouse gases whilst generating electricity (Fthenakis & Kim, 2007; Jean-Baptiste & Ducroux, 2003; Sovacool, 2008; Verbruggen, 2008). Yet, it has also been argued that due to the carbon intensive lifecycle of nuclear power, the energy source offers little in terms of climate change mitigation (Caldicott, 2006; Kopytko & Perkins, 2011; Sovacool, 2008). I seek to provide a more nuanced understanding of the relationship between nuclear power and climate change, by arguing that nuclear power not only affects the quantity of GHGs emitted during electricity production, but influences states' ambitions in the development of climate change *policy*. Wurzel (2008: 79) provides a concise summary of the attitudes towards nuclear electricity in the four case study states explored in this chapter:

> *"In the late 1990s, Sweden and Germany began to phase out nuclear power while Austria stopped the construction of its only nuclear reactor prior to completion after a referendum in the 1980s…Finland is therefore the only environmental leader state which expanded its new nuclear power stations at the beginning of the twenty-first century."*

I argue that a pre-existing reliance on nuclear power can encourage strong climate policy, because in order to meet reductions targets, emissions must be made outside the electricity sector, necessitating significant investment and lifestyle changes. Austria produced none of its electricity from nuclear power during the five-year period, but, as a result of this abstinence, was dependent upon fossil fuels for its electricity provision (EREC, 2009). As a result of this dependence, the state's ambitious KP goal became almost impossible, with the outcome that climate change was pushed down the agenda because of the state's perceived weakness in the area (OECD/IEA, 2007). However, I also argue that reliance on nuclear energy can introduce complacency into climate policy formulation and takes precious investment away from the renewables sector. Finland represented such a situation between 2006 and 2010. While many other European countries committed to phase out nuclear power in the 1990s and 2000s, the Finnish Parliament approved *Teollisuuden Voima's* application to build a fifth nuclear power plant in 2002 (Teräväinen, 2010*b*: 413).

Germany and Sweden fell between these two extremes, thus reflecting a 'Goldilocks Effect' (*see* Rosa, 2001; Martin, 2011; Kidd *et al.*, 2012), whereby nuclear power enabled the two states to decouple from fossil fuels, but in addition, the intention to phase-out nuclear power in the future necessitated still further ambition in order to replace a potential energy shortfall. This shortfall was mitigated by improving energy efficiency, reducing electricity consumption and expanding renewables provision (BMU, 2010; Regeringskansliet, 2009*a*). As Jänicke (2011: 139-140) states, the "decision to phase out nuclear power may even have increased the pressure for innovation and demands for renewable energy." Thus, having already decoupled a large percentage of electricity production from GHG emissions production whilst being obliged to invest in renewables and energy efficiency for when nuclear is phased out, Germany and Sweden were able to commit to more ambitious climate policies. *Table 18* below states the percentage of electricity generated in each of the states from nuclear power in 2006 and then 2010, noting that Austria sourced none of its electricity from nuclear, and Finland maintained its overall percentage of electricity provision from nuclear energy, while Germany and Sweden both reduced theirs as they planned for phasing out the electricity source by investing in renewables (IEA, 2014).

Table 18: Percentage of electricity sourced from nuclear power in 2006 and 2010 (IEA, 2014).

State	**2006**	**2010**
Austria	0%	0%
Finland	28%	28%
Germany	26%	22%
Sweden	47%	39%

This chapter argues that in developed states between 2006 and 2010, those states that already possessed nuclear power, but were seeking to phase out the energy source in the coming decades, were the most ambitious regarding climate change policy. To be in such a position, a state must be neither locked into a total ban on nuclear electricity, nor be locked into favouring nuclear energy as the dominant target for electricity investment. As such, in contrast to Chapter 5 in which a state must be locked into favouring renewable electricity based on EM principles, regarding nuclear electricity, a state must *not* be locked into a strong position regarding nuclear energy and instead must be able to formulate a dynamic policy response that considers to both concerns over climate change and nuclear energy. This chapter is broken into three sections. The first develops the 'Goldilocks Hypothesis' regarding nuclear power and climate policy outlined briefly above. The second section then explains the relationship between each case study state and nuclear electricity, surveying the motivations for Austria's opposition to nuclear power and Finland's confidence in the energy source. Germany and Sweden's ambivalent response to the electricity source will also be explained, in which the states simultaneously relied on nuclear energy while seeking to phase it out during 2006-2010. The final section discusses the ramifications of each policy stance with regards to climate policy, finding that, as theorised, reliance upon nuclear energy in conjunction with an intention to phase out the energy source facilitates the most ambitious climate policy.

6.1: Goldilocks Hypothesis

Borrowing from the literature of several different fields (*see* Kidd *et al.*, 2012; Martin, 2011; Rosa, 2001), my argument is that there is an optimum attitude towards nuclear power regarding its impact on climate change policy, which may be considered a 'Goldilocks Hypothesis'. Much has been written on how nuclear power may effect climate change in terms of reducing dependence on fossil fuels and thus lowering GHG emissions (Fthenakis & Kim, 2007; Jean-Baptiste & Ducroux, 2003; Sovacool, 2008; Verbruggen, 2008). Yet, there is little in the literature on the effect of nuclear power on climate change *policy*. This chapter therefore seeks to formulate a Goldilocks Hypothesis regarding nuclear energy as an explanatory variable that should be considered when explaining climate policy in developed states.

The Goldilocks Effect has been theorised in a variety of academic fields, including Psychology (Kidd *et al.*, 2012), Biology (Martin, 2011), and, interestingly, climate research (Rosa, 2001). Here, I seek to expand the usage of the terminology to theorise how nuclear power may influence climate policy formulation. Firstly, at one extreme, if nuclear power is pursued when a state is already heavily dependent on the energy source, then there is little incentive to invest in renewable electricity technologies, reduce electricity consumption or improve energy efficiency. This situation therefore represents the 'porridge that is too hot' end of the spectrum, whereby the state is heavily dependent on nuclear energy, but also has no plans to phase out the energy source, and may even seek to expand it. At the other end of the 'Goldilocks Hypothesis' lies the 'too cold' position. In short, a lack of nuclear power in the electricity mix can create a dependence on coal and oil, which could have been avoided with nuclear energy. Reliant on these fossil fuels and unable to replace them with nuclear energy, the state's GHG emissions remain high, thus hindering the state's ability to formulate ambitious climate policy.

As these two 'extreme' positions regarding nuclear power have indicate, "decisions on nuclear power have a major influence on power procurement and CO_2 emissions" (Eduskunta, 2005: 10). The positions between these two ends of this spectrum demonstrate how nuclear electricity policy can facilitate more ambitious climate policy. This area is where the ‘Goldilocks Effect’ may be seen, with attitudes that are neither too enthusiastic about, nor too opposed to, nuclear power. It must be noted, that this ‘zone’ does not require consensus, and could feature heated debates on the issue, as long as the overall policy approach falls in between a total opposition to nuclear energy, and attempts to expand provision from the energy source. These states cannot rely on benefitting from the ‘low-hanging fruit’ of reducing emissions from the electricity sector, but instead need to seek to lower emissions by reducing overall consumption and improving efficiency. At the same time, these states are not disincentivised from investing in renewable electricity technologies, reducing energy consumption or improving energy efficiency. Therefore, I argue that a state which had nuclear power as an electricity source during 2006-2010, but had committed to phase it out at some point in the future, was more likely to develop highly ambitious climate policy than states that did not meet these two criteria.

6.2: Explaining the case studies’ attitudes to nuclear electricity

6.2.1: Austria

Austria sourced none of its domestically produced electricity from nuclear power during 2006-2010 (IEA, 2014), and campaigners lobbied the Austrian government to persuade neighbouring states to phase-out their nuclear facilities as well (Lofstedt, 2008). None of the Austrian policy-makers interviewed during this investigation was willing to express support for nuclear power in any way (Interviews 14-22). What explains such a stark opposition to nuclear power at a time when nuclear energy potentially offered a low carbon, domestic solution with which to replace expensive imports of fossil fuel? This section highlights the principal factors that have influenced Austria’s long-standing opposition to nuclear power, resulting in total opposition to the energy source between 2006 and 2010, with the 1978 referendum that banned nuclear energy a crucial focal point around which all discussions on the issue revolve.

The passion and effectiveness of the environmental movement towards nuclear power prior to the 1978 referendum, and the political factors that influenced the outcome, were crucial in banning nuclear power and creating an institutional opposition to the energy source. Since then, Austria's identity as an environmental pioneer regarding its local environment (Liefferink & Andersen, 1998*b*) has strengthened concerns over nuclear waste and the threat of nuclear meltdown, such that reversing the 1978 referendum decision became impossible for all parties in the state. Despite a small increase in general support for nuclear between 2005 and 2008, in 2010 the Austrian public was the least willing in Europe to see a role for nuclear in responding to climate change, with just 29% arguing the electricity source could provide an answer to climate change, and 63% arguing the opposite (Eurobarometer, 2010: 14). This statistic is almost a complete reversal of the Finnish situation, as will be seen shortly, in which the percentages were 67% to 26% in favour of nuclear energy. In a similar vein to renewable electricity policy in Germany and Sweden in the previous chapter, Austria became locked into certain policy approaches as a result of past events. Thus, in contrast to the previous chapter, path dependence locked out the state from policy approaches that favoured climate policy ambition. It was impossible for the government of 2006-2010 to favour investment in nuclear energy, as the energy source was so unpopular with the Austrian electorate. As one Austrian civil servant (Interview 19) argued during an interview, "for Austria, nuclear shouldn't play a role; it is common sense."

Following Austria's rapid descent into extremism during the 1930s, the governance model of the post-war period was deliberately designed to be as consensus-based as possible. Grand coalitions between the SPÖ and ÖVP were common, while the 'Social Partnership' of chambers institutionalised a voice for agriculture, labour and commerce, which ensured that opinions on these matters were not neglected (Tálos, 2008). Environmental concerns, however, did not fit as neatly into this structure, thus forcing these issues outside of mainstream politics, resulting in the development of a more excluded, and subsequently more radicalised, civil society. The number of Austrian environmental activists expanded rapidly in the 1970s and, as Lauber (1996: 202) notes, "soon opposition to nuclear power became a rallying ground for the nascent environmental movement." Austria began constructing its first and only NPP at Zwentendorf (around 40km north-west of Vienna) during the mid-1970s in response to the 1973 Oil Crisis. Mass demonstrations took place outside the reactor (*see* Wurzel *et al.*, 2003: 57) and as a result of this pressure, Austria conducted a referendum on whether to ban energy production from nuclear power in 1978 (Martinovsky & Mareš, 2012: 349-350). This referendum was passed narrowly – largely as a result of political expediency, as will be seen shortly – but the legacy of the decision continued to live on, with the Austrian environmental movement firmly committed to opposing nuclear power since 1978.

The 1978 referendum, as demanded by the strong voices of the Austrian environmental movement, saw a ban on the production of electricity from nuclear sources, but the vote itself was as much about partisan politics as it was about energy policy. The referendum reflected the lack of agreement between the leaders of the major parties and so, as a means of preventing the issue from dominating the upcoming General Election in 1979, the political hot potato was passed onto the electorate instead (*see* Müller, 1996: 25). However, by the time of the referendum in 1978, all three of the main parties featured strong voices on the anti-nuclear side of the debate. The SPÖ sought to avoid the electoral damage that had resulted from the Swedish Social Democrats' support for nuclear energy, the ÖVP (in opposition) sought to exploit increasing anti-nuclear sentiment, while the Liberal Party (FPÖ) was against nuclear as a matter of principle (Pelinka, 1983: 255).

The Austrian Prime Minister, Bruno Kreisky, placed a great deal of personal political capital in the construction of the new NPP in Zwentendorf, and thus felt compelled to support nuclear in the 1978 referendum (Martinovsky & Mareš, 2012: 349-350). In an attempt to shore up support for nuclear power, Kreisky claimed that a vote against nuclear was a vote against his leadership as PM, and even stated that he would step down should the abolition be supported. As a result, political opponents of Kreisky used the referendum to voice their opposition to him as much as to nuclear energy. Thus, with the vote a slim 50.5% to 49.5% in favour of banning nuclear power, Kreisky's personal involvement in the campaign can be seen as a key factor in explaining the opposition to nuclear (Pelinka, 1983). The legacy of the referendum has rendered nuclear power in Austria highly unpopular ever since. The strength of opposition to nuclear was galvanised still further by the 1986 Chernobyl accident, with Austria the closest geographically of the four case study states to the site of the disaster (Lauber, 1996: 202; Lauber, 1997: 101). As such, opposition to nuclear power continued to dominate the agenda of the Austrian environmental movement, with concerns about NPPs in the Czech Republic and Slovakia featuring heavily in environmental campaigns between 2006 and 2010 (Lofstedt, 2008).

In contrast to its status as a climate laggard, since the 1978 referendum, Austria has developed a proud reputation as an environmental pioneer, with ambitious policies that have protected the state's outstanding natural surroundings (Interviews 16; 22). Throughout the 1960s and 1970s, much of the worst effects of industrialisation were cleaned up through end of pipe methods. As a result, much of the population perceives Austria to be an environmentally pioneering state; "[w]hen it comes to the environment, Austrians are top of Europe and top of the world" argues Alfred Stringl, Deputy Director for the Austrian Institute for Sustainability (Austria.info, 2014). This claim is arguably accurate regarding traditional, localised environmental concerns, such as river pollution, or the risks posed by nuclear waste, but less so regarding the dangers of more transboundary issues, for example, climate change. Thus, the traditional fears over nuclear waste and meltdown resonate particularly strongly in Austria, with natural wilderness areas surrounding the Alps a key source of tourist income as well as national identity (Interviews 16; 22). This identity consolidates the continued opposition to nuclear power. By favouring the local environment over the global environment, Austrians are more opposed to the threats posed by nuclear power than by more abstract threats of climate change (Interviews 16; 22). It is this prioritisation that also explains why Austrians are particularly concerned with the NPPs in surrounding states, which, as will be seen later in this chapter, ensures that much political capital is expended on engaging with neighbouring states, rather than trying to lobby for more ambitious policies by the Austrian government.

6.2.2: Finland

Finland stands in contrast to the other three case studies regarding nuclear power. The state not only already possessed significant nuclear energy provision – accounting for 28.3% of electricity production in 2010 (EC, 2011) – but also sought to increase its production of electricity from nuclear power during 2006-2010. If all currently planned nuclear projects are completed, 60% of Finland's electricity will be produced by nuclear power in 2025 (OECD, 2013: 113). Writing in 2009, Ruostetsaari (2009: 102) noted that Finland was the only state in the world where the final placement of spent nuclear fuel had been authorised both nationally and locally. As a result, Salo (2009: 117) argues that "[t]he foundation of Finnish energy politics has been nuclear power." As will be seen shortly, the Mankala Principle – a decision that strongly favoured the development of nuclear energy in Finland – was a critical juncture in Finland. When a subsequent critical juncture occurred in 1986, following the Chernobyl accident, Finland merely agreed to limit the expansion of nuclear electricity, rather than phase out the energy source altogether. The cross-party support enjoyed by nuclear power in Finland has existed since the first NPP was constructed during the 1970s. Crucially, not only did none of the parties oppose nuclear energy at the time, but none was identified as being the sole champion of the energy source, ensuring that the issue was not framed as a partisan issue (Säynässalo, 2009: 143). While in both Germany and Sweden nuclear electricity was part of the reformist agenda of the Social Democrats, in Finland the energy source was received ambivalently across the political spectrum as a pragmatic means of ensuring energy independence from the USSR.

Even though the 1986 Chernobyl disaster resulted in the withdrawal of a pending application for a fifth NPP, as a result of the political consensus on nuclear energy, an agreement to fully phase out nuclear energy was not made in Finland (Teräväinen, 2012: 79). Thus, the issue was much less contentious in the early 2000s when nuclear power enjoyed a renaissance in the state. As such, the decision in 1986 to merely limit nuclear energy, rather than phase out the energy source, was a critical juncture which prevented anti-nuclear sentiment being locked-in to Finnish energy policy. The decision not to phase out nuclear electricity in 1986 can be traced back to the

Mankala decision of 1963, which created strong vested interests in the Finnish economy that favoured nuclear power. As a result, even the Green Party, when in government between 2007 and 2011, did not veto further expansion of nuclear in 2007 and 2010 (*see* Järvelä *et al.*, 2012: 24). This section on Finland finds that the state enjoyed cross-party support for nuclear power for three main reasons, namely the perceived threat of Russia, the electricity requirements of an economy reliant on heavy industry, and the perception that nuclear is a climate-friendly energy source.

While the risks identified in Beck's (1992) *Risk Society* are primarily environmental challenges due to the omnipresent, international nature of such threats, Finland's citizens possess an even more immediate perception of risk: the presence of former colonial rulers Russia (and, to a lesser degree, Sweden) on their doorstep (*see* Wurzel, 2008: 79-80). As recently as March 2014, it was argued that Putin sought to reintegrate Finland back into Russia (*see* Withnall, 2014). Russia has been described as the permanent enemy of Finland's freedom (Jakobsson, 1998: 146). Yet, despite this looming presence, in 2007, 80% of oil, 100% of gas and 10% of electricity consumed in Finland came from Russia (Lund, 2007: 2276). This reliance on Russian energy, particularly natural gas, belies a vulnerability to Finland's Eastern neighbours that many Finns long to overcome. As a result, independence – including energy provision – is the principal concern of the Finnish population and elites alike, making domestically-operated nuclear power an appealing prospect. A pivotal reason behind the desire to build NPP5 in 2002 was the independence nuclear energy could provide, as the NPP was expected to last 60 years and be powered by an energy source (uranium) with a very stable price structure (Lampinen 2009: 64). Ironically, however, nuclear power worsens Finland's energy vulnerability, as the state has no indigenous uranium, or fuel production facilities, or reactor industry, making the state highly reliant on its former colonial ruler, Russia (Lampinen, 2009: 59). While this message of continued dependence had managed to reach some parts of the population – a demonstration against Russian involvement in Finnish energy took place whilst I was conducting interviews in Helsinki – for the most part, nuclear power was presented as a means of ensuring Finnish independence from Russia during interviews for this thesis. Environmental activists, civil servants and politicians alike expressed the view that

Russia continues to influence political debate in Finland (Interviews 25; 26; 27; 32). One interviewee stated explicitly that they were trying to find a way not to refer to Russia, as the state remains such a threat in Finland. As such, the perceived significance of this risk strongly influenced the highly centralised approach Finland pursued by investing in further nuclear power.

Yet, it is not only the threat of Russia on the doorstep that incentivises the maintenance and expansion of nuclear power. The vast amount of energy produced by each NPP is vital for powering heavy industry in Finland. Finland produces forestry products for 100 million people and steel for 50 million more around the world (Interview 23). These industries accounted for 40% of the country's industrial GDP and over 80% of industrial electricity consumption in 2003 (OECD, 2003: 15). The relationship between industry and electricity and heat production is highly interdependent in Finland. Industrial companies own power companies, while heat produced by industry is used for district heating (WWF, 2010: 73). With several forestry companies having formed collectively the first nuclear power provider as early as 1958, the Mankala principle has enabled companies to generate their own low-cost electricity since 1963 (*see* European Parliament, 2010). The Mankala principle was a critical juncture in the history of Finnish energy policy, because the decision ensured that nuclear power would be favoured by significant industrial voices for decades to come (ILO, 2011). The principle enables industrial companies to co-own electricity production facilities and pay cost price for the electricity consumed; as a result, 40% of electricity is produced at cost price in Finland (Pohjolan Voima, *undated*). Nuclear is therefore an effective means for heavy industry to generate its own low cost, domestic and centralised source of electricity. Due to the role of these heavy industries as major employers, the dependence on nuclear of industry in turn influences politicians and policy-making (Baker & Stoker, 2014: 11-14). In interviews with politicians from the True Finns (Interview 30) and the Swedish People's Party (Interview 31), cheap electricity was identified as a necessary requirement for keeping heavy industries in Finland rather than allowing them to move from Finland to developing states that possess cheaper wages and fewer environmental regulations.

Since the turn of the millennium, pro-nuclear citizens have organised effectively, arguing that nuclear is a necessary feature of the future, with climate change a key component of that argument (Berg, 2009: 98). Finland has claimed it is ‘unrealistic’ to become carbon neutral without nuclear (Järvelä *et al.*, 2012: 23). The Finnish public increasingly perceived climate change as a more salient environmental issue than nuclear waste, at a time when Finland was beholden to ambitious Kyoto Protocol targets (Salo, 2009: 119). The decision to build the fifth NPP in 2002 was thus presented as the primary method for reducing GHG emissions for the Kyoto Protocol period of 2008-2012 (Eduskunta, 2005: 13). The *Eduskunta* claimed this reduction would occur because nuclear could replace the power produced by coal, decreasing the price of CO_2 permits and not causing CO_2 emissions itself (Teräväinen, 2012: 95). As one MP (*in* Berg, 2009: 104) stated, “the risk is rather minimal that a nuclear accident would happen. So for me the bigger threat is the burning of fossil fuels.” As a result, climate change was a crucial reason for explaining support for nuclear electricity. *EK* (*in* Litmanen, 2009: 25), the Confederation of Finnish Industries, has claimed that climate change is a key reason to support nuclear, as have representatives for the Energy Ministry (Interview 23), National Coalition Party (Interview 28), Finns Party (Interview 30), and Centre Party (Interview 32). Thus, by 2006-2010, Finnish politicians were able to expand nuclear energy provision with confidence.

6.2.3: Germany

The German approach to nuclear power falls somewhere in between the policy stances taken by Austria and Finland. Germany was dependent on nuclear power between 2006 and 2010, and was obliged to phase-out the energy source in the future, but in 2010 also sought to extend the deadline for the phase-out (before then U-turning once more in 2011) (Hillebrand, 2013). As in the other three case-studies, the 1970s saw a period of strengthening societal opposition to nuclear energy, with Germany’s passively exclusive governance model facilitating the creation of a strong and radicalised green movement that placed opposition to nuclear power at its core (Hunold & Dryzek, 2005: 76). Yet, a referendum on the issue did not take place, and it was not until the Red-Green coalition of 1998-2005 that nuclear phase-out was agreed (Dryzek *et al.*, 2002: 672). However, with the election of a Grand Coalition government led by the centre-right from 2005, nuclear power was favoured once more, with an extension to nuclear power agreed in 2010. Although outside the scope of this investigation, this phase-out would be repealed just a year later, following the Fukushima Dai'ichi nuclear accident (Hillebrand, 2013: 673). Thus, unlike Austria and Finland, which were locked into opposing and favouring nuclear energy respectively, it was the absence of 'locked in' behaviours in the German policy approach that enabled the state to assume a middle-ground approach, favouring and then opposing nuclear energy in a weaving manner.

As with the other case studies, the primary starting point in Germany for rapid investment in nuclear power was the 1973 Oil Crisis (Jacobsson & Lauber, 2006: 261; Lauber & Mez, 2006: 105). For post-war, divided Germany, energy security was paramount. As a result, West Germany "responded to energy crisis in part by declaring an 'environmental moratorium' and through a programme to expand nuclear power" (Dryzek *et al.*, 2003: 61). As the quote from Dryzek *et al.* suggests, the needs of the environment were left in the background while economic development was prioritised; a policy approach at odds with the environmental leader Germany has since become. However, in part this weak approach to environmental protection – which was even starker in East Germany – galvanised the German environmental movement (Pehle, 1997: 163-164). Aided by a 'passively exclusive' state structure, a large and radical green movement flourished (Dryzek *et al.*, 2003: 111). As the 1970s and early 1980s passed, protests increasingly attracted over 100,000 people, alerting decision-makers to new, post-war values that had been neglected under the conventional policy process (Jahn & Korolczuk, 2012: 145). This new environmental movement was – unlike the trade union movement that facilitated the welfare state – middle-class and highly educated. This membership projected their fears of newly perceived threats from a more post-materialist worldview, centring on the threat of nuclear catastrophe (Mol & Spaargaren, 1993: 444). Yet, as the 1980s continued, the state continued to be closed, with neither the parliament nor executive willing to engage in a debate over nuclear power, and all of the major parties united in support for the electricity source as a means of powering the state's energy-intensive industrial sector (Hunold & Dryzek, 2005: 87).

By the late 1990s, environmental radicalism was at its peak both inside and outside the *Bundestag*. The Green Party – which had long seen itself as an 'anti-party party' and was fuelled by Germany's marginalised yet passionate environmental movement – was able to form a coalition government with the Social Democratic Party that lasted from 1998 until 2005. Mindful of long-seated Cold War fears that Germany would be in the middle of an atomic conflict between the USSR and the West, and with lingering memories of the Chernobyl disaster in 1986, the Green Party placed nuclear phase-out at the very top of its agenda. Indeed, Chernobyl transformed the German political landscape to such a degree that the SPD joined the Greens in opposing nuclear in 1986, in public at least (Schreurs, 2002: 232) and the Department for the Environment, Nature and Reactor Safety (BMU – *Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit*) was created as a response to the disaster (*see* Watanabe, 2011: 72).

By 1999, the plan for nuclear phase-out was established and passed, placing a total cap of 2623 billion kWh on lifetime production from all nineteen operating reactors, equivalent to an average lifetime of thirty-two years (*see* Jahn & Korolczuk, 2012: 160). At the forefront of the long and tough negotiations was the Environment Minister, Jürgen Trittin, of the Green Party, who repeatedly emphasised that his priority was nuclear phase-out rather than climate change, adhering to the argument that abandoning nuclear would improve energy efficiency (Michaelowa, 2003: 34). While it was democratically-elected representatives who enabled the passage of nuclear phase-out in legal terms, Hunold and Dryzek (2005: 87) argue that the decision "would have been unthinkable without the antinuclear movement's influence on social values." The phase-out decision was a significant coup for an environmental movement that had mobilised passionately against nuclear power for decades. However, the result was a civil society that had neglected the threat of climate change, as activists felt that the dangers of global warming could legitimise nuclear power (Hatch, 2007: 44). As such, large-scale anti-nuclear protests continued throughout the 1990s and 2000s while the threat from climate change slowly grew in the public perception (Dryzek *et al.*, 2002: 673).

With social momentum firmly in favour of addressing climate change, and Merkel's Christian Democrat Union reaping the rewards of her effective marriage of economic and environmental policies, Merkel saw the opportunity to challenge the previous nuclear consensus. Nuclear power would offer Germany's booming economy a low-carbon, reliable and relatively cheap electricity source. As an East German, Merkel perceived nuclear power to be modern and a tool against poverty, failing to understand how unpopular the energy source remained in West Germany. As such, the 2010 Energy Concept for Environmentally Sound, Reliable and Affordable Energy Supply not only sought to expand renewables but also extended the phase-out deadline for nuclear by twelve years (Townshend *et al.*, 2013: 186). The decision split both the *Bundestag* – with the Conservatives and Liberals in favour of nuclear while the others opposed – and public opinion. Merkel was immediately attacked for reversing the carefully negotiated energy compromise of the Red-Green government, drawing ire not just from the political left but also many middle-class Conservative supporters who had grown up opposing nuclear power (Jasanoff, 2011: 139). The anti-nuclear movement mobilised rapidly and effectively, in stark contrast to that of Finland, and pushed the U-turn over nuclear power to the top of the political agenda (Poguntke, 2011: 983), before the decision was reversed rapidly in the aftermath of the 2011 Fukushima Dai'ichi disaster in Japan. Thus, while Germany represented a middle-ground between Austrian and Finnish attitudes towards nuclear energy, the dominant approach was not fixed, but rather fluctuated between support for and opposition to the electricity source.

6.2.4: Sweden

In a similar fashion to Austria, there was a strong movement to abolish nuclear power during the late 1970s in Sweden, which resulted in a referendum in 1980, whereby nuclear energy was not banned, but could not be expanded either (Compston & Bailey, 2008: 176). From here, a degree of 'flip-flopping' took place, in which the phase-out was rescinded, before two NPPs were shut down in 1999 and 2005 (Nilsson, 2005: 237). Then, with the election of the Coalition government in 2006 and the ascendance of climate change on the political agenda, the nuclear phase-out was once again extended. As one Swedish Environmental Protection Agency employee (Interview 7), who had previously worked in Germany, stated, "[t]he Conservative side were not interested in the climate but they were interested in promoting nuclear" for the purposes of national security. As such, Sweden's attitude towards nuclear power has changed repeatedly over recent decades. This flux was demonstrated during 2006-2010; although nuclear power was the source of almost half of all electricity generation and the lifespan of the energy source was extended in 2010, Sweden remained committed to phasing out nuclear energy eventually. As such, similar to Germany but in contrast to Austria and Finland, Sweden was not locked into a particular policy approach regarding nuclear power. This lack of locked in policy approaches enabled the state to find a middle ground in which nuclear energy provided almost half of electricity, but nuclear phase-out remained an established commitment.

Proudly neutral in conflicts, Sweden saw nuclear energy as a means of maintaining security in the 1950s, by developing its own nuclear weapons programme. As such, nuclear energy has long been seen as both a provider of electricity and security in Sweden, despite the closure of the weapons programme (Forbes, 2011). Moreover, during the late 1960s, nuclear power had been supported by the Swedish environmental movement as a means of protecting the country's rivers, which had already been heavily dammed (Ericsson *et al.*, 2004: 1709). Thus, as a result of the combination of potential security benefits, a supportive environmental movement, and the Oil Crisis of 1973, a rapid expansion of nuclear power took place between 1972 and 1985 in which twelve reactors were constructed, making Sweden the state with the highest nuclear power per capita ratio in the world (Jewert, 2012: 10). Yet, throughout the 1970s, political resistance to nuclear energy – developing alongside similar movements in other states – continued to grow significantly (Löfstedt, 1994: 1106). By the time of the Three Mile Island accident in 1979, the political atmosphere was on course for a blanket ban on nuclear power, leading to a referendum in 1980 (Parliamentary Resolution 1979/80: 410). Here, a 'middle approach' was taken in which nuclear was not banned outright, as was the case in Austria, but further expansion was prohibited (Marshall, 2007: 148). This decision should have resulted in nuclear power eventually being phased out in Sweden by around 2010, with the conclusion of the existing reactors' predicted lifespans; however, this deadline was not met.

Following the referendum, the trade union movement placed pressure on the hegemonic Social Democrats to support nuclear power because of the jobs provided by the sector (Nohrstedt, 2009: 326). The presence of such voices – and their close link to the dominant party of the country – weakened the anti-nuclear momentum in the state, again shifting public opinion back towards favouring the energy source. In turn, the 1986 Chernobyl disaster pushed support away from nuclear once more (Fischer & Berglund, 1994; Nohrstedt, 2009). As a result of Chernobyl, the ambitiously anti-nuclear 1988 Energy Bill sought to close the first reactors in 1995 and 1998 (*see* Nilsson, 2005: 236). Although climate change was gaining increasing international attention at the time – exemplified by the creation of the Intergovernmental Panel on Climate Change in 1988 – the anti-nuclear discourse forced climate change out of the Swedish energy debate. Knaggård (2014: 25) argues that during the 1990s, "[i]t became problematic to talk about climate change, as oil and coal were the main energy sources that could replace nuclear power."

Yet, despite this political context, the phase-out decision created hostility from those whose jobs depended on nuclear power and those who argued that Swedish nuclear power was safer than elsewhere. Furthermore, nuclear phase-out was identified as holding the potential to exacerbate other environmental problems, such as climate change (Nordhaus, 1997). As such, the 1988 phase-out decision was subsequently reversed in 1991 after having created much resistance amongst powerful groups both within the governing SDP and in the wider Swedish energy sector (Nilsson, 2005: 236). Eventually, however, Barsebäck 1 NPP was closed in November 1999, following a court case and costly compensation to the plant's owners, while Barsebäck 2 was closed in 2005 after a political compromise resulting from repeated lobbying from the anti-nuclear movement (Nilsson, 2005: 237). Although nuclear power continued to provide around a half of Sweden's electricity, the state sought to phase out the electricity source by 2010 (Parliamentary Resolution 1979/80: 410).

While careful and considered opposition to nuclear had been the dominant discourse from environmentalists since the 1970s, the threat of climate change seized the agenda from the early

2000s onwards. Regarding the Kyoto Protocol greenhouse gas reductions targets, Nordhaus (*in* Marshall, 2007: 44) argued in 1997 that "[i]f Sweden chooses to phase out its nuclear power plants, meeting that commitment will go from difficult to near impossible." Yet, as climate change continued to push onto the political agenda, concerns over nuclear power were, if not reduced, pushed into the background. By 2000, there were only around 3,000 members of anti-nuclear campaigns in Sweden (Marshall, 2007: 147). Meanwhile, as a result of key climate conferences, such as Kyoto, extreme weather phenomena, for example, the Gudrun storm that hit Sweden in 2005, and the success of Al Gore's film 'An Inconvenient Truth' in 2006, the Swedish climate movement went from strength to strength (Knaggård, 2014: 27), reflecting the status of climate change as the primary environmental issue of concern in Sweden since the mid-2000s (Eurobarometer, 2009: 8).

Sweden's centre-right government of four parties was elected in 2006. Traditionally, Sweden has not possessed many such multi-party coalitions, but it was the decision of Centre Party and Christian Democrats to drop their opposition to nuclear energy that gave such a government the green light, and also demonstrated the significance of the issue (Zannakis, 2009: 141). Meanwhile, the Moderate Party used climate change to reignite the debate over nuclear power's role in the Swedish electricity mix (Knaggård, 2014: 26). By 2009, Sarasini (2009: 645) argued that "it is deemed pointless to decommission nuclear plants given that the most prominent environmental issue is climate change". As a result, the appropriately named 'Nuclear Power – Opening the Way to a Generation Change' Bill (Regeringskansliet, 2009*b*), was passed in June 2010, repealing the 1980 referendum's decision to phase out nuclear power and enabling the construction of a maximum of ten new nuclear power reactors, provided that each replaces an existing reactor. Prime Minister Reinfeldt felt he could overturn a long-established referendum due to a perceived public indifference on the issue and was proven right when there was little public opposition to the decision from citizens or the green movement. In answer to a Eurobarometer question in 2010, Sweden possessed the highest percentage (73%) of its population in Europe who agreed that nuclear helps to limit climate change, as well as the smallest proportion (19%) who disagreed this statement (Eurobarometer, 2010: 14). Thus, during the period under investigation, Sweden sourced almost half of its electricity from nuclear, but was also committed to phasing out the energy source at some point in the future, with a tax discriminating against nuclear power at around €0.67 cents/kWh, which makes up around one third of the operating cost of nuclear energy (WNA, 2014). Sweden, like Germany, was relatively free to formulate energy policy decisions and thus exhibited a dynamic policy approach, enabling the state simultaneously to rely on nuclear power and intend to phase out the energy source.

6.3: How the case studies' attitudes to nuclear energy influences climate policy

6.3.1: Austria

Austria's refusal to source electricity from nuclear power within its borders had a negative impact on the state's climate policy ambition. By refusing to produce nuclear power, Austria's energy-intensive economy was forced to produce large amounts of electricity from other sources, with fossil fuels playing a key role (EC, 2007). Technological renewables were seen as too costly and inefficient to provide the quantities of energy required for 100% of Austria's electricity consumption (Interview 14). Thus, I argue that while environmental motivations may lie at the heart of Austrian opposition to nuclear power, the outcome was reduced ambition regarding climate change. Firstly, the ban on nuclear power that has lasted since the 1978 referendum weakened climate policy during 2006-2010 because of the need to import fossil fuels as an electricity source. Secondly, this reliance on fossil fuels rendered Austria's international climate obligations increasingly difficult even prior to the start of the Kyoto Protocol commitment period of 2008-2012, making attempts to meet the goal a failure before they had even begun, thus weakening confidence regarding future emissions targets. Finally, the anti-nuclear environmental movement's prioritisation of opposing nuclear power in surrounding states enabled climate change to be pushed down the political agenda, thus weakening the imperative to develop ambitious policy still further. Thus, I challenge the argument made by two Austrian Energy Agency employees (Interview 17), who stated that the legacy of the nuclear ban has not affected Austria negatively. Instead, I argue that attempting to meet similar emissions reductions targets as nuclear-powered European neighbours rendered ambitious climate policy a daunting task for Austria, thus weakening policy ambition.

The option of building nuclear power plants in Austria was impossible between 2006 and 2010 as a result of the 1978 referendum, which – in the words of one civil servant (Interview 15) – meant it would be “kamikaze political behaviour to be in favour of nuclear power.” Nuclear energy was perceived as the most significant environmental risk in Austria and climate change struggled to garner traction as a significant policy area. Indeed, not only was the planned Zwentendorf NPP replaced by coal power in 1978, but Austria’s opposition to nuclear has forced it import fossil fuels since then (*see* European Commission, 2007; IEA, 2014). The lack of nuclear power in the Austrian electricity mix has necessitated that the state turn elsewhere for a significant percentage of its electricity supply. Indeed, in 2007, Austria sourced as much as 73.1% of its total primary energy consumption from fossil fuels (EREC, 2009: 2). With limited fossil fuel reserves of its own, such an approach not only worsened carbon emissions, but also weakened Austrian energy security by increasing the dependence on imports. This scenario had been envisioned as early as 1973 by Prime Minister Kreisky, ensuring energy independence during the Oil Crisis was the primary motivation for investing in nuclear power (Lauber, 2006: 201). By ruling out nuclear power as a possible source of energy, Austria was forced to turn to carbon-intensive fossil fuels, thus weakening the state’s ability to commit to ambitious climate change legislation. Austria was therefore locked into an anti-nuclear – and reluctantly carbon intensive – policy approach that was too strong to be altered.

Secondly, as a result of Austria’s dependence on fossil fuels, the highly ambitious target of reducing greenhouse gases emissions by 13% during 2008-2012 on 1990 levels as part of the Kyoto Protocol became increasingly challenging, if not impossible, for the Austrian government (OECD/IEA, 2014: 11). Knowing that the goal almost certainly could not be met, climate change soon became a sensitive issue that was pushed down the political agenda, as no party wished to weaken the existing targets for fear of losing support with an environmentally-conscious public (Interviews 26; 27; 29). Austria would have needed to have sourced its electricity from non-fossil fuels much sooner than 2008, at a time when renewables, for example, were much more expensive. As a result, goals necessitating significant reductions were portrayed as unrealistic, ensuring that climate change was avoided by politicians from across the three main parties (Schmidt *et al.*, 2011: 3261). Thus, the knowledge that Austria was likely to be dependent on fossil fuels for a considerable period to come hindered ambitious climate policy formulation between 2006 and 2010.

Finally, as a result of the dominance of nuclear power to Austrian risk perception, the threats posed by NPPs in surrounding states became a significant topic of political engagement between 2006 and 2010. The presence of NPPs in neighbouring European states, such as Slovakia and the Czech Republic, became an issue of great political importance to many Austrians (*see* Lofstedt, 2008). In many post-communist states there was no significant opposition to nuclear power, as the energy source provided a relatively cheap, independent and 'modern' means of providing electricity in states that were poorer than their Western European neighbours (Martinovsky & Mareš, 2012: 338). The Austrian environmental movement regularly organised protests outside the embassies of the Czech Republic and Slovakia in opposition to the presence of NPPs within those states (Martinovsky & Mareš, 2012). Such is the effectiveness of these campaigns that Austria expended significant political capital in persuading Slovakia to close its Bohunice reactor in 1999 by threatening to veto the state's EU accession talks (Lofstedt, 2008: 2228). Campaigning by Austrian activists continued throughout the period under investigation, and called for Slovakia to close all of its NPPs. As a result, Austrian civil society perceived the greatest risk to be the threat posed by neighbouring states' nuclear reactors, not the need to reduce overall GHG emissions. Moreover, with the Austrian green movement expending political capital on issues outside of the state, climate change was pushed down the political agenda (Dolezal, 2008: 118). Thus, Austria's total opposition to nuclear energy both necessitated a reliance on a carbon-intensive fuel for electricity (coal), and drew political awareness away from climate change, resulting in climate change policies that exhibited low levels of ambition throughout 2006-2010.

6.3.2: Finland

As identified above, nuclear power has garnered a wealth of support from the Finnish population and political elite, such that rather than phasing out the energy source, the *Eduskunta* sought to expand nuclear electricity production still further during 2006-2010. In contrast to citizens in Austria, Germany and Sweden, in Finland, "supporters have considered nuclear-related risks as virtually non-existent and the problem of nuclear waste management practically solved" (Teräväinen *et al.*, 2011: 3340). However, by producing nuclear electricity and seeking to expand its use, I argue that Finnish climate policy has been weakened. This influence will explained by two factors, namely the high baseload produced by nuclear, which inhibited the expansion of renewables, and, ironically, the complacency that is engendered towards climate change as a result of the windfall reductions that are expected to result from the use of nuclear power (Interviews 25; 26).

Firstly, the large baseload produced by nuclear power in Finland was identified by one Greenpeace employee (Interview 26) as explaining a reduction in ambition towards renewable energy construction. Energy grids cannot handle overproduction of electricity. As a result, in the event that additional renewable electricity was added to the mix on top of that sourced from nuclear, it is possible that the grid could collapse (Morison, 2014). Nuclear power plants can be turned off relatively quickly and so the influence of this argument regarding baseload demonstrates how 'locked in' to nuclear electricity Finland had become. The decision to build a fifth NPP therefore reduced not only the desire but the practical possibility of significantly increasing investment in renewable electricity, thus creating a missed opportunity regarding climate-friendly electricity production (Lampinen, 2009: 53). While nuclear power may appear a prudent electricity source considering its more consistent production of electricity when compared with the intermittence of wind or solar, by producing such a large baseload – and with the decision to expand this further via a fifth, sixth and seventh NPP – the need for other forms of energy production was diminished. The perception that solar panels and wind turbines would struggle to join the grid disincentivised production of, and research into, such technologies (Interviews 26; 27; 29; 30; 31; 32).

Ironically, considering that climate protection was identified as a key reason for investing in nuclear power, the decision to construct a fifth NPP inhibited investment in other climate mitigation policies. Other climate-friendly projects, such as energy efficiency drives, were identified by one Swedish People's Party politician (Interview 31) as being postponed due to the development of nuclear power. Indeed, as outlined in Chapter 4, Finland demonstrated few ambitious climate policies during the period. The *Eduskunta* (2005: 13) assumed that most of Finland's energy demands would be met by nuclear rather than fossil fuels, thus enabling the state to meet its Kyoto Protocol goals, but these windfall reductions in emissions did not take place due to delays in the construction of NPP5. The argument that nuclear power enabled emissions reductions was again propagated during the period under investigation when, in agreeing a new deal for licences for the sixth and seventh reactors in 2010, the Minister for Employment and Economy, Mauri Pekkarinen (*in* Teräväinen *et al.*, 2011: 3440), argued that Parliament was acting in the interests of the climate, independence and industrial growth. Indeed, the Finnish Ministry of Trade and Industry has long been such a staunch supporter of nuclear that its proposals during the period did not even feature a renewables scenario within future energy projections (Lampinen, 2009: 44). As a result of this ubiquitous party political support for nuclear as a low emissions electricity source, in 2010 the Finnish population was second only to Sweden's in supporting nuclear energy as a response to climate change, with 67% agreeing and 26% disagreeing (Eurobarometer, 2010: 14). "The risks of climate change had made the threats of nuclear technology appear much less sinister" (Berg, 2009: 104). Thus, as has been shown above, Finland's continuing investment in nuclear weakened climate policy ambition, by preventing investment in renewables and lowering the need to reduce consumption of energy. As the construction of new NPPs was delayed while calls for investment in renewables and efficiency directives were ignored, confidence was lost over the prospects of reducing emissions significantly, resulting in lower emissions reductions targets during 2006-2010.

6.3.3: Germany

As shown earlier in this chapter, Germany relied heavily upon nuclear power as a source of electricity, yet was planning to phase out the energy source in the decades after 2006-2010. As a result, the state received all of the benefits of a reduced reliance upon fossil fuels in its energy portfolio, but the incentive still remained to reduce emissions and develop renewable electricity sources in order to prepare for the phase-out of nuclear. What remains to be seen, therefore, is whether it is possible for Germany to maintain stringent climate change policies whilst phasing out nuclear power in the years ahead, as the years following 2010 have so far suggested such an approach may prove expensive (Toke & Vezirgiannidou, 2013: 545). However, regarding the period under investigation, the ambivalent approach to nuclear was crucial in facilitating ambitious climate change policy. This relationship will now be explained by two arguments; the role played by nuclear in reducing the dependence on fossil fuels during the period, thus necessitating future emissions reductions to come from other areas, and the significance of impending nuclear phase-out acting as a further incentive to reduce emissions, increase efficiency and produce electricity from other sources. Thus, in 2010, "not climate skeptics but nuclear skeptics sounded the loudest notes of dissonance in German environmental and energy policy" (Jasanoff, 2011: 139). Although the science was largely settled in Germany regarding climate change and the risks posed by the phenomenon (Eurobarometer, 2009: 9), nuclear energy was also seen as a potential threat. I argue that this combination of dependence on nuclear power but an intention to phase out the energy source was crucial in developing Germany's ambitious climate policy. Only in a state which was neither locked into total opposition to nuclear power, nor overwhelming support for the energy source, would such a dynamic approach be possible.

Unlike neighbouring Austria, which had faced a referendum over the abolition of nuclear power, the electricity source had long been seen as crucial to Germany's vast economy. As Hunold and Dryzek (2005: 87) argue regarding most of the 1980s, "[t]he state was closed; neither parliament nor the executive was eager to engage in a nuclear debate, and all the major political parties supported nuclear power." As such, coal and nuclear continued to receive support throughout the

1980s. With Germany's limited fossil fuel reserves and the ascension of climate change on the political agenda, however, the possibility of relying on coal indefinitely posed a significant energy security risk as well as an environmental threat (Toke & Vezirgiannidou, 2013). Thus, with nuclear providing a stable source of energy, fossil fuel dependency was reduced while increasingly efficient renewables filled in any shortfalls. During the Grand Coalition of 2005-2009, the three governing parties were sufficiently divided on the issue that the 2005 Coalition agreement dictated that changes to the nuclear phase-out agreement were impossible, thus strengthening the need to develop a replacement to nuclear as rapidly as possible (IEA, 2007: 27). Therefore, by the time of the CDU/CSU-FDP government that presided over the final years of the period under investigation, peak levels of investment in renewable energy technologies were occurring in Germany. In 2009 alone, installed capacity of solar PV increased from 1.8 GW to 3.8 GW (Jacobs, 2012: 175). With emissions from electricity generation diminishing steadily, the only way for Germany to meet international climate goals was to make ambitious goals outside the electricity sector. Thus, the 2010 Energy Concept outlined the need for a long-term energy strategy until 2050, and featured emissions reductions targets of 40% below 1990 levels by 2020, 55% by 2030 and 80-95% by 2050, placing Germany at the very forefront of ambition regarding emissions reductions (BMU, 2010: 5). As discussed in Chapter 5, such ambitious goals were developed because of Germany's strong renewables sector, which stood to benefit economically from ambitious climate policies overseas.

In addition to the benefits of relying on nuclear as a stable source of low-carbon electricity around which the dependence on fossil fuels could be reduced, the intention to phase-out nuclear played an equally important role in strengthening German climate policy. With the thorny issue of nuclear power essentially 'settled' following the 1999 phase-out bill, German NGOs could finally join the climate debate during the 2000s. "Up to this point, they had not been active in the climate policy subsystem, due to their fear that advocates of nuclear energy… would promote atomic power as a CO_2-free source" (Watanabe, 2011: 85). Nuclear power stations were taken offline in 2004 (Stade) and 2005 (Obrigheim), suggesting that Germany was willing to act immediately to phase out nuclear energy (IEA, 2007: 27). Moreover, with a new Chancellor in Angela Merkel from 2005, the stage was set for Germany's perceived primary environmental risk to be switched from nuclear power to climate change. A trained scientist, Merkel identified climate change as an area in which Germany could push for global climate ambition whilst also reaping the benefits of exporting renewable electricity technologies, giving her a new moniker, the 'Climate Chancellor' (Interview 1). In 2007, with the support of the newly-focussed environmental movement, Merkel's Grand Coalition committed to a 40% greenhouse gas reduction target by 2020 (from a 1990 base), without the inclusion of nuclear energy, placing Germany at the forefront of climate policy (Schreurs, 2008: 349). Thus, by intending to phase out nuclear power – which accounted for almost one third of domestic electricity production during the period – Germany was forced to replace the energy source with renewables (and, to a lesser degree, fossil fuels) and also improve energy efficiency. Modelling has suggested that the nuclear shut-down can be completed without increased emissions of carbon dioxide, as a result of an increased renewables provision and greater energy efficiency gains (IEA, 2007: 8). Thus, Germany's balanced position of using nuclear power as a stopgap to wean itself off fossil fuels, while also seeking to phase-out nuclear in the middle-term, facilitated more ambitious climate policies.

6.3.4: Sweden

As identified earlier, Sweden relied on nuclear between 2006 and 2010 and saw an upturn in popular support for the energy source during the period. However, Sweden also possessed a culture of scepticism about nuclear power as well, and during 2006-2010 the intention to phase out the energy source at some point in the future, despite the 2010 deadline extension. With the political climate such that a return to fossil fuels would be almost impossible having already phased them out (for electricity production at least), the delayed but impending phase-out thus incentivised investment in renewables, an increase in energy efficiency and an overall reduction in electricity consumption. This section highlights the manner in which a middle-ground stance towards nuclear power can play a key role in the development of ambitious climate change policy in the state. This thesis therefore finds agreement with Marshall's (2007: 146) suggestion that Sweden's reliance on nuclear is key to its attempts to be a climate pioneer. This section highlights the impact of nuclear power on Sweden's emissions during the period, arguing that the intention to phase out nuclear energy engendered an ambitious attitude towards climate change by decoupling the energy sector from fossil fuels, before arguing that the promise of nuclear phase-out necessitated investment in renewables and reductions in energy consumption, creating further incentives to develop strong climate mitigation policies.

As shown in Chapter 4, despite nuclear power in Sweden having been forecast to be abolished by 2010 as a result of the 1980 referendum, nuclear played a pivotal role throughout 2006 to 2010. During the 2000s, nuclear power rapidly regained acceptance as a carbon-free energy source, despite the production of waste and potential threat of meltdown (Zannakis, 2009: 140). As Fischer and Berglund (1994: 317) argued presciently in 1994, "[t]he underlying consensus required for a complete ban can erode over time as new perceptions and political realities are faced." In this case, the risks associated with climate change were perceived to be greater than those of nuclear power. The decision to further extend the phase-out in 2010 was seen as pragmatic and necessary, considering the pressure to act on climate change (*see* Wang, 2006). With the Centre Party and Christian Democrats having previously expressed opposition to nuclear power, their support for the Bill highlighted a willingness to facilitate low-carbon electricity decisions, even if energy security and electricity prices were also factors in the decision (*see* Löfstedt, 1994: 1106; Zannakis, 2009: 141). Thus, by 2006, nuclear power was responsible for almost half of Sweden's electricity supply (Regeringskansliet, 2009: 20-21; Sarasini, 2009: 639).

The outcome was that Sweden garnered a global reputation for low carbon emissions, which in turn necessitated even more ambitious policies to meet global emissions reductions targets. With the low-hanging fruit of reducing fossil fuels in the electricity portfolio unavailable, Sweden was forced to develop more stringent policies, which thus placed the state at the forefront of global ambition. A key part of Sweden's international identity is its reputation as the 'best student in class' (Interview 9; Zannakis, 2009: 159); with nuclear power reducing emissions in the electricity sector, further reductions were required to remain at the forefront of climate policy, as demonstrated in the Energy Bill of 2009. Thus, the presence of nuclear power can be identified as a key factor in encouraging a state to develop ambitious climate policy.

If it were simply the case that nuclear power engendered ambitious climate policy, Finland would have been a climate pioneer to the same degree as Sweden. Yet, the political dominance of nuclear power in Finland as a panacea to its most pertinent threats removed the need to produce electricity from any other source. Thus, it is the additional factor in Sweden's case that the state not only possessed nuclear power, but was expected to phase out the energy source, that was crucial in enabling ambitious climate policy. By relying on nuclear power up to and during 2006 to 2010, Sweden had already separated its electricity production portfolio from fossil fuels, making it difficult to go back. As Friberg (2009: 176) stated in 2009, "[t]he discussion has now shifted to how, not if, Sweden should rapidly reduce its emissions". Therefore, the expectation that nuclear power would be phased in the future necessitated that the state should seek to reduce overall energy consumption, improve energy efficiency and invest in renewables to make up the shortfall left by nuclear. These policies directly facilitated more ambitious climate policies, as the pursuit of each approach would lower emissions, thus enabling greater confidence towards future reduction goals. While nuclear power enabled the state to be a low carbon pioneer, its theoretical phase-out ensured that further climate-friendly solutions would be needed in the long-term. Although the Coalition government extended the nuclear phase-out in 2010, the decision was so close (174 votes to 172) that even that decision was a risky venture by the Alliance (Ward, 2010). As such, the only politically viable approach towards nuclear energy on the part of the pro-nuclear Coalition was to extend the phase-out deadline, thus ensuring that an eventual phase-out remained an obligation to the Swedish state. Sweden's ambivalent and dynamic attitude towards nuclear therefore created the ideal conditions for moving away from fossil fuels and incentivising further investment in renewables.

6.4 Discussion

In a similar vein to the Discussion section of Chapter 5, the concept of path dependence can be used to understand more clearly the arguments made in this chapter. As discussed in Chapter 5, by identifying a critical juncture and positive feedback mechanisms that consolidate a certain behaviour, the extent to which a state has become locked into a given behaviour may be identified. While in Chapter 5, path dependence was used to highlight how a state can become locked into a path that facilitates climate policy ambition, in this chapter it will be argued that states can become locked into a path that hinders climate policy ambition. The Goldilocks Hypothesis at the start of this chapter was developed as a means of theorising the optimum relationship between nuclear electricity policy and climate policy. Path dependence can be used to understand the policy behaviours that fall either side of this position. States can become locked into policy approaches regarding nuclear energy that inhibit climate policy ambition, thus inhibiting the dynamic policy stance required to simultaneously produce nuclear energy and seek to phase out the energy source.

The 1978 ban on nuclear energy was a critical juncture in Austrian electricity policy, locking the state into an energy policy approach that did not include nuclear power. This event was a critical juncture. The referendum passed by just 50.5% to 49.5% – partially as a result of the unpopularity of the Austrian Chancellor at the time – but once established, opposition to nuclear energy became consolidated and locked into Austrian politics. Since 1978, the government has been unable to pursue the introduction of nuclear energy for fear of the electoral consequences. With the Three Mile Island and Chernobyl disasters strengthening public opinion against nuclear energy, positive feedback mechanisms were established that necessitated that politicians oppose the energy source. Furthermore, the fervent opposition to nuclear power felt by many Austrian citizens resulted in campaigns to oppose nuclear power in surrounding states too (Lofstedt, 2008; Martinovsky and Mareš, 2012). This focus on neighbouring states displaced potential pressure on the Austrian government to reduce its carbon emissions onto the governments of the Czech Republic and Slovakia, thus pushing climate change down an already packed political agenda.

With renewables still relatively costly and inefficient during the period under investigation, the lack of nuclear power required that electricity be sourced from fossil fuels. With the state dependent upon fossil fuels for its electricity supply, the government lacked both the capacity and incentive to formulate ambitious climate policies. Thus, through its total opposition to nuclear energy, Austria was inhibited from formulating ambitious climate policy.

As Säynässalo (2009: 126) notes, "Finland [is a state]… in which anti-nuclear politics has had considerably less success than in Sweden or Germany", let alone Austria, which has never produced its own nuclear electricity. The critical juncture in Finnish energy policy was the Mankala principle in 1963 which enabled industrial organisations to co-own electricity production and buy the resultant energy at cost price. As a result, heavy industry – a key provider of jobs and exports to Finland – was a strong supporter of nuclear power as the energy source enabled the industries to keep electricity prices low. Thus, when another critical juncture occurred following the Chernobyl disaster occurred in 1986, the Finnish government committed to only cease expansion of nuclear energy (Teräväinen, 2012: 79), rather than phase out the energy source. In addition to the support of heavy industry, concerns over the need to ensure energy independence from Russia a significant positive feedback mechanism for the maintenance of nuclear energy, by 2002 a proposal was developed to expand nuclear electricity once more. As climate change rose on the Finnish political agenda during the 2000s, nuclear presented a potential means of maintaining low GHG emissions, which in turn acted as another positive feedback mechanism for nuclear energy.

Thus, by 2006-2010, Finland was locked into a path that favoured nuclear energy significantly, and agreed to construct two more NPPs in 2007 and 2010 (*see* Järvelä *et al.*, 2012: 24). As a result, because Finland produced very few GHG emissions resulted from electricity production between 2006 and 2010, the state showed little desire to develop ambitious climate change policy. This reliance on nuclear electricity demonstrates the extent to which Finland had become locked into favouring nuclear energy to the detriment of other energy sources. The Finnish government was able to champion itself as a low-carbon leader because of the lack of greenhouse gases produced by the energy sector as a result of the role played by nuclear energy, reducing the pressure created by Finnish citizens to lower emissions further (Interview 26). Finland therefore had little need to invest in renewables, reduce electricity consumption or improve energy efficiency. As a result, the decision that heavily favoured nuclear energy in 1963 created a dependence on nuclear energy that hindered Finland's climate policy ambition during 2006-2010.

Both Germany and Sweden have seen meandering policy positions with regards to nuclear power since the 1973 Oil Crisis. I argue that this dynamic approach was only possible because certain behaviours and attitudes towards nuclear energy had not become locked into the two states' policy-making. Both states generated a significant percentage of electricity from nuclear power during 2006-2010 (*see Table 18*). As a result, the two states were able to phase-out fossil fuels and bring in renewables incrementally, whilst relying on nuclear power to provide a significant baseload for their energy. Simultaneously, having committed to phasing out nuclear energy in the future – even if both states sought to extend the phase-out deadline in 2010 – Germany and Sweden were not disincentivised from reducing electricity consumption, investing in renewables or improving electricity efficiency, as was the case in Finland. As discussed, this optimal approach to nuclear energy in terms of climate policy ambition demonstrated a Goldilocks Effect. I argue that such an effect was only possible during 2006-2010 if a state was not locked into a certain policy approach towards nuclear energy, but instead could formulate new policies as required. While "[d]oubts have been voiced about Germany's ability to phase out coal and nuclear power simultaneously", having committed to doing both, the German renewables and energy efficiency industries were able to become world-leading, thus incentivising more ambitious climate policies, as discussed in Chapter 5 (Toke & Vezirgiannidou, 2013: 545).

6.5: Conclusion

It has been argued widely that nuclear power can directly improve the climate by acting as a low-carbon source of electricity (Fthenakis & Kim, 2007; Jean-Baptiste & Ducroux, 2003; Sovacool, 2008; Verbruggen, 2008). NPPs have thus shifted from environmental enemy to environmental remedy in the eyes of some. However, the existing literature has not explored how far nuclear power may influence climate change *policy*, by strengthening or weakening the imperative to develop more ambitious objectives in other sectors. This chapter makes an original contribution to the literature by arguing that although nuclear power may provide a low-carbon source of electricity, total opposition to nuclear energy is likely to result in a dependence on carbon-intensive fossil fuels, which also impinge on a state's confidence when formulating ambitious climate policy goals. Meanwhile, if a state relies on the energy source to too great an extent, a degree of complacency is developed regarding emissions reductions, thus reducing the need to develop ambitious climate policy. Thus, the area between these two extremes may be considered a 'Goldilocks' zone, such that the most ambitious climate policies are found in those states that rely on nuclear energy, but intend to phase it out. To occupy this zone, a state must be locked into a policy approach that neither favours nor opposes nuclear electricity, and instead must be able to weave between policy priorities over time. Thus, unlike in Chapter 5 where climate pioneers were locked into behaviours that favoured renewable electricity development, regarding nuclear energy a state must be able to assume a dynamic and sometimes meandering policy position in order to become a climate policy pioneer. Path dependence can thus be used to see how established processes can both facilitate and inhibit ambitious climate policy.

This argument was outlined by firstly explaining the relationship between each of the case studies and nuclear power. Austria possessed a total ban on nuclear electricity generation within its borders, meaning that concerns over the safety of nuclear precluded the possibility of receiving any climate-friendly outcomes of investing in nuclear power. This perception was reflected in and strengthened by a crucial 1978 referendum to ban nuclear power, which passed narrowly as a result of a strong environmental movement and political expediency at the time. Having institutionalised opposition to nuclear power, Austria has not seen attempts to U-turn on the ban, due to the state's proximity to the worst effects of the Chernobyl disaster and a public that takes great pride in its domestic reputation for environmental beauty. In turn, the state remains dependent upon fossil fuels for a significant percentage of its electricity generation, reducing its capacity to formulate ambitious greenhouse gas reduction targets.

For Finland, nuclear power was an important source of electricity between 2006 and 2010, representing not just a third of all electricity generation at the time, but also an area of investment for future electricity production as well, with both the construction of a fifth NPP, and the allocation of licences for two further NPPs, occurring during the period. This expansion was identified as being a result of Finland's cross-party support for nuclear power, which arose from the perception that nuclear power offered independence from Russia, a centralised and reliable source for the state's large amounts of heavy industry resulting from the Mankala principle, and, ironically, a solution to climate change. As one Finnish Green Party interviewee was quoted in Teräväinen *et al.* (2011: 3437) as saying, in Finland, nuclear has been seen "not as an energy policy decision but a decision of a new direction for Finland… a measure of how much one supports sovereign Finland." As a result, a number of potentially climate-friendly policies in Finland were ignored because they were deemed unnecessary (Interviews 25; 26; 27; 31; 32). Germany and Sweden fell in between these two extremes; with larger populations and industrial sectors, nuclear provided a reliable source of electricity during the five-year period, but the states were also both committed to phase-outs in the future.

While nuclear phase-out was extended in 2010 in both Germany and Sweden, the commitment to phase out nuclear power remained in principle, thus necessitating policies that would reduce electricity consumption, improve energy efficiency and result in the expansion of renewable electricity. A Goldilocks Hypothesis was developed in this chapter to explain the impact of nuclear energy on a state's climate change policy. Nuclear power can provide a low-carbon electricity source that is favourable to the development of ambitious climate policy as it necessitates reductions in other sectors in order to meet international obligation. Equally, a lack of nuclear power can also be beneficial as it necessitates investment in other electricity sources, which may include renewables, or require reductions in electricity consumption, or improvements in energy efficiency. The optimum scenario, therefore, regarding nuclear power and climate policy was to produce nuclear power but to seek to phase it out at some point in the future. In line with the findings of Jänicke (2011: 144), the potential nuclear-phase out "created extraordinary pressure for innovation of energy technology and policy". Germany and Sweden reflected this 'Goldilocks Effect', having relied on nuclear power during the period but also seeking to phase it out at some point, with the outcome that the two states developed much more ambitious climate policy than Austria or Finland.

Germany and Sweden were only able to assume such positions, however, because they were not locked into a certain path on the issue. Neither state was locked into opposing or supporting the electricity source, meaning that in both states, energy policy twisted and turned according to requirements at the time. Path dependence can be used to show how dominate narratives – particularly nuclear energy in Austria, and the threat of Russia in Finland – can lock states into certain policy approaches regarding nuclear energy, which in turn hinders policy-making capacity regarding climate change. Thus, path dependence shows that long-term investment in renewables as a result of the principles of EM facilitated ambitious climate policy, as shown in Chapter 5. To be a climate policy pioneer it was also necessary not to be locked into a policy path regarding nuclear energy, in order to develop a dynamic approach to the energy source that simultaneously enabled both a reliance on nuclear power and the intention to phase it out.

Chapter 7: Conclusion

This investigation has identified a gap in the existing literature on comparative climate change policy and sought to address why there is variation in the ambition of climate policies of developed states. In so doing, the states that may be considered climate policy pioneers and laggards have been identified, the patterns that influence climate policy across developed states have been explored, and arguments that explain those cases not included in the medium-n solution have been created. The existing literature related to this subject, and specifically on the subject of climate (rather than environmental) pioneers, was inconclusive on a number of issues, and, as such, this investigation has sought to answer the following question.

Research Question: What explains variation amongst developed states' climate policies?

The nested analysis approach, beginning with a medium-n analysis and then focussing down into a small-n investigation, detected patterns that explain correlations amongst all twenty-three Annex II states. Moreover, the medium-n analysis also enabled the case studies with the greatest explanatory value to be selected, through the use of Mill's (1848) Method of Difference. This conclusion overviews the empirical findings of this thesis, synthesises these findings, discusses the wider relevance of the thesis and the limitations of the study, before detailing the next steps and future avenues for research.

Since the period under investigation, climate policy appears to have dipped down the political agenda significantly. According to one German SPD politician (Interview 6), this reduction in political support for ambitious climate policy can be explained primarily by the impact of the financial crisis on policy development. Citizens who have seen their annual incomes drop significantly due to lower salaries and higher employment levels are perceived by many politicians – rightly or wrongly – as prioritising the economy over all other issues. In turn, two Swedish diplomatic staff members (Interview 38) posited that the financial crisis has been exploited by other European states in order to reduce the pressure to expend political capital on climate change. These effects of the global financial crisis on climate policy ambition have been exacerbated by the failure at the Copenhagen Conference of the Parties to agree a replacement to the Kyoto Protocol, which further reduced international pressure to mitigate climate change (Interviews 11; 12; 29). As a result, between the end of the period under investigation in this thesis (December 2010) and the time of writing (September 2014), climate change policy has not developed significantly in terms of ambition. States that were identified as laggards in this thesis, such as Australia and Canada, have weakened rather than strengthened pre-existing climate legislation since 2006-2010, at the national level at least (Hurst, 2014). Moreover, climate policy pioneers, for example, Germany, have failed to maintain the momentum highlighted in this investigation (Rönsberg, 2013).

7.1: Empirical findings

This thesis has challenged a number of pre-existing assumptions regarding the nature of climate policy formulation in developed states. By translating existing data into fsQCA terms, climate policy leaders and laggards for 2006-2010 were identified. From here, this investigation enabled the patterns of conditions that are sufficient to result in ambitious and not ambitious climate policy to be identified. Two additional arguments that could not be translated in terms applicable to the medium-n analysis were then developed, with the concept of path dependence a means of understanding both arguments. These arguments were developed from forty semi-structured interviews with elite policy-makers and analyses of government policy documents, legislation, published research articles, working papers and news articles.

7.1.1 Empirical findings from the medium-n analysis

First of all, five states were identified as climate pioneers between 2006 and 2010 – Germany, Iceland, Portugal, Sweden and the UK – in the fsQCA undertaken in Chapter 3, while France, Ireland and Norway developed strong, but not pioneering, policy. Austria, Canada, Italy, Japan and the USA, and to a lesser extent, Australia, Belgium, Finland, Greece, Luxembourg, Netherlands, and New Zealand, were the least ambitious of the Annex II states. Four of the five climate pioneers have been highlighted as climate leaders before (*see* WWF, 2014), while Iceland was not included in the WWF study and is often neglected due to its small size. What is perhaps more significant is the discovery that states that have traditionally been considered environmental pioneers have neglected climate change. Of particular interest here are states such as Austria, Finland and Netherlands, which have each been identified as environmental pioneers (Liefferink & Andersen, 1998*b*), but were defined as relative climate laggards in this thesis. The identification of a differentiation between the factors that explain pioneering environmental policy and pioneering climate policy thus raises questions over why certain states were able to prioritise transboundary as well as local environmental issues while other states were not. Four of the six environmental pioneers were selected as case studies for further exploration in Chapters 4, 5 and 6, ensuring that a clearer understanding of the factors that shape climate policy in these environmental pioneers could be gleaned.

The application of fsQCA to explain climate policy ambition in developed states provided an innovative contribution to the literature on set theoretic methods, as the method has never been used for examining variation in climate policy ambition (for research on climate policy implementation, see Never & Betz, 2014). The method is ideal for locating causal configurations that influence a given outcome; in this case, variation in climate legislation. Significantly, EU membership was almost a necessary condition for pioneering climate legislation by itself, supporting existing literature that argues the EU is a crucial variable when explaining climate policy ambition (Jänicke, 2005; Jordan *et al.*, 2011*a*; Lenschow *et al.*, 2005; Schreurs & Tiberghien, 2007). However, as the condition was found to be not quite necessary, non-EU members states may still become climate pioneers, suggesting that agency and decision-making play a key role in climate policy formulation as well as structural conditions.

Regarding configurations of conditions that are sufficient for pioneering climate policy, the combination of EU membership and left-wing government was identified as sufficient. While both of these variables have been identified previously as factors that influence climate policy formulation (Jänicke, 2005, 2006; Jordan *et al.*, 2010; Lenschow *et al.*, 2005; Neumayer, 2003, 2004; Rohrschneider, 1988; Schreurs & Tiberghien, 2007), the inter-related nature of these conditions is a new finding that is of particular interest to those who research European politics and party politics. Moreover, the finding adds support to the argument that climate change remains a directional issue, challenging those assumptions that suggest climate change is a valence issue in those states that have become pioneers (Mertig & Dunlap, 1995). There were exceptions to this finding, however. Five states – Germany and Sweden, and to a lesser extent, Denmark, France and Ireland – were EU members with 'not left-wing' governments, and formulated ambitious climate policy. Chapters 4, 5 and 6 sought to explain why these states formulated ambitious climate policy despite not meeting the conditions of the sufficient solution in the fsQCA.

Regarding 'not ambitious' climate policy, the parsimonious solution of the fsQCA identified not being a member of the EU as a sufficient condition. This solution explained the policy outputs of Australia, Canada, Japan, New Zealand and the USA, as each state received a score of 0 for EU membership, and either 0 or 0.23 for climate policy ambition. This finding suggests it is particularly unlikely that non-EU states will formulate ambitious climate policy in the future; a finding that is particularly problematic when it is remembered that in 2010, eight of the ten biggest emitters of GHGs in absolute terms were outside the EU (World Bank, 2014). The finding also extends the work of Tosun & Knill (2009) on the impact of trade integration on environmental policy development to include climate policy development. However, Austria, Belgium, Finland, Greece, Italy, Luxembourg and Netherlands received low scores for climate policy ambition but received full scores of 1 for EU membership. This finding does not challenge the results of the fsQCA, as non-membership of the EU was a sufficient rather than necessary condition for 'not ambitious' climate policy. However, it did raise the question of why these states were climate laggards.

Two of the conditions identified in Chapter 2 as potential independent variables that influence climate policy ambition were found by the fsQCA not to be sufficient for ambitious policy or 'not ambitious' climate policy. Political discretion and GDP per capita have been identified in the existing environmental policy literature as potential causes of policy ambition. Veto points have been identified within the literature as playing a mixed role; while Baumgartner and Jones (1993) posited that veto points could provide access for otherwise marginalised voices, thus increasing policy ambition, Tsebelis (1995) and Hallerberg and Basinger (1998) argued that veto points could introduce barriers to the policy process which could stymie ambition. As political discretion was not identified within the parsimonious configuration of conditions that was sufficient for ambitious and not ambitious climate policy, it is impossible to determine which side of the argument on the role of veto points was correct; both perspectives could offer a degree of validity. In certain situations veto points may offer an access point for new voices, at other times they may present an obstacle; further research is required to determine how this dual role functions.

GDP per capita was also excluded from the configuration of conditions that was sufficient for pioneering climate policy, challenging the findings from Börzel (2002), Jänicke (2005) and Neumayer (2002*c*) that suggested wealth could play a significant role in affecting climate policy. As all twenty-three states in the fsQCA were, by definition, developed, the finding that GDP per capita was not sufficient for ambitious or not ambitious climate policy suggests that wealth may play a role when explaining policy differences between developed and less economically developed states, but may not play a role when explaining differing levels of ambition amongst developed states.

The patterns identified in Chapter 3 – arguing that EU membership and left-wing government in combination are sufficient for a state to become a climate policy pioneer, and that non-membership of the EU is sufficient for not ambitious climate policy – is therefore original. However, there were exceptions to this finding, thus necessitating further research in this thesis to identify which other factors may be sufficient for a state to become a climate policy pioneer. The findings identified in the subsequent chapters of the thesis were unable to be translated into fsQCA terms, which require a 0-1 scale, otherwise they would have been included in the analysis in Chapter 3. Despite these further findings, the correlations identified within Chapter 3 not only provided new understanding of the inter-relationship between EU membership and left-wing government and the significance of EU membership, but also enabled case studies that offered the greatest explanatory power possible to be selected.

7.1.2 Empirical findings from the small-n analysis

Having selected as case studies four states that were not explained by the two solutions in Chapter 3 and also shared similar scores for the four conditions but different scores for the outcome, it was possible to explain the pioneering climate policy of Germany and Sweden in contrast to the relative lack of ambition shown by Austria and Finland. Following forty elite interviews as well as informal scoping conversations held with academics and specialists in the field (*see* Dexter, 2012), and analysis of legislation and other primary sources, two arguments based on empirical research were made to explain the differences in policy outputs in the four states.

Firstly, I argue that when renewable electricity policy is influenced by Ecological Modernisation, investment in renewable electricity technologies is encouraged as a means of providing an export opportunity. By seeking to create a new export opportunity – either in the form of technology or excess electricity – states that were influenced by the principles of EM sought to invest in new renewables technologies. By developing ambitious climate policies, such states were able to support their burgeoning technological renewable electricity industries. Moreover, the pioneers stood to gain economically in the event that other states followed their lead by formulating ambitious climate policies, as these other states would be likely to invest in technological renewables, too. Investment in renewables – particularly solar power in Germany, and wind turbines in Sweden – created a win-win scenario for the two pioneers during 2006-2010, as they were able to profit from emissions reductions. As a result, "Germany has played both a political and economic leadership role in climate change policy" (Jänicke, 2011: 129), as has Sweden.

Austria, on the other hand, failed to engage with the EM narrative (during 2006-2010, and with regards to climate change, at least), while Finland applied the pro-growth and pro-technology principles of EM to end-of-pipe solutions for heavily polluting industries. Christoff (1996: 101) and Zannakis (2009: 67) argue that end-of-pipe solutions are out of keeping with the principles of EM, as they maintain sectors that are likely to be at least slightly damaging to the environment, rather than creating new sectors that can be environmentally-friendly from the start. Thus, neither Austria nor Finland embraced the paradigm of EM in a manner that would reduce emissions, and as such, their energy portfolios were more reliant on climate-damaging sources than they might have been. Thus, the primary empirical finding of Chapter 5 was that in states which developed renewables policy that was influenced by EM, more ambitious climate policy resulted.

This finding challenges existing assumptions regarding the role of EM and climate change. It has previously been argued that pro-growth strategies would inevitably damage the climate (Spaargaren & Mol, 2010), or that EM would be inadequate when responding to the challenge of climate change (Gouldson & Murphy, 1997). Indeed, Jänicke (2005: 129) argues that states which pursue EM may struggle to maintain the prioritisation of environmental concerns during times of economic crisis, suggesting that while economic interests can be used to prioritise the climate, when the economy is the government's priority in times of recession, climate change is likely to be neglected. As capitalism is noted for occasional recessions and depressions, it is unlikely that EM can be relied upon for providing a long-term solution to climate change. This thesis therefore posits a more nuanced position. While it may be the case that in the long-term, EM is insufficient for mitigating the worst effects of climate change, during 2006-2010, pursuit of the paradigm was sufficient to ensure that some states became pioneers. EM may act as an incentive to create first-movers, which could then facilitate increased ambition in other states.

The second argument made in the small-n analysis was that attitudes towards nuclear power can influence whether a state becomes a climate policy pioneer. I argue that a dependence on nuclear power, or total opposition to the energy source, can hinder climate policy ambition. There is therefore a ‘Goldilocks’ point at which climate policy is facilitated between these two extremes. As Germany and Sweden both possessed nuclear power during 2006-2010, yet were obliged to phase out the energy source in the future, the two states’ approach to nuclear power fell within the boundaries of the Goldilocks Hypothesis. By relying on nuclear power already, fossil fuel consumption could be reduced, thus decoupling the energy sector from fossil fuels and necessitating that future reductions are made in other sectors. In addition, by also seeking to phase out nuclear power, replacement energy sources – which were primarily renewables, as a result of wider obligations to reduce emissions – facilitated further ambitious emissions reductions goals.

In contrast, Austria’s total ban on nuclear energy since 1978 ensured that the state was forced to rely on fossil fuels for its electricity supply. This reliance thus reduced the capacity of the Austrian state to formulate more ambitious climate policies. At the other end of the nuclear energy policy spectrum, by relying upon and expanding nuclear provision, Finland lacked an incentive to invest in renewables, reduce electricity consumption or improve energy efficiency. Finland’s particularly pro-nuclear stance may be traced back to the agreement of the Mankala principle in 1963, in which heavy industry was enabled to buy electricity at cost price, thus incentivising their investment in large, centralised electricity sources, particularly nuclear power. This argument provides a more nuanced interpretation of the existing literature related to nuclear power. While it has been argued that nuclear power facilitates climate protection (Caplan, 2014; Lynas, 2011; Massey, 2014; Sailor *et al*., 2000), the opposite has also been argued because of the emissions created over the lifecycle of an NPP (Caldicott, 2006; Green America, 2014; Kopytko & Perkins, 2011; Sovacool, 2008). Thus, the empirical evidence garnered in this thesis has enabled a more nuanced interpretation of the relationship between nuclear power and climate change to be developed. Nuclear power can be a stepping stone towards more ambitious climate policy, but only if there is an expectation that the energy source will at some point be phased out, such that plans for improved energy efficiency and investment in renewables may be made.

7.2: Synthesis of empirical findings

When drawing together the empirical findings outlined above, I argue that path dependence can be employed as an effective concept for understanding the nature of the two arguments identified in Chapters 5 and 6. Path dependence provides a means of understanding how events leading from a critical juncture can result in conditions that can either strengthen or hinder climate policy ambition. This is not to say that the nature of the two arguments made in the small-n analysis are qualitatively different to the four conditions of the fsQCA, but rather that by employing the concept of path dependence to examine the arguments made in the small-n analysis, a greater understanding of the causal process may be developed.

In the case of renewable energy policy, the principles of EM were established by past policy decisions, such as the introduction of FITs in Germany and the Carbon Tax in Sweden, which locked the states into policy approaches that favoured renewables. In the case of nuclear energy, however, path dependence can identify the manner in which Austria and Finland became locked into paths that hindered climate policy ambition. By *not* being locked into either favouring or opposing nuclear energy, Germany and Sweden could develop a more dynamic position, in which they simultaneously relied upon nuclear energy, but also sought to phase out the energy source in the future. While this is not to say that states can only become climate policy pioneers if past events facilitate such an outcome – after all, agency remains a crucial facet of policy-making – in the cases explored in this thesis, path dependence provides a strong analytical concept for understanding variation of climate policy ambition during the period under investigation. Thus, this thesis has demonstrated that path dependence can be used for identifying processes that can support or hinder climate policy formulation.

Having noted the utility of path dependence for understanding the processes that influence climate change policy, it is necessary to synthesise the findings of the small-n analysis. The two arguments made in Chapters 5 and 6 are complementary: regarding renewables policy, path dependence can be used to identify how states can become locked into patterns of behaviour that strengthen climate policy ambition; regarding nuclear electricity policy, path dependence can be used to identify how states can become locked into patterns of behaviour that weaken climate policy ambition. Thus, when seeking to explain why states become climate policy *pioneers* while others become *laggards*, rather than explaining variation *per se*, it is possible to hypothesise that the two arguments may operate in tandem. As noted in section 1.2, the following hypothesis may be developed from the results of this investigation. For the sake of clarity, let the argument around renewable electricity be 'A' and the nuclear electricity argument be 'B'. Argument A facilitates climate policy ambition; if a state's renewable electricity policy is shaped by EM, then the state develops more ambitious climate policy. Argument B also supports climate policy ambition; if a state sources electricity from nuclear power, but is seeking to phase out the energy source, then the state develops more ambitious policy. As such, the following will be argued:-

If a state exhibits A and B, then the state becomes a pioneer.
If a state exhibits neither A nor B, then the state becomes a laggard.
If a state exhibits either A or B, then the state is neither a leader nor a laggard.

This hypothesis draws from the empirical research collected in this thesis which explains climate policy variation. The two arguments developed in Chapters 5 and 6 can be used to explain variation in climate policy ambition; empirical evidence drawn from a range of sources appears to suggest that the two independent variables influence the dependent variable. When seeking to explain why a state formulated the *most* ambitious climate policy, however, rather than merely good climate policy, it may be hypothesised that a state would need to demonstrate both arguments in a manner that favours climate policy ambition. Similarly, when seeking to explain why a state formulated the *least* ambitious climate policy, rather than merely climate policy that was less ambitious than most developed states', it may be hypothesised that a state would need to demonstrate both arguments in a manner that hinders climate policy ambition. In the event that a state exhibits one of the arguments in a manner that supports climate policy ambition, but the other in a manner that hinders climate policy ambition, it is unlikely that the state would be a pioneer or laggard, and would instead demonstrate somewhat average climate policy ambition for a developed state. This hypothesis can provide the foundations for future research.

7.3: The wider relevance of the thesis

The empirical findings developed from this investigation provide some wider contributions to related fields of existing literature. In addition, the arguments made within this thesis are generalizable across the Annex II states, as a result of the nature of the case selection at the start of the thesis, but are less generalizable to countries that are not developed states.

7.3.1: The broader contribution

I have defined ‘developed states’ as the twenty-three members of the UNFCCC Annex II. This definition has presented an opportunity to explore an often overlooked group of states. The existing literature related to the Annex II group of states is limited, yet at the time of writing in 2014, the twenty-three states are the most likely champions of ambitious climate policy, and continue to be the majority of the biggest emitters of greenhouse gases. While both China (Johnson, 2014) and to a lesser extent, India (CPI, 2014), have demonstrated increasing commitment to climate change, both states depend upon prioritising economic growth over environmental concerns as they attempt to lift hundreds of millions of citizens out of poverty. While some may argue that China and India, as the most rapidly increasing source of emissions, are the most analytically salient cases when examining climate policy (*see* Dutta and Radner, 2010), this thesis refocusses the lens back onto the most developed states. Moreover, while much has been written comparing individual members of the Annex II (*see* Bailey & Rupp, 2005; Boasson, 2013; Harrison & Sundstrom, 2010; Steinberg & VanDeveer, 2012), little has been written on the group as a whole. As such, by investigating the Annex II states, new interpretations have been introduced to the existing literature on comparative policy-making.

Secondly, as was noted in the literature review in Chapter 2, much of the existing literature seeks to explain ambitious environmental policy, rather than climate policy. However, environmental policy and climate policy may be in conflict in certain circumstances. For example, renewable energy sources may be friendly towards the climate, but could necessitate significant local environmental damage, while nuclear electricity could lower GHG emissions, but in the event of a meltdown, be an environmental disaster (Tobin, 2014). Thus, by seeking to explain climate policy ambition, rather than environmental policy ambition, a significant distinction has been made in this thesis which emphasises the differences between the two policy areas. For instance, two of the conditions previously identified as playing a role in influencing environmental policy – GDP per capita (Börzel, 2002; Neumayer, 2002*c*) and the number of veto points (Baumgartner & Jones, 1993; Hallerberg & Basinger, 1998; Tsebelis, 1995) – were not identified in the fsQCA as part of any of the parsimonious configurations of conditions that influenced climate policy ambition.

Finally, fsQCA is a burgeoning paradigm that has received limited, but increasing, attention in political science research. The method has existed since the late 1980s, but question marks over the potentially subjective nature of the approach have seen some researchers shy away from employing what can be an analytically useful method (Lucas & Szatrowski, 2014). This thesis has sought to minimise potential criticisms of subjectivity by employing existing data as the source of information for coding the cases, as will be discussed in Section 7.4 of this chapter. Moreover, by using the method as a means of both testing initial assumptions and selecting cases, the strengths of fsQCA have been maximised. As a result, this investigation makes a contribution to the small body of existing literature on fsQCA, and is also the first attempt to explain climate policy ambition using the method.

7.3.2: Generalizability of the findings

While the findings of this thesis make a broad contribution to several existing fields of study beyond the strict topic of the investigation, as detailed above, the generalizability of the findings is not particularly strong outside the Annex II group of states. Firstly, the research question focussed upon policy ambition in developed states, as it was argued that these states possessed the greatest obligations and capacities to reduce emissions. By selecting the Annex II states, which were specifically defined upon the creation of the group as needing to lower emissions by the greatest amount, the most relevant cases were identified; very few states outside the Annex II twenty-three may be considered as developed. Potentially, since the creation of the Annex II in 1992, states such as the Czech Republic, Israel, Liechtenstein and Slovenia may be considered as developed, although they produce relatively low GHG emissions (OECD, 2014*b*). The findings of this thesis offer limited explanatory power when applied to less developed states that produce limited emissions and are also economically weak, for example, say, Guatemala, Sierra Leone or Vietnam. As such, this thesis has sought to provide an explanation of climate policy in developed states and has done so, but the arguments made offer limited utility when applied beyond those states.

Within the Annex II, however, the findings from this thesis are relatively generalizable. While the fsQCA was applied to all twenty-three states, the small-n research across Chapters 4, 5 and 6 was only applied to four case study states. The four cases were selected to include two climate pioneers and two laggards that were not explained in Chapter 3, and also controlled for the four conditions employed in the fsQCA; as such, they were the most analytically useful cases to be explored in greater detail. The four cases are relatively dissimilar to many of the other twenty-three Annex II states, particularly those outside the EU, potentially limiting the generalizability of the findings. Yet, by controlling for the conditions and selecting both climate leaders and laggards, new explanations that could not be tested in the fsQCA were developed. These interpretations, regarding renewables policy and nuclear energy, could provide new understandings of the other states in Annex II. Further research, in which these findings are applied to the nineteen other Annex II states, would therefore be beneficial.

Turning to the two main arguments outlined in Chapters 5 and 6, it is difficult to ascertain how generalizable the findings are without further research. For instance, the examination of the influence of EM principles on renewable electricity policy is impossible without conducting in-depth research on the state in question. As such, the generalizability of this argument regarding the other Annex II states is unknown without further investigation. In contrast, the argument related to nuclear phase-out, however, may be assessed for generalizability more easily with a cursory look at which states produced nuclear energy, those that did not, and those that were seeking to phase out the energy source during 2006-2010. This initial indication is deserving of further research.

According to the outcome scores allocated in the fsQCA, the explanation demonstrated by Austria that a lack of nuclear power can hinder climate policy is supported by Australia, Greece, Italy, Luxembourg and New Zealand, as none of these states sourced their electricity from nuclear and also received low scores for climate policy. In a similar fashion to Finland, Belgium, Canada, Switzerland and the USA produced nuclear energy but had no intention of phasing out the electricity source, and received low scores for their climate policy in the fsQCA. Finally, it appears that the argument that the intention to phase out nuclear energy results in strong climate policy is supported by Spain, as well as Germany and Sweden. The finding that fourteen of the twenty-three states appear to correlate with the argument about the relationship between nuclear energy policy and climate policy ambition is encouraging. The other nine states are therefore deserving of further research in order to explain why the Goldilocks Hypothesis appears not to apply to them, on first appearances at least. It may be the case that these unexplained states demonstrate the complementary nature of the two arguments formulated in this thesis, as hypothesised in Section 7.2. While the climate policies of the nine states may not be explained by the states' nuclear energy policies, if the influence of EM on their renewable electricity policies were known, however, these findings may explain the states' divergent outcome scores. The application of both of the arguments to the other nineteen Annex II states is therefore of importance.

7.4: Limitations of the study

A number of limitations that were encountered in this thesis must be noted. These limitations relate to challenges faced in both the application of the fsQCA in Chapter 3 and the undertaking of interviews for the analysis in Chapters 5 and 6. Firstly, fsQCA is weakened by an inability to analyse unlimited numbers of conditions simultaneously. The software is restricted by the number of cases in the investigation for fear of introducing limited diversity, prohibiting the inclusion of every variable identified in the existing literature (Schneider & Wagemann, 2010: 6). This weakness ensured that conditions were based on themes, rather than every possible argument found in the literature. Secondly, while a strength of fsQCA is the qualitative nature of the method – which in turn depends upon strong empirical knowledge of the cases under examination – a weakness of the method is the potential subjectivity involved in the process (Lucas & Szatrowski, 2014). This subjectivity was minimised by coding the cases according to existing data. However, when the anchors for determining scores of 0 and 1 were allocated, personal judgement was required to identify what may be considered a score of 0 or 1. To do so, the cases were plotted according to their raw scores and then groupings were identified; those states that clustered together at the extremes of each condition were coded as either 0 or 1, with the states in between calibrated accordingly. While the allocation of these values was thus conducted according to the recommendations in the existing literature, and changes to these anchors would make little difference (Ragin, 2014), these intrinsic features of fsQCA must be flagged up as potential limitations of the findings.

Challenges were also faced during the interview process. Prior to starting this PhD thesis I did not possess access to any contacts within the fields of Austrian, Finnish, German or Swedish climate policy with whom I could begin my investigation, meaning that I relied upon the generosity of the interviewees, and my own persistence, to locate individuals for interview. As a result of the snowball method I was able to interview forty elite individuals across the four states and in Brussels. However, the forty individuals were not evenly distributed across the four states; Austria and Finland provided the greatest number of interviewees. Additionally, as the interviews were conducted over the course of twelve months, both my existing knowledge and the questions I asked changed over time. Thus, the interviews were both exploratory and confirmatory, as new hypotheses were developed iteratively over the duration of the investigation. Finally, I was unable to interview individuals in similar roles or from similar parties across all four states. For example, my interviews in Germany were conducted shortly after the 2013 German general election in which the FDP lost all of their seats, ensuring that no employees of the FDP could be identified who were willing to be interviewed.

The limitations identified above are unlikely to have weakened the arguments made in this thesis significantly. While fsQCA possesses certain weaknesses, the method is ideal when seeking to test initial assumptions and select case studies, which was the function of the method in this investigation as part of a nested analysis. Limitations were mitigated as much as possible, and it is unlikely that any small alterations to the coding would make a difference to the solutions produced by the software (Ragin, 2014). As such, the implications of the limitations involved during the fsQCA are minimal. Regarding the elite interviews conducted in each of the case study states, it could be possible that more explanatory conditions or a more nuanced understanding of the factors involved could have been obtained with a greater number of interviews. However, having conducted forty interviews with individuals based in the climate policy field across each of the four states, and with each interview lasting around an hour, or even two hours in some cases, the wealth of data was sufficient for identifying and strengthening the arguments made in this investigation. As such, while every piece of original research is certain to face certain weaknesses, this thesis has minimised the potential limitations faced as part of the project, and those that could not have been avoided are unlikely to have altered the overall arguments that have been made significantly.

7.5: Future research

Building on from the contributions made by the thesis, the wider relevance of the investigation and the limitations of the study, it is possible to isolate a number of areas in which future research would be beneficial. Firstly, the application of the arguments regarding EM and nuclear phase-out should be applied to other Annex II states. In the event that the findings made in this thesis are applicable across all twenty-three states, it will be clear that electricity policy plays a highly significant role in explaining climate policy ambition in developed states. It would be particularly interesting to identify whether there are any barriers to climate policy ambition in the non-European states. Only Australia and New Zealand received a score above zero for climate policy ambition in the fsQCA (both states received a score of 0.23, which was still at the lower end of ambition amongst Annex II states), suggesting that non-EU states experienced significant barriers to ambitious climate policy formulation.

In addition to exploring the other nineteen Annex II states, it would also be beneficial to identify any climate pioneers amongst the additional states comprising the Annex I group. The forty-two Annex I states comprise the twenty-three Annex II states, but also include Economies in Transition following the fall of the USSR (UNFCCC, 2014*b*). While the nineteen 'non-Annex II, Annex I' states possessed a smaller obligation and capacity for reducing emissions, there may be pioneer states amongst their ranks. As such, applying the findings of this thesis to the Annex I states could further strengthen the arguments made here, or result in the identification of new pathways to pioneering climate policy. It is unlikely, however, that any states will be found to be as ambitious as Germany or Sweden within the non-Annex II Annex I states, as the two states have frequently been identified as global pioneers across the literature (Burck *et al.* 2007; 2008; 2009*a*; 2010; 2011).

Moving beyond the application of the findings to differing cases, it would be of interest to explore the factors explaining pioneering environmental policy as well as climate policy in more recent years. While climate policy arguably remains the less investigated of the two policy fields, overall it would be beneficial to determine whether the same factors explaining climate policy ambition may be applied to environmental policy. I would argue that it would be unlikely that there are such crossovers, due to the differing motivations that explain why a state may favour ambitious policies for protecting the local environment, such as a desire to protect areas of natural beauty. As such, an explicit comparison of the different motivations for climate policy ambition and environmental policy ambition would provide an original contribution to existing research.

Finally, the global financial crisis that took place in 2007-2008 was identified by several actors as reducing ambition with each of the four case study states (Interviews 4; 6; 7; 10; 11; 15; 16; 17; 18; 19; 20; 27). However, as the crisis did not alter the status of any of the four states as either leaders or laggards but rather diminished overall ambition in each of them, the financial crisis was not identified in this thesis as a salient factor for explaining climate policy variation. A climate pioneer is defined in this thesis as a relative term, meaning that the status of climate leaders is unaffected in the event that laggards reduce their ambition as well. Germany and Sweden became slightly less ambitious pioneers following the crisis, while Austria and Finland became even less ambitious laggards. As the scope of this thesis extends only until the end of 2010, and climate policy has been identified as a long-term process in this thesis, the worst effects of the crisis may not have yet been felt by the end of the period under investigation. Thus, an exploration into the impacts of the financial crisis on climate and environmental policy would be of particular relevance to the field. Of particular interest would be an examination of whether leaders or laggards reduced their ambition to a similar degree, or if there was variation in the reduction of ambition.

7.6: Conclusion

This thesis has sought to explain why certain developed states are climate policy pioneers using a nested analysis design. To do so, the investigation began by identifying which states may be considered as being climate policy pioneers by recoding existing data provided by Germanwatch.

Germany, Iceland, Portugal, Sweden and the UK were found to be climate policy pioneers during 2006 to 2010; Austria, Canada, Italy, Japan and the USA were climate laggards. While EU membership came close to being a necessary condition for pioneering climate policy, EU membership in conjunction with left-wing government was found to be sufficient for ambitious climate policy. This finding supports the argument that climate change is a directional issue in developed states, rather than being a valence issue. Yet, this solution did not explain German or Swedish policy, necessitating further investigation into these two pioneers. Non-membership of the EU was sufficient for 'not ambitious' climate policy. Controlling for the conditions used in the fsQCA, Austria and Finland were selected as additional case studies, as they possessed similar scores for each of the conditions, and were not explained by the solution for 'not ambitious' climate policy. As all four of the states were environmental pioneers during the late 1990s and early 2000s, the states made particularly interesting case studies.

Having selected four case studies, in-depth qualitative research was conducted involving forty semi-structured interviews with elite policy-makers, and analyses of government policy documents, legislation, published research articles, working papers and news articles. Here, two main arguments were made, which were supported by the concept of path dependence. Firstly, I argued that the concept of EM had become established in Germany and Sweden and incentivised investment in technological renewables, which both created an export opportunity and lowered emissions. While the capacity of EM to mitigate climate change in the long run is unknown, its principles were sufficient to result in a state becoming a *policy* pioneer during the period in question. Secondly, a Goldilocks Hypothesis was made regarding nuclear energy. I argued that by relying on nuclear power but seeking to phase out the energy source, Germany and Sweden were able to break away from fossil fuels but also encouraged to invest in renewables as a means of replacing nuclear. Austria was locked into a path that made nuclear energy impossible, thus creating a dependence on fossil fuels, while Finland was locked into prioritising nuclear energy, which removed the need to improve energy efficiency or invest in renewables. Neither Austria nor Finland developed renewable electricity policy according to the principles of EM, or sought to phase out nuclear power, explaining why the two states were relative laggards while Germany and Sweden were pioneers despite sharing the same conditions in the fsQCA.

The findings made in this thesis make original contributions to the existing literature on environmental and climate policy analysis. By seeking to explain the behaviour of both leaders and laggards, the factors that can facilitate the most rapid response to mitigating climate change were identified. As the effects of climate change are likely to worsen rapidly with each passing year as a result of the accumulation of greenhouse gases, it is imperative that the most ambitious policies possible be adopted by the biggest emitters as soon as possible. The findings in this thesis therefore have significant repercussions for policy. States should seek to invest in new renewable electricity technologies in order to create new export opportunities and also reduce emissions, while those states that possess nuclear power should legislate to phase out the energy source in order to incentivise a reduction in electricity consumption and an increase in renewables investment. Meadowcroft (2012: 79) notes that "defining a target is not effecting a transformation. But if climate leaders such as Germany… and Sweden follow through with further policy initiatives, they will achieve a fundamental transformation of their energy systems". If the worst effects of climate change – for example, drought, flooding, famine, conflict, and mass migration – are to be avoided, the leadership shown by Germany and Sweden should be followed by as many states around the world as possible.

List of Appendices

<u>Appendix 1: Raw data used in the fsQCA</u>

Table 19: climate policy ambition. 1= very good; 5= very poor.

Table 19: Raw data from the Climate Change Performance Index. Scores relate to national climate policy.

State	**2007**	**2008**	**2009**	**2010**	**2011**	**Average**	**fsQCA**
Australia	4.0	4.5	4.0	3.8	3.2	3.9	0.23
Austria	4.3	3.8	4.2	4.3	4.2	4.1	0.00
Belgium	3.5	3.7	4.3	4.1	3.6	3.8	0.30
Canada	4.9	4.4	4.3	4.5	3.7	4.4	0.00
Denmark	2.9	4.0	3.3	3.8	3.7	3.5	0.58
Finland	3.6	4.1	4.3	3.9	3.1	3.8	0.31
France	3.5	4.0	3.5	3.2	3.2	3.5	0.66
Germany	3.0	3.0	3.1	3.5	3.1	3.1	1.00
Greece	3.6	3.8	4.2	4.2	3.6	3.9	0.23
Iceland	3.7	2.8	3.4	3.4	2.3	3.1	1.00
Ireland	3.5	3.6	3.5	3.3	2.9	3.4	0.76
Italy	3.7	4.3	4.5	4.5	3.7	4.1	0.00
Japan	4.1	4.8	4.3	4.2	3.5	4.2	0.00
Luxembourg	4.1	3.9	3.9	3.6	3.7	3.8	0.30
Netherlands	3.8	4.0	4.0	4.0	3.4	3.8	0.29
New Zealand	3.6	3.8	3.8	4.3	3.9	3.9	0.23
Norway	3.5	4.1	3.7	3.4	2.2	3.4	0.75
Portugal	3.0	3.0	2.7	3.0	2.6	2.8	1.00
Spain	3.5	3.7	3.2	3.8	3.8	3.6	0.53
Sweden	2.9	2.9	3.1	3.1	2.7	2.9	1.00
Switzerland	4.0	4.0	4.0	3.7	2.9	3.7	0.41
United Kingdom	2.7	2.7	3.7	2.7	3.1	3.0	1.00
United States	5.0	5.0	4.4	3.6	3.5	4.3	0.00

Table 20: political discretion. 0= political constraints, 1 = political discretion. Shown to two decimal places here. Calibrated for fsQCA with 0.31 as 0 and 0.54 as 1.

Table 20: Raw data from the POLCON Index.

State	**2006**	**2007**	**2008**	**2009**	**2010**	**Average**	**fsQCA**
Australia	0.50	0.50	0.36	0.36	0.36	0.42	0.46
Austria	0.53	0.55	0.42	0.44	0.44	0.48	0.72
Belgium	0.69	0.69	0.71	0.71	0.71	0.70	1.00
Canada	0.32	0.33	0.31	0.30	0.30	0.31	0.00
Denmark	0.13	0.13	0.54	0.54	0.54	0.38	0.29
Finland	0.53	0.53	0.54	0.54	0.54	0.54	1.00
France	0.54	0.54	0.56	0.49	0.49	0.53	0.95
Germany	0.47	0.47	0.47	0.47	0.50	0.48	0.74
Greece	0.37	0.37	0.41	0.41	0.41	0.39	0.36
Iceland	0.49	0.49	0.49	0.49	0.51	0.50	0.82
Ireland	0.47	0.43	0.45	0.45	0.45	0.45	0.60
Italy	0.34	0.33	0.33	0.45	0.45	0.38	0.31
Japan	0.50	0.50	0.50	0.50	0.49	0.50	0.82
Luxembourg	0.50	0.50	0.50	0.50	0.49	0.50	0.83
Netherlands	0.64	0.66	0.67	0.67	0.67	0.66	1.00
New Zealand	0.22	0.22	0.22	0.43	0.43	0.31	0.00
Norway	0.53	0.53	0.53	0.53	0.51	0.52	0.93
Portugal	0.41	0.41	0.41	0.41	0.21	0.37	0.24
Spain	0.31	0.31	0.31	0.28	0.28	0.30	0.00
Sweden	0.51	0.51	0.51	0.51	0.51	0.51	0.86
Switzerland	0.40	0.40	0.41	0.41	0.41	0.41	0.42
United Kingdom	0.39	0.39	0.39	0.39	0.39	0.39	0.36
United States	0.40	0.39	0.39	0.40	0.40	0.40	0.37

Table 21: left-wing government. 1= hegemony of right-wing and centre parties, 5= hegemony of social democratic parties. Calibrated for fsQCA with 1 as 0 and 5 as 1.

Table 21: Raw data from the Comparative Political Data Index.

State	**2006**	**2007**	**2008**	**2009**	**2010**	**Average**	**fsQCA**
Australia	1.0	2.0	5.0	5.0	5.0	3.6	0.65
Austria	1.0	3.0	3.0	3.0	3.0	2.6	0.40
Belgium	3.0	3.0	2.0	2.0	2.0	2.4	0.35
Canada	1.0	1.0	1.0	1.0	1.0	1.0	0.00
Denmark	1.0	1.0	1.0	1.0	1.0	1.0	0.00
Finland	3.0	2.0	2.0	2.0	2.0	2.2	0.30
France	1.0	1.0	1.0	1.0	1.0	1.0	0.00
Germany	3.0	3.0	3.0	3.0	1.0	2.6	0.40
Greece	1.0	1.0	1.0	2.0	5.0	2.0	0.25
Iceland	1.0	2.0	3.0	4.0	5.0	3.0	0.50
Ireland	1.0	2.0	2.0	2.0	2.0	1.8	0.20
Italy	3.0	4.0	2.0	1.0	1.0	2.2	0.30
Japan	1.0	1.0	1.0	2.0	2.0	1.4	0.10
Luxembourg	3.0	3.0	3.0	3.0	3.0	3.0	0.50
Netherlands	1.0	2.0	3.0	3.0	2.0	2.2	0.30
New Zealand	5.0	5.0	4.0	1.0	1.0	3.2	0.55
Norway	4.0	4.0	4.0	4.0	4.0	4.0	0.75
Portugal	5.0	5.0	5.0	5.0	5.0	5.0	1.00
Spain	5.0	5.0	5.0	5.0	5.0	5.0	1.00
Sweden	4.0	1.0	1.0	1.0	1.0	1.6	0.15
Switzerland	2.0	2.0	2.0	2.0	2.0	2.0	0.25
United Kingdom	5.0	3.0	3.0	3.0	3.0	4.6	0.90
United States	1.0	1.0	1.0	1.0	1.0	1.0	0.00

Table 22: GDP per capita. Calibrated for fsQCA with 21773=0, 38626= 1.

Table 22: Raw data from OECD on GDP per capita/USD, Constant Prices, 2005 PPPs.

State	**2006**	**2007**	**2008**	**2009**	**2010**	**Average**	**fsQCA**
Australia	35751	36393	36231	36274	36593	36248	0.88
Austria	34691	35859	36259	34789	35322	35384	0.83
Belgium	32846	33542	33603	32411	32885	33057	0.69
Canada	36617	36954	36951	35513	36281	36463	0.90
Denmark	34209	34604	34133	32024	32328	33460	0.72
Finland	31939	33501	33443	30441	31321	32129	0.64
France	30076	30576	30384	29279	29636	29990	0.51
Germany	32306	33404	33825	32180	33520	33047	0.69
Greece	25634	26457	26345	25517	24329	25656	0.25
Iceland	35620	36896	36403	34026	32759	35141	0.82
Ireland	39843	40585	38861	36035	35490	38163	1.00
Italy	28738	29008	28454	26729	27059	27998	0.39
Japan	30941	31584	31239	29515	30886	30833	0.56
Luxembourg	70488	73913	72095	66859	67669	70205	1.00
Netherlands	36250	37585	38119	36530	36896	37076	0.93
New Zealand	25779	26255	25509	25182	25353	25616	0.25
Norway	48327	49135	48518	47152	46776	47982	1.00
Portugal	21607	22068	22037	21376	21780	21773	0.00
Spain	28075	28531	28331	27045	26907	27778	0.37
Sweden	33915	34783	34299	32298	34124	33884	0.74
Switzerland	37739	38877	39242	38038	39236	38626	1.00
United Kingdom	34039	34973	34471	32481	32770	33747	0.73
United States	44993	45361	44807	43169	43889	44443	1.00

Appendix 2: List of interviewees

Interview 1: Two employees of the German CDU Party.

Interview 2: Eco-Institute of Germany employee.

Interview 3: Ministry of the Environment of Germany employee.

Interview 4: Environment Agency of Germany employee.

Interview 5: Green Party of Germany employee.

Interview 6: SPD of Germany MP.

Interview 7: Swedish Environmental Protection Agency employee.

Interview 8: Moderate Party of Sweden MP.

Interview 9: Swedish Energy Agency employee.

Interview 10: Ministry of the Environment of Sweden employee.

Interview 11: Swedish Energy Agency employee.

Interview 12: Finnish employee of climate NGO.

Interview 13: Swedish Green Party MEP.

Interview 14: NEOS Party of Austria Employee.

Interview 15: Chamber of Agriculture of Austria employee.

Interview 16: Klimafonds of Austria employee.

Interview 17: Two Energy Agency of Austria employees.

Interview 18: Ministry of Agriculture, Forestry, Environment and Water Management employee.

Interview 19: Chamber of Agriculture of Austria employee.

Interview 20: Co-ordination Office of Austria employee.

Interview 21: Economic Chamber of Austria employee.

Interview 22: Green Party of Austria MP.

Interview 23: Two Finnish TEM employees.

Interview 24: Finnish Meteorological Institute employee.

Interview 25: Finnish Environment Institute employee.

Interview 26: Greenpeace Finland employee.

Interview 27: Finnish 350.org Finland employee.

Interview 28: National Coalition of Finland MP.

Interview 29: Green League of Finland MP.

Interview 30: Finns Party of Finland MP.

Interview 31: Swedish People’s Party of Finland MP.

Interview 32: Centre Party of Finland MP.

Interview 33: Employee at DG Environment.

Interview 34: Employee at DG Environment.

Interview 35: Employee at DG Environment.

Interview 36: Employee at DG Environment.

Interview 37: Employee at DG Energy.

Interview 38: Two Swedish diplomatic employees in Brussels.

Interview 39: German diplomatic employee in Brussels.

Interview 40: Finland diplomatic employee in Brussels.

Bibliography

Abatzoglou, J., DiMento, J. F. C., Doughman, P. & Nespor, S. (2007*a*). ‘2: A Primer on Global Climate Change and Its Likely Impacts’. *In:* DiMento, J. F. C. & Doughman, P. *Eds.* (2007). *Climate Change: What it Means for US, Our Children, and Our Grandchildren*. (Massachusetts: MIT Press).

Abatzoglou, J., DiMento, J. F. C., Doughman, P. & Nespor, S. (2007*b*). ‘3: Climate Change Effects: Global and Local Views’. *In:* DiMento, J. F. C. & Doughman, P. *Eds*. (2007). *Climate Change: What it Means for US, Our Children, and Our Grandchildren.* (Massachusetts: MIT Press).

Armingeon, K. Weisstanner, D., Engler, S., Potolidis, P. & Gerber, M. (2012). ‘Comparative Political Dataset 1 (23 OECD Countries).’ ONLINE. [Accessed 17.01.2013].
Available from:
http://www.ipw.unibe.ch/content/team/klaus_armingeon/comparative_political_data_sets/index_ger.html

Arter, D. (2011) ‘Taking the Gilt off the Conservatives’ Gingerbread: The April 2011 Finnish General Election’. *West European Politics*. **34** (6), pp.1284-1295.

Aslani, A., Helo, P. & Naaranoja, M. (2014). ‘Role of Renewable Energy Policies in Energy Dependency in Finland: System Dynamics Approach’. *Applied Energy*. **113**, pp.758-765.

Aslani, A., Naaranoja, M., Helo, P., Antila, E. & Hiltunen, E. (2013). ‘Energy Diversification in Finland: Achievements and Potential of Renewable Energy Development’. *International Journal of Sustainable Energy*. **32** (5), pp.504-514.

Austria.info. (2014). ‘Green Austria’. ONLINE. [Accessed 25.03.2014].
Available from:
http://www.austria.info/uk/about-austria/green-austria-1157073.html

Aylott, N. & Bolin, N. (2007). ‘Towards a Two-Party System? The Swedish Parliamentary Election of September 2006’. *West European Politics*. **30** (3), pp.621-633.

Aylott, N., Blomgren, M. & Bergman, T. (2013). *Political Parties in Multi-Level Polities: The Nordic Countries Compared*. (Basingstoke: Palgrave Macmillan).

Baettig, M. B., Brander, S. & Imboden, D. M. (2008). ‘Measuring Countries Cooperation Within the International Climate Change Regime’. *Environmental Science and Policy*. **11**, pp.478-489.

Bailey, I. (2007). ‘Market Environmentalism, New Environmental Policy Instruments, and Climate Policy in the United Kingdom and Germany’. *Annals of the Association of American Geographers*. **97** (3), pp.530-550.

Bailey, I. & Rupp, S. (2005). ‘Geography and Climate Policy: A Comparative Assessment of New Environmental Policy Instruments in the UK and Germany’. *Geoforum*. **36**, pp.387-401.

Baker, K. & Stoker, G. (2014). ‘A Comparison of State Traditions and the Revival of a Nuclear Power in Four Countries’. *Journal of Comparative Policy Analysis: Research and Practice*. DOI: 10.1080/13876988.2014.889901.

Bang Søfting, G. (2000). ‘Climate Change Policymaking- Three Explanatory Variables’. *CICERO*. ONLINE. [Accessed 17.12.12].
Available from:
http://www.cicero.uio.no/media/205.pdf

Barnett, J. (2007). 'The Geopolitics of Climate Change'. *Geography Compass*. **1** (6), pp.1361-1375.

Bättig, M. B. & Bernauer, T. (2009). 'National Institutions and Global Public Goods: Are Democracies More Cooperative in Climate Change Policy?' *International Organization*. **63** (2), pp.281-308.

BBC [British Broadcasting Corporation] (2011). 'Germany: Nuclear Power Plants to Close by 2022'. ONLINE [Accessed 27.05.2014].
Available from:
http://www.bbc.co.uk/news/world-europe-13592208

Bechberger, M. & Reiche, D. (2004). 'Renewable Energy Policy in Germany: Pioneering and Exemplary Regulations'. *Energy for Sustainable Development*. **VIII** (I), pp.47-57.

Beck, U. *Trans.* Ritter, M. (1992). *Risk Society: Towards a New Modernity*. (London: SAGE Publications Ltd.).

Beise M. (2001). *Lead Markets. Country Specific Success Factors of the Global Diffusion of Innovations*. (Heidelberg: Physica).

Bengtsson, Å., Hansen, K. M., Harðarson, Ó. Þ., Narud, H. M. & Oscarsson, H. (2013). *The Nordic Voter: Myths of Exceptionalism*. (Colchester: ECPR Press).

Benoit, K. & Laver, M. (2006). *Party Policy in Modern Democracies*. (Abingdon: Routledge).

Benton, T. (1997). 'Beyond left and right? Ecological Politics, Capitalism and Modernity'. *In:* Jacobs, M. *Ed*. (1997). *Greening the Millennium? The New Politics of the Environment*. (London: Blackwell).

Berg, A. (2009). ‘4: The Discursive Dimensions of a Decent Deal: How Nuclear Energy Evolved from Environmental Enemy to Climate Remedy in the Parliament of Finland’. *In:* Kojo, M. & Litmanen, T. *Eds*. (2009). *The Renewal of Nuclear Power in Finland*. (Basingstoke: Palgrave Macmillan).

Bergek, A. & Jacobsson, S. (2010). ‘Are Tradable Green Certificates a Cost-Efficient Policy Driving Technical Change or a Rent-Generating Machine? Lessons from Sweden 2003-2008’. *Energy Policy*. **38**, pp.1255-1271.

Berghäll, E. & Perrels, A. (2010). ‘The Economic Crisis and its Consequences for the Environment and Environmental Policy’. *Nordic Council of Ministers*. ONLINE. [Accessed 08.04.2014].
Available from:
http://www.norden.org/en/publications/publikationer/2010-555

Bernauer, T. & Böhmelt, T. (2013*a*). ‘National Climate Policies in International Comparison: The Climate Change Cooperation Index’. *Environmental Science and Policy*. **25**, pp.196-206.

Bernauer, T. & Böhmelt, T. (2013*b*). ‘Are Economically ‘Kinder, Gentler Societies’ also Greener?’ *Environmental Science and Technology*. **47**, pp.11993-12001.

Bernauer, T. & Schaffer, L. M. (2012). ‘Climate Change Governance’. *In:* Levi-Faur, D. *Ed*. (2012). *Oxford Handbook of Governance*. (Oxford: Oxford University Press).

Bickerstaff, K., Lorenzoni, I., Pidgeon, N. F., Poortinga, W. & Simmons, P. (2008). ‘Reframing Nuclear Power in the UK Energy Debate: Nuclear Power, Climate Change Mitigation and Radioactive Waste’. *Public Understanding of Science*. **17**, pp.145-169.

Bina, O. & La Camera, F. (2011). ‘Promise and Shortcomings of a Green Turn in Recent Policy Responses to the ‘Double Crisis’. *Ecological Economics*, **70** (12), pp.2308–2316.

Binder, S. & Neumayer, E. (2005). ‘Environmental Pressure Group Strength and Air Pollution: An Empirical Analysis’. *Ecological Economics.* **55**, pp.527-538.

Blomgren, M., Aylott, N. & Bergman, T. (2013). *Political Parties in Multi-Level Polities: The Nordic Countries Compared.* (Basingstoke: Palgrave Macmillan).

Blondel, J. (1995). *Comparative Government: An Introduction.* (New York, NY: Harvester Wheatsheaf).

Blyth, M. (2001). ‘The Transformation of the Swedish Model: Economic Ideas, Distributional Conflict, and Institutional Change’. *World Politics*. **54** (1), pp.1-26.

BMU [Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit]. (1997). *Second National Communication to the UNFCCC by the Federal Republic of Germany*. (Bonn: BMU).

BMU [Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit – Federal Ministry for Environment, Nature and Reactor Safety]. (2010). *Energy Concept for an Environmentally Sound, Reliable and Affordable Energy Supply*. ONLINE. [Accessed 16.12.13].
Available from:
http://www.bmu.de/fileadmin/bmu-import/files/english/pdf/application/pdf/energiekonzept_bundesregierung_en.pdf

BMWFJ [Bundesministerium für Wirtschaft, Familie und Jugend – Federal Ministry for Economics, Family and Youth] (2010). 'EnergieStrategie Österreich: Maßnahmenvorschläge [Austrian Energy Strategy: Proposals for Action]'. ONLINE [Accessed 25.05.2014].
Available from:
http://www.energiestrategie.at/images/stories/pdf/longversion/energiestrategie_oesterreich.pdf

Boasson, E. L. (2013). 'National Climate Policy Ambitiousness: A Comparative Study of Denmark, France, Germany, Norway, Sweden and the UK'. *CICERO*. Report 2013:02.

Bolin, B. (1975). *Energi och Klimat: en Sammanställning av våra Kunskaper om de Mekanismer som Bestämmer Jordens Klimat och Möjligheter att Människan Direkt eller Indirekt Påverkar Densamma* [Energy and Climate: A Summary of our Understanding of the Mechanisms that Determine the Earth's Climate and the Opportunities to Man to Affect them Directly or Indirectly]. (Stockholm: Statsrådsberedningen).

Börzel, T. A. (2002). 'Pace-Setting, Foot-Dragging, and Fence-Sitting: Member State Responses to Europeanization'. *Journal of Common Market Studies*. **40** (2), pp.193-214.

Brand, U. & Pawloff, A. (2014). 'Selectivities at Work: Climate Concerns in the Midst of Corporatist Interests. The Case of Austria'. *Journal of Environmental Protection*. **5** (9), pp.780-795.

Brand, U. & Vadrot, A. (2013). 'Epistemic Selectivities and the Valorisation of Nature: The Cases of the Nagoya Protocol and the Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services (IPBES)'. *Law, Environment and Development Journal*. **9**, pp.202-220.

Braumoeller, B. F. & Goertz, G. (2000). 'The Methodology of Necessary Conditions'. *American Journal of Political Science*. **44** (4), pp.844-858.

Bryman, A. (2012). *Social Research Methods*. 4th Ed. (Oxford: Oxford University Press).

Bryner, G. C. (2008). '2: Political Science Perspectives on Climate Policy.' *In:* Compston, H. & Bailey, I. *Eds*. (2008). *Turning Down the Heat: The Politics of Climate Policy in Affluent Democracies.* (Basingstoke: Palgrave Macmillan).

Bulkeley, H. & Newell, P. (2010). *Governing Climate Change*. (Oxford: Routledge).

Burck, J. & Bals, C. (2013). 'The Climate Change Performance Index: Background and Methodology'. ONLINE. [Accessed 22.01.2013].
Available from:
http://germanwatch.org/en/download/7133.pdf

Burck, J., Bals, C. & Ackermann, S. (2009*a*). 'The Climate Change Performance Index 2009'. ONLINE. [Accessed 22.01.2013].
Available from:
http://germanwatch.org/klima/ccpi09res.pdf

Burck, J., Bals, C. & Ackermann, S. (2009*b*). 'The Climate Change Performance Index: Background and Methodology'. ONLINE. [Accessed 22.01.2013].
Available from:
http://germanwatch.org/klima/ccpi09res.pdf

Burck, J., Bals, C. & Parker, L. (2011). 'The Climate Change Performance Index 2011'. ONLINE. [Accessed 08.08.2013].
Available from:
http://germanwatch.org/klima/ccpi2011.pdf

Burck, J., Bals, C. & Rossow, V. (2010). ‘The Climate Change Performance Index 2010’. ONLINE. [Accessed 08.08.2013].
Available from:
http://germanwatch.org/klima/ccpi10.pdf

Burck, J., Bals, C., Beck, M. & Rüthlein, E. (2008). ‘The Climate Change Performance Index 2008’. ONLINE. [Accessed 08.08.2013].
Available from:
http://germanwatch.org/klima/ccpi08.pdf

Burck, J., Bals, C., Wittger, B. & Beck, M. (2007). The Climate Change Performance Index 2007. ONLINE. [Accessed 07.08.2013].
Available from:
http://germanwatch.org/klima/ccpi07.pdf

Burnham, P., Gilland, K., Grant, W. & Layton- Henry, Z. (2004). *Research Methods in Politics*. (Basingstoke: Palgrave Macmillan).

Byrne, D. (2002). *Interpreting Quantitative Data.* (London: SAGE Publications Ltd.).

Caldicott, H. (2006). *Nuclear Power is not the Answer to Global Warming or Anything Else*. (Victoria: Melbourne University Press).

Caplan, M. (2014). ‘As a Solution for Climate Change – Nuclear Power is Falling Behind’. *The Energy Collective*. ONLINE [Accessed 05.09.2014].
Available from:
http://theenergycollective.com/mzconsulting/415256/solution-climate-change-nuclear-power-falling-behind

Capoccia, G. & Keleman, R. D. (2007). ‘The Study of Critical Junctures: Theory, Narrative, and Counterfactuals in Historical Institutionalism’. *World Politics*. **59** (3), pp.341-369.

Carter, N. (2013). ‘Greening the Mainstream: Party Politics and the Environment’. *Environmental Politics*. **22** (1), pp.73-94.

Castles, F. G. & Mair, P. (1984). ‘Left-Right Political Scales: Some ‘Expert’ Judgements’. *European Journal of Political Research*. **12** (1), pp.73-88.

Christoff, P. (1996). ‘Ecological Modernisation, Ecological Modernities’. *In:* Mol, A. P. J, Sonnenfeld, D. A. & Spaargaren, G. *Eds*. (2009). *The Ecological Modernisation Reader: Environmental Reform in Theory and Practice*. (Oxford: Abingdon).

Christoff, P. (2005). ‘2: Out of Chaos, a Shining Star? Toward a Typology of Green State’. *In:* Barry, J. & Eckersley, R. *Eds.* (2005). *The State and the Global Ecological Crisis*. (Cambridge, MA: MIT Press).

Christoff, P. & Eckersley, R. (2011). ‘Comparing State Responses’. *In:* Dryzek, J. S., Norgaard, R. B. & Schlosberg, D. *Eds*. (2011). *Climate Change and Society*. (Oxford: Oxford University Press).

Collier, R. B. & Collier, D. (1991). *Shaping the Political Arena: Critical Junctures, the Labor Movement, and Regime Dynamics in Latin America*. (Princeton, NJ: Princeton University Press).

Compston, H. & Bailey, I. (2008). *Turning Down the Heat: The Politics of Climate Policy in Affluent Democracies*. (Basingstoke: Palgrave Macmillan).

Compston, H. & Bailey, I. (2012). *Climate Clever: How Governments Can Tackle Climate Change (and Still Win Elections).* (Abingdon: Routledge).

Cooper, B. (2005). ‘Applying Ragin's Crisp and Fuzzy Set QCA to Large Datasets: Social Class and Educational Achievement in the National Child Development Study’. *Sociological Research Online*. **10** (2).

Cooper, B. & Glaesser, J. (2011). ‘Paradoxes and Pitfalls in Using Fuzzy Set QCA: Illustrations from a Critical Review of a Study of Educational Inequality’. *Sociological Research Online*. **16** (3).

Cornwall Alliance (2014). ONLINE [Accessed 25.08.2014].
Available from:
http://www.cornwallalliance.org/2009/05/01/evangelical-declaration-on-global-warming/

Cox, G. W. (1997). *Making Votes Count: Strategic Coordination in the World’s Electoral Systems. Political Economy of Institutions and Decisions Series.* (Cambridge, New York and Melbourne: Cambridge University Press).

Cox, G. & McCubbins, M. (1997). ‘The Institutional Determinants of Economic Policy Outcomes’. *In*: Haggard, S. & McCubbins, M. D. *Eds*. (2001). *Structure and Policy in Presidential Democracies*. (New York: Cambridge University Press).

CPI [Climate Policy Initiative]. (2014). ‘India’. ONLINE [Accessed 05.09.2014].
Available from:
http://climatepolicyinitiative.org/india/

Crace, J. (2007). ‘Wanted: Attractive Swedish Model’. *Guardian*. ONLINE. [Accessed 12.08.2013].
Available from:
http://www.theguardian.com/education/2007/nov/20/schools.schoolsworldwide

Crepaz, M. M. L. & Moser, A. W. (2004). 'The Impact of Collective and Competitive Veto Points on Public Expenditures in the Global Age'. *Comparative Political Studies*. **37**, pp.259-285.

Dalton, R. J. (2009). 'Economics, Environmentalism and Party Alignments: A Note on Partisan Change in Advanced Industrialised Democracies'. *European Journal of Political Research*. **48**, pp.161-175.

Daly, H. E. (2007). *Ecological Economics and Sustainable Development: Selected Essays of Herman Daly*. (Edward Elgar: Cheltenham).

Damro, C. & MacKenzie, D. (2008). '4: The European Union and the Politics of Multi-Level Climate Governance.' *In:* Compston, H. & Bailey, I. *Eds*. (2008). *Turning Down the Heat: The Politics of Climate Policy in Affluent Democracies.* (Basingstoke: Palgrave Macmillan).

Daskalakis, G. (2013). 'On the Efficiency of the European Carbon Market: New Evidence from Phase II'. *Energy Policy*. **54**, pp.369-375.

David P. A. (1985). 'Clio and the economics of QWERTY'. *American Economic Review* **75** (2), pp.332–336.

Davies, S. J., Caldeira, K. & Matthews, H. D. (2010). 'Future CO_2 Emissions and Climate Change from Existing Energy Infrastructure'. *Science*. **329** (5997), pp.1330-1333.

Davis, F. L. & Wurth, A. (2003). 'Voting Preferences and the Environment in the American Electorate: The Discussion Extended'. *Society and Natural Resources*. **16** (8), pp.729–740.

Daynes, B. W. & Sussman, G. (2010). *White House Politics and the Environment: Franklin D. Roosevelt to George W. Bush*. (Texas: Texas A&M University Press).

Dell, G., Egger, C. & Grübl, A. (1996). 'Renewable Energy in Austria'. *Renewable Energy*. **9** (1), pp.1116-1119.

Denzin, N. K. & Lincoln, Y. S. (2000).*The SAGE Handbook of Qualitative Research*. (London: Sage Publications).

Der Spiegel (2013). 'From Black to Orange: SPIEGEL ONLINE's Guide to German Political Parties'. Spiegel Online. ONLINE. [Accessed 20.08.2013].
Available from:
http://www.spiegel.de/international/germany/guide-to-german-political-parties-a-886188.html

Dessai, S. & Schipper, E.L. (2003). 'The Marrakech Accords to the Kyoto Protocol: Analysis and Future Prospects'. *Global Environmental Change.* **13** (2), pp.149–153.

Dexter, L. A (2012). *Elite and Specialized Interviewing*. (Essex: ECPR Press).

Dietz, T., Stern, P. C. & Guagnano, G. A. (1998). 'Social Structural and Social Psychological Bases of Environmental Concern'. *Environment and Behavior*. **30** (4), pp.450-471.

DiMento, J. F. C. & Doughman, P. (2007). 'Climate Change: What it Means to Us, Our Children, and Our Grandchildren'. *In*: DiMento, J. F. C. & Doughman, P. *Eds*. (2007). *Climate Change: What it Means for US, Our Children, and Our Grandchildren*. (Massachusetts: MIT Press).

Dobson, A. (2007). *Green Political Thought.* 4th Ed. (Oxford: Routledge).

Dolezal, M. (2008). 'Austria: Transformation Driven by an Established Party'. *In:* Kriesi, H., Grande, E., Lachat, R. & Dolezal, M. *Eds*. (2008). *West European Politics in the Age of Globalization*. (Cambridge: Cambridge University Press).

Dolsak, N. (2001). 'Mitigating Global Climate Change: Why Are Some Countries More Committed Than Others?' *Policy Studies Journal*. **29** (3), pp.414-436.

Downes, D. (1996). 'Neo-Corporatism and Environmental Policy'. *Australian Journal of Political Science*. **31** (2), pp.175-190.

Driesen, D. M. (2010). 'Introduction'. *In:* Driesen, D. M. *Ed.* (2010). *Economic Thought and US Climate Change Policy*. (London: The MIT Press).

Dryzek, J. (2005). *The Politics of the Earth.* (Oxford: Oxford University Press).

Dryzek, J. S., Downes, D., Hunold, C., Schlosberg, D. & Hernes, H.-K. (2003). *Green States and Social Movements: Environmentalism in the United States, United Kingdom, Germany, & Norway*. (Oxford: Oxford University Press).

Dryzek, J. S., Hunold, C., Schlosberg, D., Downes, D. & Hernes, H.-K. (2002). 'Environmental Transformation of the State: the USA, Norway, Germany and the UK.' *Political Studies*. **50**, pp.659-682.

Dryzek, J. S., Norgaard, R. B. & Schlosberg, D. (2013). *Climate-Challenged Society*. (Oxford: Oxford University Press).

Dunlap, R. E. & Xiao, C. & McCright, A. M. (2001). 'Politics and Environment in America: Partisan and Ideological Cleavages in Public Support for Environmentalism'. *Environmental Politics*. **10** (4), pp.23-48.

Dutta, P. K. & Radner, R. (2010). 'Capital Growth in a Global Warming Model: Will China and India Sign a Climate Treaty?' *Economic Theory*. **49** (2), pp.411-443.

Duverger, M. (1954). *Political Parties*. (New York: Wiley).

Eaton, K. (2000). 'Parliamentarism versus Presidentialism in the Policy Arena'. *Comparative Politics*. **32** (3), pp.355-376.

EC [European Commission]. (2007). 'Austria Energy Mix Factsheet'. ONLINE. [Accessed 24.03.2014].
Available from:
http://ec.europa.eu/energy/energy_policy/doc/factsheets/mix/mix_at_en.pdf

EC [European Commission]. (2011). 'Finland'. ONLINE. [Accessed 28.06.2014].
Available from:
http://ec.europa.eu/energy/gas_electricity/doc/fi_energy_market_2011_en.pdf

EC [European Commission] (2012). 'European Climate Change Programme'. ONLINE [Accessed 10.09.2012].
Available from:
http://ec.europa.eu/clima/policies/eccp/index_en.htm

Eckersley, R. (2000). 'Disciplining the Market, Calling in the State: The Politics of Economy-Environment Integration'. *In:* Young, S. C. *Ed*. (2000). *The Emergence of Ecological Modernisation: Integrating the Environment and the Economy?* (London: Routledge).

Economy, E. C. (2007). 'The Great Leap Backward? The Costs of China's Environmental Crisis'. *Foreign Affairs*. **86** (5), pp.38-59.

EDF [Électricité de France]. (2014). 'Carbon Emissions from Nuclear Power'. ONLINE [Accessed 31.08.2014].
Available from:
http://www.edfenergy.com/energyfuture/energy-gap-climate-change/nuclear-and-the-energy-gap-climate-change

Eduskunta [Finnish Government]. (2005). 'Outline of the Energy and Climate Policy for the Near Future – National Strategy to Implement the Kyoto Protocol'. ONLINE. [Accessed 12.11.2013].
Available from:
http://www.tem.fi/files/16129/jul27eos_2005_eng.pdf

Eduskunta [Finnish Government] (2007). 'National Energy Efficiency Action Plan (NEEAP 2008-2010)'. ONLINE. [Accessed 28.04.2014].
Available from:
http://ec.europa.eu/energy/demand/legislation/doc/neeap/finland_en.pdf

Eduskunta [Finnish Government] (2009). 'Government Foresight Report on Long-term Climate and Energy Policy: Towards a Low-carbon Finland'. *Government Foresight Report*. (Helsinki: Prime Minister's Office).

Eduskunta [Finnish Government] (2011). 'Finland's Second National Energy Efficiency Action Plan (NEEAP-2)'. ONLINE. [Accessed 28.04.2014].
Available from:
http://www.buildup.eu/sites/default/files/content/FI%20-%20Energy%20Efficiency%20Action%20Plan%20EN.pdf

EEA [European Energy Agency] (2002). ‘EU Reaches CO2 Stabilisation Target Despite Upturn in Greenhouse Gas Emissions’. ONLINE [Accessed 10.09.12].
Available from:
http://www.eea.europa.eu/pressroom/newsreleases/greenhouse_gas_emission

EFTA [European Free Trade Association]. (2014). ONLINE [Accessed 11.08.2014].
Available from:
http://www.efta.int/

Ek, K. (2005). ‘Public and Private Attitudes Towards “Green” Electricity: The Case of Swedish Wind Power’. *Energy Policy*. **33**, pp.pp.1677-1689.

Ekins, P. (2000). *Economic Growth and Environmental Sustainability: The Prospects for Green Growth*. (London: Routledge).

Ellerman, A. D. & Buchner, B. K. (2007). ‘The European Union Emissions Trading Scheme: Origins, Allocation and Early Results’. *Review of Environmental Economics and Policy*. **1** (1), pp.66-87.

Energie Systeme der Zukunft (2003). ‘Energy Systems of Tomorrow’. ONLINE [Accessed 14.07.2014].
Available from:
http://www.energiesystemederzukunft.at/english.htm

Energimyndigheten (2012). *Energy in Sweden 2012*. ONLINE [Accessed 14.07.2014].
Available from:
http://www.energimyndigheten.se/Global/Engelska/Facts%20and%20figures/Energy_in_sweden_2012.pdf

EREC [European Renewable Energy Council] (2009). 'Renewable Energy Policy Review: Austria'. ONLINE [Accessed 30.06.2014].

Available from:

http://www.erec.org/fileadmin/erec_docs/Projcet_Documents/RES2020/AUSTRIA_RES_Policy_Review_09_Final.pdf

Ericsson, K., Huttunen, S., Nilsson, L. J. & Svenningsson, P. (2004). 'Bioenergy Policy and Market Development in Finland and Sweden'. *Energy Policy*. **32**, pp.1707-1721.

EU [European Union] (2009). 'Promotion of the Use of Energy from Renewable Resources- Directive 2009/28/EC'. ONLINE [Accessed 24.04.2014].

Available from:

http://europa.eu/legislation_summaries/energy/renewable_energy/en0009_en.htm

Eurobarometer (2009). 'Eurobarometer 71: Europeans' Attitudes Towards Climate Change'. ONLINE. [Accessed 07.08.2013].

Available from:

http://ec.europa.eu/public_opinion/archives/ebs/ebs_313_en.pdf

Eurobarometer (2010). 'Europeans and Nuclear Safety: Report'. ONLINE. [Accessed 24.03.2014].

Available from:

http://ec.europa.eu/energy/nuclear/safety/doc/2010_eurobarometer_safety.pdf

European Parliament (2010). 'Subject: Concealed Distribution of Dividends by Teollisuuden Voima Oy'. ONLINE [Accessed 22.04.2014].

Available from:

http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+WQ+E-2010-2217+0+DOC+XML+V0//EN

Fallend, F. (2007). ‘Austria’. *European Journal of Political Research*. **46**, pp.876-890.

Fallend, F. (2008). ‘Austria’. *European Journal of Political Research*. **47**, pp.902-916.

Fallend, F. (2009). ‘Austria’. *European Journal of Political Research*. **48**, pp.884-902.

Fallend, F. (2010). ‘Austria’. *European Journal of Political Research*. **49**, pp.880-898.

Faninger, G. (2003). ‘Towards Sustainable Development in Austria: Renewable Energy Combinations’. *Mitigation and Adaptation Strategies for Global Change*. **8**, pp.177-188.

Fischer, D. W. & Berglund, E. (1994). ‘The Greening of Swedish Energy Policy: A Critique’. *Futures*. **26** (3), pp.305-322.

Florida, R. (2011). ‘The World’s Leading Nations for Innovation and Technology’. ONLINE [Accessed 14.07.2014].
Available from:
http://www.citylab.com/tech/2011/10/worlds-leading-nations-innovation-and-technology/224/

Forbes (2011). ‘Fukushima Disaster Threatens To Snuff Nuclear Power Revival In Europe’. ONLINE. [Accessed 25.03.2014].
Available from:
http://www.forbes.com/sites/energysource/2011/03/16/fukushima-disaster-threatens-to-snuff-nuclear-power-revival-in-europe/

FOTE [Friends of the Earth] (*undated*). ‘2030 Climate and Energy Policy’. ONLINE [Accessed 05.10.2014].
Available from:
http://www.foeeurope.org/2030-climate-plan

Fouché, G. (2008). 'Sweden's Carbon Tax Solution to Climate Change Puts it Top of the Green List'. *The Guardian*. ONLINE. [Accessed 19.07.2013].
Available from:
http://www.guardian.co.uk/environment/2008/apr/29/climatechange.carbonemissions

Fouquet, D. & Johansson, T. B. (2008). 'European Renewable Energy Policy at a Crossroads – Focus on Electricity Support Mechanisms'. *Energy Policy*. **36**, pp.4079-4092.

Friberg, L. (2008). '9: Conflict and Consensus: The Swedish Model of Climate Politics.' *In:* Compston, H. & Bailey, I. *Eds*. (2008). *Turning Down the Heat: The Politics of Climate Policy in Affluent Democracies*. (Basingstoke: Palgrave Macmillan).

Fridolfsson, S.-O. & Tangerås, T. P. (2013). 'A Reexamination of Renewable Electricity Policy in Sweden'. *Energy Policy*. **58**, pp.57-63.

Frondel, M., Ritter, N. & Schmidt, C. M. (2008). 'Germany's Solar Cell Promotion: Dark Clouds on the Horizon'. *Energy Policy*. **36**, pp.4198-4204.

Frondel, M., Ritter, N., Schmidt, C. M. & Vance, C. (2010). 'Economic Impacts from the Promotion of Renewable Energy Technologies: The German Experience'. *Energy Policy*. **38**, pp.4048-4056.

Fthenakis, V. M. & Kim, H. C. (2007). 'Greenhouse-gas Emissions from Solar Electric- and Nuclear Power: A Life-Cycle Study'. *Energy Policy*. **35** (4), pp.2549-2557.

Gabriel, S. (2008). *Links Neu Denken. Politik für die Mehrheit* [New Left Thinking: Policy for the Majority]. (Munich: Piper).

Gallagher, M., Laver, M. & Mair, P. (2006). *Representative Government in Modern Europe*. (New York: McGraw-Hill).

Gan, L., Eskeland, G. S. & Kolshus, H. H. (2007). 'Green Electricity Market Development: Lessons from Europe and the US.' *Energy Policy*. **35**, pp.144-155.

Garud, R., Kumaraswamy, A. & Karnøe, P. (2010). 'Path Dependence or Path Creation?' *Journal of Management Studies*. **47** (4), pp.760-774.

Gibbs, D. (2000). 'Ecological Modernisation, Regional Economic Development and Regional Development Agencies'. *Geoforum*. **31**, pp.9-19.

Goertz, G. & Mahoney, J. (2005). 'Two-Level Theories and Fuzzy-Set Analysis'. *Sociological Methods and Research.* **33** (4), pp.497-539.

Gouldson, A. P. & Murphy, J. (1997). 'Ecological Modernisation'. *In:* Jacobs, M. *Ed*. (1998). *Greening the Millennium: the New Politics of the Environment*. (Oxford: Blackwell).

Gov.uk (2014). 'Participating in the EU ETS'. ONLINE [Accessed 01.10.2014].
Available from:
https://www.gov.uk/participating-in-the-eu-ets#phase-iii-free-allocation

Granberg, M. & Elander, I. (2007). 'Local Governance and Climate Change: Reflections on the Swedish Experience'. *Local Environment*. **12** (5), pp.537-548.

Grant, J. T. & Kelly, H. J. (2008). 'Legislative Productivity of the US Congress, 1789-2004'. *Political Analysis*. **16** (3), pp.303-323.

Grant, W., Matthews, D. & Newell, P. (2000). *The Effectiveness of European Union Environmental Policy*. (Basingstoke: Macmillan Press Ltd.).

Green American (2014). 'Ten Strikes Against Nuclear Power'. ONLINE [Accessed 05.09.2014]. *Available from:* http://www.greenamerica.org/programs/climate/dirtyenergy/nuclear.cfm

Greener, I. (2005). 'The Potential of Path Dependence in Political Studies'. *Politics*. **25** (1), pp.62-72.

Grubb, M., Brackley, P., Ledić, M., Mathur, A. Rayner, S, Russell, J. & Tanabe, A. (1991). *Energy Policies and the Greenhouse Effect. Volume Two: Country Studies and Technical Options.* (Aldershot: Dartmouth Publishing Company).

Guevara-Stone, L. (2013). 'A High Renewables Tomorrow, Today: Güssing, Austria'. *Rocky Mountain Institute*. ONLINE [Accessed 08.09.2014]. *Available from:* http://blog.rmi.org/blog_2013_10_08_high-renewables_tomorrow_today_gussing_austria

Haas, R., Panzer, C., Resch, G., Ragwitz, M., Reece, G. & Held, A. (2011). 'A Historical Review of Promotion Strategies for Electricity from Renewable Energy Sources in EU Countries'. *Renewable and Sustainable Energy Reviews*. **15**, pp.1003-1034.

Hacker, J. (1998). 'The Historical Logic of National Health Insurance: Structure and Sequence in the Development of British, Canadian, and U.S. Medical Policy'. *Studies in American Political Development*. **12** (Spring), pp.57-130.

Hajer, M. A. (1995). *The Politics of Environmental Discourse: Ecological Modernization and the Policy Process*. (Oxford: Oxford University Press).

Hallegatte, S., Heal, G., Fay, M. & Treguer, D. (2011). ‘From Growth to Green Growth: A Framework’. *The World Bank*. ONLINE. [Accessed 29.05.2013].
Available from:
http://elibrary.worldbank.org/doi/pdf/10.1596/1813-9450-5872

Hallerberg, M., & Basinger, S. (1998). ‘Internationalization and Changes in Tax Policy in OECD Countries: The Importance of Domestic Veto Players’. *Comparative Political Studies*. **31**, pp.321-352.

Harris, P. G. (2007). ‘Europe and the Politics and Foreign Policy of Global Climate Change’. *In:* Harris, P. G. *Ed*. (2007). *Europe and Global Climate Change*. (Cheltenham: Edward Elgar).

Harrison, K. & Sundstrom, L. M. (2010). *Global Commons, Domestic Decisions: The Comparative Politics of Climate Change*. (Massachusetts: Massachusetts Institute of Technology Press).

Hatch, M. T. (2007). ‘Chapter 2: The Politics of Climate Change in Germany: Domestic Sources of Environmental Foreign Policy.’ *In:* Harris, P. G. *Ed*. (2007). *Europe and Global Climate Change*. (Cheltenham: Edward Elgar).

Henisz, W. J. (2002). ‘The Institutional Environment for Infrastructure Investment’. *Industrial and Corporate Change*. **11** (2), pp.355-389.

Hibbs, D. A., Jr. (1977). ‘Political Parties and Macroeconomic Policy’. *American Political Science Review*. **71**, pp.1467-1487.

Hillebrand, R. (2013). ‘Climate Protection, Energy Security, and Germany’s Policy of Ecological Modernisation’. *Environmental Politics*. **22** (4), pp.664-682.

Hogan, J, & Doyle, D. (2007). 'The Importance of Ideas: An *A Priori* Critical Juncture Framework.' *Canadian Journal of Political Science.* **40** (4), pp.883–910.

Hogwood, B. W. & Peters, B. G. (1983). *Policy Dynamics.* (Brighton, Wheatsheaf Books).

Huber, J. & Inglehart, R. (1995). 'Expert Interpretations of Party Space and Party Locations in 42 Societies'. *Party Politics*. **1** (1), pp.73-111.

Hudson, J. & Kühner, S. (2009). 'Towards Productive Welfare? A Comparative Analysis of 23 OECD Countries'. *Journal of European Social Policy*. **19** (1), pp.34-46.

Huitema, D., Jordan, A., Massey, E., Rayner, T., van Asselt, H., Haug, C., Hildingsson, R., Monni, S. & Stripple, J. (2011). 'The Evaluation of Climate Policy: Theory and Emerging Practice in Europe'. *Policy Science*. **44**, pp.179-198.

Hunold, C. & Dryzek, J. (2005). '4: Green Political Strategy and the State: Combining Political Theory and Comparative History.' *In:* Barry, J. & Eckersley, R. *Eds*. (2005). *The State and the Global Ecological Crisis*. (Cambridge, MA: MIT Press).

Hurrell, A. & Sengupta, S. (2012). 'Emerging Powers, North-South Relations and Global Climate Politics.' *International Affairs*. **88** (3), pp.463-484.

Hurst, D. (2014). 'Climate Unity Dealt Blow as Australia and Canada put Business First'. *Guardian*. ONLINE [Accessed 05.09.2014].
Available from:
http://www.theguardian.com/environment/2014/jun/10/climate-unity-dealt-blow-as-australia-and-canada-take-issue-with-us-stance

Huttunen, S. (2012). ‘10: Bioenergy Production and Social Sustainability on Finnish Farms.’ *In:* Järvelä, M. & Juhola, S. *Eds*. (2012). *Energy, Policy, and the Environment: Modeling Sustainable Development for the North*. (London: Springer).

IEA [International Energy Agency] (2007*a*). *Key World Energy Statistics*. (Paris: OECD).

IEA [International Energy Agency] (2007*b*). ‘Energy Policies of IEA Countries: Germany 2007 Review’ ONLINE [Accessed 24.06.2014].
Available from:
http://www.iea.org/publications/freepublications/publication/germany2007.pdf

IEA [International Energy Agency] (2014). ‘Statistics’. ONLINE [Accessed 16.09.2014].
Available from:
http://www.iea.org/statistics/

ILO [International Law Office] (2011). ‘Mankala Energy Production Model Under Threat?’ ONLINE [Accessed 16.09.2014].
Available from:
http://www.internationallawoffice.com/newsletters/detail.aspx?g=fe1e33ce-5a25-4843-96a0-225b95a2efce

Inglehart, R. & Klingemann, H.D. (1976). ‘Party Identification, Ideological Preference and the Left-Right Dimension Among Western Mass Publics’. *In*: Budge, I. Crewe, I. & Fadie, D. *Eds*. (1976). *Party Identification and Beyond.* (New York: John Wiley).

Inglehart, R. (1990). *Culture Shift*. (Princeton, NJ: Princeton University Press).

IPCC [Intergovernmental Panel on Climate Change] (2013). 'Summary for Policymakers'. ONLINE [Accessed 31.08.2014].
Available from:
http://www.climatechange2013.org/images/report/WG1AR5_SPM_FINAL.pdf

IPCC [Intergovernmental Panel on Climate Change] (2014). 'Climate Change 2014: Mitigation of Climate Change. Summary for Policy-Makers'. ONLINE [Accessed 28.06.2014].
Available from:
http://report.mitigation2014.org/spm/ipcc_wg3_ar5_summary-for-policymakers_approved.pdf

Jacobs, D. (2012). *Renewable Energy Policy Convergence in the EU: The Evolution of Feed-in Tariffs in Germany, Spain and France*. (Farnham: Ashgate).

Jacobs, D. (2014). 'Policy Invention as Evolutionary Tinkering and Codification: the Emergence of Feed-In Tariffs for Renewable Electricity'. *Environmental Politics*. **23** (5), pp.755-773.

Jacobsson, S. & Lauber, V. (2006). 'The Politics and Policy of Energy System Transformation-Explaining the German Diffusion of Renewable Energy Technology'. *Energy Policy*. **34**, pp.256-276.

Jaggard, L. (2007). 'Chapter 14: The Reflexivity of Ideas in Climate Change Policy: German, European and International Politics'. *In:* Harris, P. G. *Ed*. (2007). *Europe and Global Climate Change*. (Cheltenham: Edward Elgar).

Jahn, D. (1998). 'Environmental Performance and Policy Regimes: Explaining Variations in 18 OECD-countries'. *Policy Sciences*. **31**, pp.107-131.

Jahn, D. & Korolczuk, S. (2012). 'German Exceptionalism: The End of Nuclear Energy in Germany!' *Environmental Politics*. **21** (1), pp.159-164.

Jahn, D. & Müller-Rommel, F. (2010). 'Political Institutions and Policy Performance: A Comparative Analysis of Central and Eastern Europe'. *Journal of Public Policy*. **30**, pp.23-44.

Jänicke, M. (1992). 'Conditions for Environmental Policy Success: An International Comparison'. *The Environmentalist.* **12** (1), pp.47-58.

Jänicke, M. (2005). 'Trend-setters in Environmental Policy: The Character and Role of Pioneer Countries'. *European Environment.* **15**, pp.129-142.

Jänicke, M. (2011). 'Chapter 8: German Climate Change Policy: Political and Economic Leadership'. *In:* Wurzel, R. K. W. & Connelly, J. *Eds*. (2011). *The European Union as a Leader in International Climate Change Politics*. (Abingdon: Routledge).

Jänicke, M. & Jörgens, H. (1998). 'National Environmental Policy Planning in OECD Countries: Preliminary Lessons from Cross-National Comparisons'. *Environmental Politics.* **7** (2), pp.27-54.

Järvelä, M. & Juhola, S. (2012). '1: Introduction: Energy, Policy, and the Environment: Modeling Sustainable Development for the North. '. *In:* Järvelä, M. & Juhola, S. *Eds*. (2012). *Energy, Policy, and the Environment: Modeling Sustainable Development for the North*. (London: Springer).

Järvelä, M., Juhola, S. & Wihersaari, M. (2012). '2: Climate Change and Energy Issues in the North.' *In:* Järvelä, M. & Juhola, S. *Eds*. (2012). *Energy, Policy, and the Environment: Modeling Sustainable Development for the North*. (London: Springer).

Jasanoff, S. (2011). 'Cosmopolitan Knowledge: Climate Science and Global Civic Epistemology.' *In:* Dryzek, J. S., Norgaard, R. B. & Schlosberg, D. (2011). *The Oxford Handbook of Climate Change and Society*. (Oxford: Oxford University Press).

Jean-Baptiste, P. & Ducroux, R. (2003). 'Energy Policy and Climate Change'. *Energy Policy*. **31**, pp.155-166.

Jewert, J. (2012). 'Swedish Climate Policy: Lessons Learnt'. *Global Utmaning*. ONLINE. [Accessed 20.07.2013].
Available from:
http://en.globalutmaning.se/?p=2885

Joas, M. (1997). 'Finland: From Local to Global Politics'. *In:* Andersen, M. S. & Liefferink, D. *Eds*. (1997). *European Environmental Policy: The Pioneers*. (Manchester: Manchester University Press).

Johnson, K. (2014). 'China's Kinda-Sorta-Oughta Plan to Fight Climate Change: Is Beijing Suddenly Getting on Board in the Fight Against Global Warming?' *Foreign Policy*. ONLINE [Accessed 05.09.2014].
Available from:
http://www.foreignpolicy.com/articles/2014/06/03/chinas_kinda_sorta_oughta_plan_to_fight_climate_change_emissions

Jones, M. P. (1995). *Electoral Laws and the Survival of Presidential Democracy*. (Notre Dame: University of Notre Dame Press).

Jones, A & Clark J. (2001). *The Modalities of European Union Governance*. (Oxford: Oxford University Press).

Jordan, A. (2002). *The Europeanization of British Environmental Policy: A Departmental Perspective*. (Palgrave Macmillan: Basingstoke).

Jordan, A., Huitema, D., van Asselt, H. (2011*a*). '1: Climate Change Policy in the European Union: An Introduction.' *In*: Jordan, A., Huitema, D., van Asselt, H., Rayner, T. & Berkhout, F. *Eds*. (2011). *Climate Change Policy in the European Union: Confronting the Dilemmas of Mitigation and Adaptation?* (Cambridge: Cambridge University Press).

Jordan, A., Huitema, D., van Asselt, H. & Rayner, T. (2011*b*). '9: The Evolution of Climate Change Policy in the European Union: A Synthesis'. *In*: Jordan, A., Huitema, D., van Asselt, H., Rayner, T. & Berkhout, F. *Eds*. (2011). *Climate Change Policy in the European Union: Confronting the Dilemmas of Mitigation and Adaptation?* (Cambridge: Cambridge University Press).

Jordan, A. & Liefferink, D. (2004). *Environmental Policy in Europe: the Europeanization of National Environmental Policy.* (Oxford: Routledge).

Jordan, A. & Rayner, T. (2011). '3: The Evolution of Climate Policy in the European Union: an Historical Overview.' *In:* Jordan, A., Huitema, D., van Asselt, H., Rayner, T. & Berkhout, F. *Eds*. (2011). *Climate Change Policy in the European Union: Confronting the Dilemmas of Mitigation and Adaptation?* (Cambridge: Cambridge University Press).

Jungherr, A., Jürgens, P. & Schoen, H. (2012). 'Why the Pirate Party Won the German Election of 2009 or the Trouble with Predictions: A Response to Tumasjan, A., Sprenger, T. O., Sander, P. G., & Welpe, I. M. 'Predicting Elections with Twitter: What 140 Characters Reveal about Political Sentiment''. *Social Science Computer Review*. **30** (2), pp.229-234.

Kalt, G. & Kranzl, L. (2011). 'Assessing the Economic Efficiency of Bioenergy Technologies in Climate Mitigation and Fossil Fuel Replacement in Austria using a Techno-Economic Approach'. *Applied Energy*. **88**, pp.3665-3684.

Karapin, R. (2012). ‘Climate Policy Outcomes in Germany: Environmental Performance and Environmental Damage in Eleven Policy Areas’. *German Politics and Society*. **30**, pp.1-34.

Katz, A., Vom Hau, M. & Mahoney, J. (2005). ‘Explaining the Great Reversal in Spanish America: Fuzzy-Set Analysis Versus Regression Analysis’. *Sociological Methods Analysis*. **33**, pp.539-573.

Kazakos, P. (1999). ‘The ‘Europeanization’ of Public Policy: The Impact of European Integration on Greek Environmental Policy’. *Journal of European Integration*. **21** (4), pp.369-391.

Kent, R. (2008). ‘Using fsQCA: A Brief Guide and Workshop for Fuzzy-Set Qualitative Comparative Analysis’. ONLINE [Accessed 25.02.2013].
Available from:
http://www.ccsr.ac.uk/publications/teaching/2008-10.pdf

Kent, R. (2009). ‘Chapter 10: Case-Based Methods and Quantitative Analysis’. *In:* Byrne, D. & Ragin, C. C. *Eds*. (2009). *The SAGE Handbook of Case-Based Methods*. (London: SAGE Publications Limited).

Kidd, C., Piantadosie, S. T. & Aslin, R. (2012). ‘The Goldilocks Effect: Human Infants Allocate Attention to Visual Sequences That Are Neither Too Simple Nor Too Complex’. *PLoS ONE*. **7** (5), doi:10.1371/journal.pone.0036399.

Kiewiet, D. R. & McCubbins, M. D. (1991). *The Logic of Delegation: Congressional Parties and the Appropriations Process.* (Chicago: University of Chicago Press).

King, R. F. & Borchardt, A. (1994). ‘Red and Green: Air Pollution Levels and Left Party Power in OECD Countries’. *Environment and Planning C: Government and Policy*. **12** (2), pp.225– 241.

King, G., Keohane, R. O. & Verba, S. (1994). *Designing Social Inquiry: Scientific Inference in Qualitative Research.* (Princeton, New Jersey: Princeton University Press).

Kirchgässner, G. & Schneider, F. (2003). 'On the Political Economy of Environmental Policy'. *Public Choice*. **115**, pp.369-396.

Kitschelt, H. (1986). 'Political Opportunity Structures and Political Protest: Anti-Nuclear Movements in Four Democracies.' *British Journal of Political Science*. **16** (1), pp.57-85.

Kitschelt, H. (1989). *The Logics of Party Formation*. (Ithaca, NY: Cornell University Press).

Knaggård, Å. (2009). *Vetenskaplig Osäkerhet I Policyprocessen* [Scientific Uncertainty in the Policy Process]. (Lund: Lunds Universitet).

Knaggård, Å. (2014). 'What do Policy-Makers do with Uncertainty? The Incremental Character of Swedish Climate Change Policy-Making'. *Policy Studies*. **35** (1), pp.22-39.

Knill, C., Tosun, J. & Bauer, M. W. (2009). 'Neglected Faces of Europeanization: The Differential Impact of the EU on the Dismantling and Expansion of Domestic Policies'. *Public Administration*. **87** (3), pp.519-537.

Knill, C., Heichel, S. & Arndt, D. (2012). 'Really a Front-Runner, Really a Straggler? Of Environmental Leaders and Laggards in the European Union and Beyond- A Quantitative Policy Perspective'. *Energy Policy*. **48**, pp.36-45.

Knutsen, O. (1995). 'Value Orientation, Political Conflicts and Left-Right Identification: A Comparative Study'. *European Journal of Political Research*. **28**, pp.63–93.

Kopytko, N. & Perkins, J. (2011). ‘Climate Change, Nuclear Power, and the Adaptation-Mitigation Dilemma’. *Energy Policy*. **39**, pp.318-333.

Korpi, W. (1983). *The Democratic Class Struggle*. (London: Routledge & Kegan Paul).

Krämer, L. (2006). ‘15: Some Reflections on the EU Mix of Instruments on Climate Change.’ *In*: Peeters, M. & Deketelaere, K. *Eds*. (2006). *EU Climate Change Policy: The Challenge of New Regulatory Initiatives*. (Cheltenham: Edward Elgar Publishing Limited).

Kronsell, A. (1997). ‘Chapter 1: Sweden: Setting a Good Example’. *In:* Andersen, M. S. & Liefferink, D. *Eds*. (1997). *European Environmental Policy: The Pioneers*. (Manchester: Manchester University Press).

Kvist, J. (1999). ‘Welfare Reform in the Nordic Countries in the 1990s: Using Fuzzy-Set Theory to Assess Conformity to Ideal Types’. *Journal of European Social Policy*. **9** (3), pp.231-252.

Lachapelle, E. & Paterson, M. (2013). ‘Drivers of National Climate Policy’. *Climate Policy*. **13** (5), pp.547-571.

Laird, F. N. & Stefes, C. (2009). ‘The Diverging Paths of German and United States Policies for Renewable Energy: Sources of Difference.’ *Energy Policy*. **37**, pp.2619-2629.

Lampinen, A. (2009). ‘2: An Analysis of the Justification Arguments in the Application for the New Nuclear Reactor in Finland.’ *In:* Kojo, M. & Litmanen, T. *Eds*. (2009). *The Renewal of Nuclear Power in Finland*. (Basingstoke: Palgrave Macmillan).

Landler, M. (2008). ‘Germany Debates Subsidies for Solar Industry’. *The New York Times*. ONLINE [Accessed 15.07.2014].
Available from:
http://www.nytimes.com/2008/05/16/business/worldbusiness/16solar.html?_r=4&scp=1&sq=Solar+Valley+Overcast&

Langhelle, O. (2010). ‘Why Ecological Modernization and Sustainable Development Should Not be Conflated’. *In*: Mol, A. P. J., Sonnenfeld, D. A. & Spaargaren, G. *Eds*. (2010). *The Ecological Modernisation Reader*. (Oxford: Routledge).

Lauber, V. (1996). ‘7: Environmental Politics and Policy.’ *In:* Lauber, V. *Ed.* (1996). *Contemporary Austrian Politics*. (Boulder, Colorado: Westview Press).

Lauber, V. (1997). ‘Austria: A Latecomer Which Became a Pioneer’. *In:* Andersen, M. S. & Liefferink, D. *Eds.* (1997). *European Environmental Policy: The Pioneers*. (Manchester: Manchester University Press).

Lauber, V. (2009). ‘The Austrian Greens in the 2008 Parliamentary Election’. *Environmental Politics*. **18** (3), pp.439-443.

Lauber, V. & Mez, L. (2006). ‘Renewable Energy Policy in Germany, 1974 to 2005’. *Bulletin of Science, Technology and Society*. **26** (2), pp.105-120.

Lauber, V. & Schenner, E. (2011). ‘The Struggle over Support Schemes for Renewable Electricity in the European Union: A Discursive-Institutionalist Analysis’. *Environmental Politics.* **20** (4), pp.508-527.

Laver, M. & Hunt, W.B. (1992). *Policy and Party Competition*. (New York: Routledge).

Laver, M. & Schofield, N. (1990). *Multiparty Government: the Politics of Coalition in Europe*. (Oxford: Oxford University Press).

Lekakis, J. N. & Kousis, M. (2013). 'Economic Crisis, Troika and the Environment in Greece'. *South European Society and Politics*. **18** (3), pp.305-331.

Lieberman, E. S. (2005). 'Nested Analysis as a Mixed-Method Strategy for Comparative Research'. *American Political Science Review*. **99** (3), pp.435-452.

Liebowitz, S. & Margolis, S. E. (1995). 'Policy and Path Dependence: From QWERTY to Windows 95'. *Regulation*. **18** (3), pp.33-41.

Liefferink, D. & Andersen, M. S. (1998*a*). 'Greening the EU: National Positions in the Run-Up to the Amsterdam Treaty'. *Environmental Politics*. **7** (3), pp.66-93.

Liefferink, D. & Andersen, M. S. (1998*b*). 'Strategies of the 'Green' Member States in EU Environmental Policy-Making'. *Journal of European Public Policy*. **5** (2), pp.254-270.

Liefferink, D., Arts, B., Kamstra, J. & Ooijevaar, J. (2009). 'Leaders and Laggards in Environmental Policy: A Quantitative Analysis of Domestic Policy Outputs'. *Journal of European Public Policy*. **16** (5), pp.677-700.

Lijphart, A. (1971). 'Comparative Politics and the Comparative Method'. *The American Political Science Review*. **65** (3), pp.682-693.

Lijphart, A. (1999). *Patterns of Democracy: Government Forms and Performance in Thirty-Six Democracies*. (New Haven, CT: Yale University Press).

Lilliefeldt, E. (2010). ‘Party and gender in Western Europe Revisited: A Fuzzy-Set Qualitative Comparative Analysis of Gender-Balanced Parliamentary Parties’. *Party Politics*. **18** (2), pp.193-214.

Lindblom, C. (1959). ‘The Science of ‘Muddling Through’’. *Public Administration Review*. **19** (2), pp.79-88.

Lindvall, J. & Rueda, D. (2013). ‘The Insider–Outsider Dilemma’. *British Journal of Political Science*. **44** (2), pp.460-475.

Linz, J. (1990). ‘The Perils of Presidentialism’. *Journal of Democracy*. **1**, pp.51-69.

Lipp, J. (2007). ‘Lessons for Effective Renewable Policy from Denmark, Germany and the United Kingdom’. *Energy Policy*. **35**, pp.5481-5495.

List, J. A. & Sturm, D. M. (2006). ‘How Elections Matter: Theory and Evidence from Environmental Policy’. *Quarterly Journal of Economics*. **121** (4), pp.1249–1281.

Litmanen, T. (2009). ‘1: The Transillumination of Finnish Nuclear Policy: Seeking a Shortcut to a Low Carbon Society.’ *In:* Kojo, M. & Litmanen, T. *Eds*. (2009). *The Renewal of Nuclear Power in Finland*. (Basingstoke: Palgrave Macmillan).

Lofstedt, R. (2008). ‘Are Renewables an Alternative to Nuclear Energy? An Analysis of the Austria/Slovakia Discussions’. *Energy Policy*. **36**, pp.2226-2233.

Löfstedt, R. E. (1994). ‘Letter to the Editor: A Comment to Fischer and Berglund’. *Futures*. **26** (10), pp.1106-1107.

Lorenzoni, I., O'Riordan, T. & Pidgeon, N. (2008). '6: Hot Air and Colt Feet: The UK Response to Climate Change'. *In:* Compston, H. & Bailey, I. *Eds.* (2008). *Turning Down the Heat: The Politics of Climate Policy in Affluent Democracies.* (Basingstoke: Palgrave Macmillan).

Lucas, S. R. & Szatrowski, A. (2014). 'Qualitative Comparative Analysis in Critical Perspective'. *Sociological Methodology*. DOI: 10.1177/0081175014532763.

Lund, P. D. (2007). 'The Link Between Political Decision-Making and Energy Options: Assessing Future Role of Renewable Energy and Energy Efficiency in Finland'. *Energy***. 32**, pp.2271-2281.

Lynas, M. (2011). 'Geo-Engineering, Nuclear Power and Climate Change: Playing God is Good for the Planet'. *The Telegraph*. ONLINE [Accessed 05.09.2014].
Available from:
http://www.telegraph.co.uk/science/science-news/8631604/Geo-engineering-nuclear-power-and-climate-change-playing-God-is-good-for-the-planet.html

Lyytimäki, J. (2011). 'Mainstreaming Climate Policy: The Role of Media Coverage in Finland.' *Mitigation, Adaptation Strategy in Global Change*. **16**, pp.649-661.

Macdonald, S. E. & Rabinowitz, G. (1998). 'Solving the Paradox of Nonconvergence: Valence, Position, and Direction in Democratic Politics'. *Electoral Studies*. **17** (3), pp.pp.281-300.

MacNeil, R. & Paterson, M. (2012). 'Neoliberal Climate Policy: From Market Fetishism to the Developmental State'. *Environmental Politics*. **21** (2), pp.230-247.

Madden, N. J, (2014) 'Green Means Stop: Veto Players and their Impact on Climate-Change Policy Outputs'. *Environmental Politics*. **23** (4), pp.570-589.

Magnusson, L. & Ottosson, J. (2009). ‘Path Dependence: Some Introductory Remarks’. *In:* Magnusson, L. & Ottosson, J. *Eds*. (2009). *The Evolution of Path Dependence*. (Cheltenham: Edward Elgar Publishing Limited).

Mahoney, J. (2000). ‘Path Dependence in Historical Sociology’. *Theory and Society*. **29** (4), pp.507-548.

Mainwaring, S. (1993). ‘Presidentialism, Multipartism, and Democracy: The Difficult Combination’. *Comparative Political Studies*. **26** (2), pp.198-228.

Marden, S. & Gough, I. (2011). ‘Fiscal Costs of Climate Mitigation Programmes in the UK: A Challenge for Social Policy?’ CASEpapers, CASE/145. ONLINE. [Accessed 12.01.2013].
Available from:
http://eprints.lse.ac.uk/36560/1/Fiscal_costs_of_climate_mitigation_programmes_in_the_UK_a_challenge_for_social_policy%28lsero%29.pdf

Marshall, E. (2005) ‘Is the Friendly Atom Poised for a Comeback?’ *Science*. **309,** pp.1168–1169.

Marshall, K. E. (2007). ‘6: Sweden, Climate Change and the EU Context’. *In:* Harris, P. G. *Ed*. (2007). *Europe and Global Climate Change*. (Cheltenham: Edward Elgar).

Marshall, M. (2013). ‘How UK’s First Reactor for 25 Years Will Work’. *New Scientist*. ONLINE [Accessed 10.09.2014].
Available from:
http://www.newscientist.com/article/mg22029392.500-how-uks-first-nuclear-reactor-for-25-years-will-work.html#.VBBPNPldWT8

Martin, S. J. (2011). ‘Oncogene-Induced Autophagy and the Goldilocks Principle’. *Autophagy*. **7** (8), pp.922-923.

Martinovsky, P. & Mareš, M. (2012). 'Political Support for Nuclear Power in Central Europe'. *International Journal of Nuclear Governance, Economy and Ecology*. **3** (4), pp.338-359.

Massey, N. (2014). 'Nuclear Power Also Needed to Combat Climate Change'. *Scientific American*. ONLINE [Accessed 05.09.2014].
Available from:
http://www.scientificamerican.com/article/nuclear-power-also-needed-to-combat-climate-change/

Mayer, J. (2013). 'Results from the PV GRID Research in Germany'. *BSW Solar*. ONLINE [Accessed 15.07.2014].
Available from:
http://www.pvgrid.eu/uploads/media/BSW_-_PV_Grid_-_20130517.pdf

McCormick, J. (2001). *Environmental Policy in the European Union*. (New York: Palgrave).

McCubbins, M. D. (1991). 'Party Governance and U.S. Budget Deficits: Divided Government and Fiscal Stalemate'. *In:* Alesina, A. & Carliner, G. *Eds*. (1991). *Politics and Economics in the Eighties*. (Chicago: University of Chicago Press).

Meadowcroft, J. (2012). '3: Greening the State?' *In:* Steinberg, P. F. & VanDeveer, S. D. *Eds.* (2012). *Comparative Environmental Politics: Theory, Practice, and Prospects*. (Massachusetts: MIT Press).

Meadows, D. H., Randers, J. & Meadows, D. (1972). *Limits to Growth*. (London: Earth Island).

Mertig, A. G. & Dunlap, R. E. (1995). 'Public Approval of Environmental Protection and other new Social Movement Goals in Western Europe and the United States'. *International Journal of Public Opinion Research*. **7** (2), pp.145-156.

Michaelowa, A. (2003). ‘Germany—a Pioneer on Earthen Feet?’ *Climate Policy*. **3** (1), pp.31-43.

Michaelowa, A. (2008). ‘8: German Climate Policy Between Global Leadership and Muddling Through.’ *In:* Compston, H. & Bailey, I. *Eds.* (2008). *Turning Down the Heat: The Politics of Climate Policy in Affluent Democracies*. (Basingstoke: Palgrave Macmillan).

Mickwitz, P., Hildén, M., Seppälä, J. & Melanen, M. (2011). ‘Sustainability Through System Transformation: Lessons from Finnish Efforts’. *Journal of Cleaner Production: Lessons from Finnish Production*. **19**, pp.1779-1787.

Mill, J. S. (1884). *A System of Logic, Ratiocinative and Inductive, being a Connected View of the Principles of Evidence and the Methods of Scientific Investigation*. (London: Longmans, Green, and Co.).

Mol, A. J. P. & Sonnenfeld, D. A. (2000). ‘Ecological Modernisation Around the World: An Introduction’. *In:* Mol, A. P. J. & Sonnenfeld, D. A. *Eds*. (2005). *Ecological Modernisation Around the World: Perspectives and Critical Debates*. (Oxford: Franks Cass Publishers).

Mol, A. P. J. & Spaargaren, G. (1993). ‘Environment, Modernity and the Risk-Society: The Apocalyptic Horizon of Environmental Reform’. *International Sociology*. **8** (4), pp.431-459.

Montanarella, L., Jones, R. J. A. & Hiederer, R. (2006). ‘The Distribution of Peatland in Europe’. *Mires and Peat*. **1**, pp.1-11.

Morelli, M. (2004). ‘Party Formation and Policy Outcomes Under Different Electoral Systems’. *Review of Economic Studies*. **71**, pp.829-853.

Morison, R. (2014). ‘Europe Faces Green Power Curbs to Stop Grid Overloading’. *Bloomberg*. ONLINE [Accessed 30.06.2014].
Available from:
http://www.bloomberg.com/news/2014-06-05/europe-faces-green-power-curbs-after-fivefold-expansion-energy.html

Motiva (2013). ‘Renewable Energy in Finland’. ONLINE [Accessed 14.07.2014].
Available from:
http://www.motiva.fi/en/areas_of_operation/renewable_energy/renewable_energy_in_finland

Müller, W. C. (1996*a*). ‘2: Political Institutions’. *In:* Lauber, V. *Ed.* (1996). *Contemporary Austrian Politics*. (Boulder, Colorado: Westview Press).

Müller, W. C. (1996*b*). ‘3: Political Parties. *In:* Lauber, V. *Ed.* (1996). *Contemporary Austrian Politics*. (Boulder, Colorado: Westview Press).

Müller, W. (2009). ‘The Snap Election in Austria, September 2009’. *Electoral Studies*. **28**, pp.514-517.

Müller-Rommel, F. (1989). *New Politics in Western Europe: The Rise and Success of Green Parties and Alternative Lists.* (Boulder, CO: Westview Press).

Murphy, J. & Gouldson, A. (2000). ‘Environmental Policy and Industrial Innovation: Integrating Environment and Economy Through Ecological Modernisation’. *Geoforum*. **31**, pp.33-44.

Murphy, J. (2001). *Ecological Modernization: the Environment and the Transformation of Society*. Oxford Centre for the Environment, Ethics and Society, Mansfield College, Oxford, UK: OCEES Research Paper No. 20.

Myllyntaus, T. (2012). ‘3: Farewell to Self-Sufficiency: Finland and the Globalization of Fossil Fuels.’. *In:* Järvelä, M. & Juhola, S. *Eds*. (2012). *Energy, Policy, and the Environment: Modeling Sustainable Development for the North*. (London: Springer).

Neumayer, E. (2002*a*). ‘Can Natural Factors Explain Any Cross-Country Differences in Carbon Dioxide Emissions?’ *Energy Policy*. **30**, pp.7-12.

Neumayer, E. (2002*b*). ‘Do Democracies Exhibit Stronger International Environmental Commitment? A Cross Country Analysis’. *Journal of Peace Research.* **39** (2), pp.139-164.

Neumayer, E. (2002*c*). ‘Does Trade Openness Promote Multilateral Environmental Cooperation?’ *The World Economy*. **25** (6), pp.815-832.

Neumayer, E. (2003). ‘Are Left-Wing Party Strength and Corporatism Good for the Environment? Evidence from Panel Analysis of Air Pollution in OECD Countries’. *Ecological Economics*. **45,** pp.203-220.

Neumayer, E. (2004). ‘The Environment, Left-Wing Political Orientation and Ecological Economics’. *Ecological Economics*. **51**, pp.167-175.

Never, B. & Betz, J. (2014). ‘Comparing the Climate Policy Performance of Emerging Economies’. *World Development*. **59**, pp.1-15.

Nilsson, L. J., Johansson, B., Åstrand, K., Ericsson, K., Svenningsson, P., Börjesson, P. & Neij, L. (2004). ‘Seeing the Wood for the Trees: 25 Years of Renewable Energy Policy in Sweden’. *Energy for Sustainable Development*. **VIII** (I), pp.67-81.

Nilsson, M. (2005). ‘The Role of Assessments and Institutions for Policy Learning: A Study on Swedish Climate and Nuclear Policy Formulation’. *Policy Sciences.* **34** (8), pp.225-249.

Nohrstedt, D. (2009). ‘Do Advocacy Coalitions Matter? Crisis and Change in Swedish Nuclear Energy Policy’. *Journal of Public Administration Research and Theory*. **20**, pp.309-333.

Nordhaus, W. D. (1997). *The Swedish Nuclear Dilemma: Energy and the Environment*. (Washington, D.C.: Resources for the Future).

Nordhaus, W. D. (1998). ‘Assessing the Economics of Climate Change: An Introduction’. *In:* Nordhaus, W. D. *Ed*. (1998). *Economics and Policy Issues in Climate Change*. (Washington, D. C.: Resources for the Future).

NSD [Nordic Social Science Data Services] (2011). ‘Political Constraint Index Dataset’. ONLINE [Accessed 23.07.2014].
Available from:
http://www.nsd.uib.no/macrodataguide/set.html?id=29&sub=1

Norris, P. (2005). *Radical Right: Voters and Parties in the Electoral Market*. (Cambridge, Cambridge University Press).

Nuticelli, D. (2014). ‘Global Warming Denial Rears its Ugly Head Around the World, in English’. *Guardian*. ONLINE [Accessed 31.08.2014].
Available from:
http://www.theguardian.com/environment/climate-consensus-97-per-cent/2014/aug/18/global-warming-denial-rears-head-in-english

Obertür, S. & Ott, H. (1999). *The Kyoto Protocol: International Climate Policy for the 21st Century*. (Berlin: Springer).

OECD [Organisation for Economic Co-Operation and Development] (2003). *Energy Policies of IEA Countries: Finland 2003 Review*. ONLINE. [Accessed 23.04.2014].
Available from:
http://www.oecd-ilibrary.org/energy/energy-policies-of-iea-countries-finland-2003_9789264019607-en

OECD [Organisation for Economic Co-Operation and Development] (2007). *Energy Policies of IEA Countries: Finland 2007 Review*. ONLINE. [Accessed 23.04.2014].
Available from:
http://www.iea.org/publications/freepublications/publication/name,3726,en.html

OECD [Organisation for Economic Co-Operation and Development] (2013). *Energy Policies of IEA Countries: Finland 2013 Review*. ONLINE. [Accessed 23.04.2014].
Available from:
http://www.oecd-ilibrary.org/energy/energy-policies-of-iea-countries-finland-2013_9789264190788-en

OECD [Organisation for Economic Co-operation and Development] (2014*a*). 'Gross Domestic Product (GDP) per head, US $, constant prices, constant PPPs, reference year 2005'. ONLINE [Accessed 15.07.14].
Available from:
http://stats.oecd.org/index.aspx?queryid=558

OECD [Organisation for Economic Co-operation and Development] (2014*b*). 'Greenhouse Gas Emissions'. ONLINE [Accessed 05.09.2014].
Available from:
http://stats.oecd.org/Index.aspx?DataSetCode=AIR_GHG

OECD/IEA [Organisation for Economic Co-operation and Development/International Energy Agency] (2007). ‘Energy Policies of IEA Countries: Austria 2007 Review’. ONLINE. [Accessed 23.04.2014].

Available from:

https://www.iea.org/publications/freepublications/publication/name,3768,en.html

OECD/IEA [Organisation for Economic Co-operation and Development/International Energy Agency] (2014). ‘Energy Policies of IEA Countries: Austria 2014 Review’. ONLINE. [Accessed 23.04.2014].

Available from:

http://www.oecd-ilibrary.org/energy/energy-policies-of-iea-countries-austria-2014_9789264209602-en

Oreskes, N. (2007). ‘4: The Scientific Consensus on Climate Change: How Do We Know We’re Not Wrong?’ *In:* DiMento, J. F. C. & Doughman, P. *Eds*. (2007). *Climate Change: What it Means for US, Our Children, and Our Grandchildren*. (Massachusetts: MIT Press).

O’Riordan, T. & Jäger, J. (1996). *Politics of Climate Change: A European Perspective*. (London: Routledge).

Paastela, J. (2002). ‘Finland’. *Environmental Politics*. **11** (1), pp.17-38.

Parkin, S. (1989). *Green Parties: An International Guide*. (London: Heretic Books).

Parliamentary resolution 1979/80:410. [Rskr 1979/80:410]. 10 June 1980.

Pearce, D. W. & Barbier, E. (2000). *Blueprint for a Sustainable Economy*. (London: Earthscan).

Pedersen, M. N. (1997). 'NOMINATIONS AND REFLECTIONS. Left-Right Political Scales: Some 'Expert' Judgements'. *European Journal of Political Research*. **31**, pp.147-157.

Pehle, H. (1997). 'Germany: Domestic Obstacles to an International Forerunner'. *In:* Andersen, M. S. & Liefferink, D. *Eds*. (1997). *European Environmental Policy: The Pioneers*. (Manchester: Manchester University Press).

Pehle, H. & Jansen, A.-I. (1998). 'Germany: The Engine in European Environmental Policy?' *In:* Hanf, K. & Jansen, A.-I. *Eds.* (1998). *Governance and Environment in Western Europe: Politics, Policy and Administration*. (Harlow: Addison Wesley Longman Limited).

Pelinka, A. (1983). 'The Nuclear Power Referendum in Austria'. *Electoral Studies*. **2** (3), pp.253-261.

Pennings, P. (2003). 'Beyond Dichotomous Explanations: Explaining Constitutional Control of the Executive with Fuzzy Sets'. *European Journal of Political Research*. **42**, pp.541-567.

Pennings, P. (2005). 'The Diversity and Causality of Welfare State Reforms Explored with Fuzzy-Sets'. *Quality and Quantity*. **39**, pp.317-339.

Petola, T. (2012). '9: Energy Policy or Forest Policy or Rural Policy? Transition from Fossil to Bioenergy in Finnish Local Heating Systems.' *In:* Järvelä, M. & Juhola, S. *Eds.* (2012). *Energy, Policy, and the Environment: Modeling Sustainable Development for the North*. (London: Springer).

Peura, P. & Hyttinen, T. (2011). 'The Potential and Economics of Bioenergy in Finland'. *Journal of Cleaner Production*. **19**, pp.927-945.

Pierson, P. (2000). ‘Increasing Returns, Path Dependence, and the Study of Politics’. *The American Political Science Review*. **94** (2), pp.251-267.

Pierson, P. (2004). *Politics in Time*. (Princeton: Princeton University Press).

Pierson, P. & Weaver, R. K. (1993). ‘Imposing Losses in Pension Policy’. *In:* Weaver, R. K. & Pierson, P. *Eds*. (2000). ‘Increasing Returns, Path Dependence, and the Study of Politics’. *The American Political Science Review*. **94** (2), pp.251-267.

Poguntke, T. (2002). ‘Green Parties in National Governments: From Protest to Acquiescence.’ *Environmental Politics*. **11** (1), pp.133-145.

Poguntke, T. (2007). ‘Germany’. *European Journal of Political Research*. **46**, pp.957-961.

Poguntke, T. (2009). ‘Germany’. *European Journal of Political Research*. **48**, pp.964-967.

Poguntke, T. (2010). ‘Germany’. *European Journal of Political Research*. **49**, pp.982-990.

Poguntke, T. (2011). ‘Germany’. *European Journal of Political Research*. **50**, pp.980-984.

Pohjolan Voima (*undated*). ‘The Mankala Cost Price Model’. ONLINE [Accessed 16.09.2014]. *Available from:* http://www.pohjolanvoima.fi/_sys_/data/pubfilebank/savefile.php?folderId=1074&fileId=24471&key=83517cefc6682bb3729a2f213d0ea5a8

Popper, K. (1968). *The Logic of Scientific Discovery*. (New York: Harper and Row).

Ragin, C. C. (1989). *The Comparative Method: Moving Beyond Qualitative and Quantitative Strategies*. (London: University of California Press).

Ragin, C. C. (2000). *Fuzzy Set Social Science*. (London: University of Chicago Press).

Ragin, C. C. (2008) *Redesigning Social Inquiry: Fuzzy Sets and Beyond.* (London: University of Chicago Press).

Ragin, C. C. (2014). 'Comment: Lucas and Szatrowski in Critical Perspective'. *Sociological Methodology*. DOI: 0081175014542081.

Ragin, C. C., Drass, K. A. & Davey, S. (2006). *Fuzzy-Set/Qualitative Comparative Analysis 2.0*. (Tucson, Arizona: Department of Sociology, University of Arizona).

Ramachandra, T. V. & Shwetmala (2012). 'Decentralised Carbon Footprint Analysis for Opting Climate Change Strategies in India'. *Renewable and Sustainable Energy Reviews*. **16** (8), pp.5820-5833.

Ramakrishna. K. (2000). 'The UNFCCC- History and Evolution of the Climate Change Negotiations'. *In:* Gómez-Echeverri, L. *Ed.* (2000). *Climate Change and Development*. (New Haven: Yale University Press).

Rathmann, M., Winkel, T., Stricker, E., Ragwitz, M., Held, A., Pfluger, B., Resch, G., Panzer, C., Busch, S. & Konstantinavicuite, I. (2009). 'Renewable Energy Policy Country Profiles'. *Ecofys*. ONLINE [Accessed 19.08.2014].
Available from:
http://www.ecofys.com/files/files/ecofys_re-shaping_country_profiles_2011.pdf

Raunio, T. & Wiberg, M. (2008). 'The Eduskunta and the Parliamentarisation of Finnish Politics: Formally Stronger, Politically Still Weak?' *West European Politics*. **31** (3), pp.581-599.

Redclift, M. (2005). ‘Sustainable Development (1987-2005): An Oxymoron Comes of Age’. *Sustainable Development*. **13**, pp.212-227.

Regeringskansliet [Swedish Government] (2002). ‘Swedish Climate Strategy: 2001:02:55’. ONLINE. [Accessed 04.08.2013].
Available from:
http://www.regeringen.se/content/1/c4/11/55/fbd1d28b.pdf

Regeringskansliet [Swedish Government] (2006). ‘Nationell klimatpolitik i global samverkan [National Climate Policy in Global Co-operation]: 2005/06:172’. ONLINE. [Accessed 04.08.2013].
Available from:
http://www.regeringen.se/content/1/c6/06/07/78/a096b1c8.pdf

Regeringskansliet [Swedish Government] (2009*a*). ‘Sweden's Fifth National Communication on Climate Change’. ONLINE. [Accessed 08.07.2013].
Available from:
http://unfccc.int/resource/docs/natc/swe_nc5.pdf

Regeringskansliet [Swedish Government] (2009*b*). ‘Kärnkraften - förutsättningar för generationsskifte [Nuclear Power – the Conditions for Generation]: 2009/10:172’. ONLINE. [Accessed 25.03.2014].
Available from:
http://www.regeringen.se/sb/d/12166/a/142359

Reiche, D. & Bechberger, M. (2004). ‘Policy Differences in the Promotion of Renewable Energies in the EU Member States.’ *Energy Policy*. **32**, pp.843-849.

Renewables International (2013). ‘Austria to go 100 Percent Nuclear-Free’. ONLINE [Accessed 30.06.2014].
Available from:
http://www.renewablesinternational.net/austria-to-go-100-percent-nuclear-free/150/537/71512

Reuters (2012). ‘German Renewables Output Hits Record High in H1’. ONLINE. [Accessed 17.12.2013].
Available from:
http://www.reuters.com/article/2012/07/26/germany-renewables-idUSL6E8IQIA720120726

Rhodes, R. A. W. (1997). *Understanding Governance*. (Buckingham: Open University Press).

Rihoux, B. & Rüdig, W. (2006). ‘Analyzing Greens in Power: Setting the Agenda’. *European Journal of Political Research*. **45**, pp.S1-S33.

Rohrschneider, R. (1988). Citizens’ Attitudes Toward Environmental Issues: Selfish or Selfless?’ *Comparative Political Studies*. **21** (3), pp.347–367.

Rönsberg, A. (2013). ‘Germany only ‘Moderate’ on Climate Protection’. *DW*. ONLINE [Accessed 05.09.2014].
Available from:
http://www.dw.de/germany-only-moderate-on-climate-protection/a-17240241

Rosa, E. A. (2001). ‘Global Climate Change: Background and Sociological Contributions’. *Society & Natural Resources: An International Journal*. **14** (6), pp.491-499.

Rudberg, P., Weitz, N., Dalen, K. & Haug, J. J. K. (2013). ‘Governing Growing Wind Power: Policy Coherence of Wind Power Expansion and Environmental Considerations in Sweden, with Comparative Examples from Norway’. *Stockholm Environment Institute*. ONLINE. [Accessed 15.08.2013].
Available from:
http://www.sei-international.org/mediamanager/documents/Publications/SEI-ProjectReport-Rudberg-GoverningGrowingWindPower-2013.pdf

Ruostetsaari, I. (2009). ‘Governance and Political Consumerism in Finnish Energy Policy-Making.’ *Energy Policy*. **37**, pp.102-110

Ruostetsaari, I. (2010*a*). ‘Citizens, Politicians and Experts in Energy Policy-Making: The Case of Finland’. *Energy & Environment*. **21** (3), pp.203-222.

Sailor, W. C., Bodansky, D., Braun, C., Fetter, S. & van der Zwaan, B. (2000). ‘Nuclear Power: A New Solution to Climate Change?’ *Science*. **288** (5469), pp.1177-1178.

Sairinen, R. (1999). ‘Voluntary Agreements as an Environmental Policy Instrument in Finland’. *European Environment*. **9**, pp.67-74.

Sairinen, R. (2003). ‘The Politics of Regulatory Reform: 'New' Environmental Policy Instruments in Finland’. *Environmental Politics*. **12** (1), pp.73-92.

Sairinen, R. & Lindholm, A. (2004). ‘Finland: A Realistic Pragmatist’. *In:* Jordan, A. & Liefferink, D. *Eds.* (2004). *Environmental Policy in Europe: the Europeanization of National Environmental Policy*. (Oxford: Routledge).

Salo, M. (2012). ‘7: Disregarding Wind Power: Introduction to Finnish Feed-In Tariff Policy.’ *In:* Järvelä, M. & Juhola, S. *Eds*. (2012). *Energy, Policy, and the Environment: Modeling Sustainable Development for the North*. (London: Springer).

Samuels, D. J. & Shugart, M. S. (2003). ‘Presidentialism, Elections and Representation’. *Journal of Theoretical Politics*. **15** (1), pp.33-60.

Sarasini, S. (2009). ‘Constituting Leadership Via Policy: Sweden as a Pioneer of Climate Change Mitigation’. *Mitigation and Adaptation Strategies for Global Change*. **14**, pp.635-653.

Sarasini, S. (2013). ‘Institutional Work and Climate Change: Corporate Political Action in the Swedish Electricity Industry'. *Energy Policy*. **56**, pp.480-489.

Sartor, O., Pallière, C. & Lecourt, S. (2014). ‘Benchmark-based Allocations in EU ETS Phase 3: an Early Assessment’. *Climate Policy*. **14** (4), pp.507-524.

Sartori, G. (1968). ‘Political Development and Political Engineering’. *In*: Montgomery, J. D. & Hirschman, A. O. *Eds*. (1968). *Public Policy.* (Cambridge, MA: Harvard University Press).

Sartori, G. (1976). *Parties and Party Systems: A framework for Analysis*. (Cambridge: Cambridge University Press).

Saul, U., & Seidel, C. (2011). ‘Does Leadership Promote Cooperation in Climate Change Mitigation Policy?’ *Climate Policy*. **11**, pp.901–921.

Säynässalo, E. (2009). ‘5: Nuclear Energy Policy Processes in Finland in Comparative Perspective: Complex Mechanisms of a Strong Administrative State.’ *In:* Kojo, M. & Litmanen, T. *Eds*. (2009). *The Renewal of Nuclear Power in Finland*. (Basingstoke: Palgrave Macmillan).

Schaffrin, A., Sewerin, S. & Seubert, S. (2014). ‘The Innovativeness of National Policy Portfolios – Climate Policy Change in Austria, Germany, and the UK’. *Environmental Politics*. **23** (5), pp.860-883.

Schmidt, M. G. (1996). ‘When Parties Matter: A Review of the Possibilities and Limits of Partisan Influence on Public Policy’. *European Journal of Political Research*. **30**, pp.155-183.

Schmidt, J., Leduc, S., Dotzauer, E. & Schmid, E. (2011). ‘Cost-Effective Policy Instruments for Greenhouse Gas Emission Reduction and Fossil Fuel Substitution Through Bioenergy Production in Austria’. *Energy Policy*. **39**, pp.3261-3280.

Schnaiberg, A., Pellow, D. N. & Weinberg, A. (2002). ‘The Treadmill of Production and the Environmental State’. *Research in Social Problems and Public Policy*. **10**, pp.15-32.

Schneider, C. Q. & Rohlfing, I. (2013). ‘Combining QCA and Process Tracing in Set-Theoretic Multi-Method Research’. *Sociological Methods and Research*. DOI: 10.1177/0049124113481341.

Schneider, C. Q. & Wagemann, C. (2006). ‘Reducing Complexity in Qualitative Comparative Analysis (QCA): Remote and Proximate Factors and the Consolidation of Democracy’. *European Journal of Political Research*. **45**, pp.751-786.

Schneider, C. Q. & Wagemann, C. (2010). ‘Standards of Good Practice in Qualitative Comparative Analysis (QCA) and Fuzzy-Sets’. *Comparative Sociology*. **9**, pp.1-22.

Schneider, C. Q. & Wagemann, C. (2012). *Set-Theoretic Methods for the Social Sciences: A Guide to Qualitative Comparative Analysis*. (Cambridge: Cambridge University Press).

Schreurs, M. (2002). *Environmental Politics in Japan, Germany, and the United States*. (Cambridge: Cambridge University Press).

Schreurs, M. (2008). 'From the Bottom Up: Local and Subnational Climate Change Politics'. *The Journal of Environment and Development*. **17** (4), pp.343-355.

Schreurs, M. A. & Tiberghien, Y. (2007). 'Multi-Level Reinforcement: Explaining European Union Leadership in Climate Change Mitigation'. *Global Environmental Politics.* **7** (4), pp.19-46.

Scruggs, L. (1999). 'Institutions and Environmental Performance in Seventeen Western Democracies. *British Journal of Political Science*. **29** (1), pp.1–31.

Sehring, J., Korhonen-Kurki, K. & Brockhaus, M. (2013). 'Qualitative Comparative Analysis (QCA): An Application to Compare National REDD+ Policy Processes'. *CIFOR*. ONLINE [Accessed 29.08.2014].
Available from:
http://www.cifor.org/publications/pdf_files/WPapers/WP121Sehring.pdf

Siaroff, A. (2003). 'Comparative Presidencies: The Inadequacy of the Presidential, Semi-presidential and Parliamentary Distinction'. *European Journal of Political Research*. **42** (3), pp.287–312.

Söderholm, P. & Petterson, M. (2011). 'Offshore Wind Power Policy and Planning in Sweden'. *Energy Policy*. **39**, pp.518-525.

Sovacool, B. K. (2008). 'Valuing Greenhouse Gas Emissions from Nuclear Power: A Critical Survey'. *Energy Policy*. **36** (8), pp.2950-2963.

Sovacool, B. K. & Cooper, C. (2008). 'Nuclear Nonsense: Why Nuclear Power is No Answer to Climate Change and the World's Post-Kyoto Energy Challenges'. *William and Mary Environmental Law and Policy Review*. **33** (1), pp.1-121

Spaargaren, G. & Mol, A. P. J. (2010). 'Sociology, Environment, and Modernity: Ecological Modernization as a Theory of Social Change'. *In*: Mol, A. P. J., Sonnenfeld, D. A. & Spaargaren, G. *Eds*. (2010). *The Ecological Modernisation Reader*. (Oxford: Routledge).

Statens Energimyndighet [State Energy Department] (2010). 'Sweden Energy 2010'. ONLINE. [Accessed 25.07.2013].
Available from:
http://webbshop.cm.se/System/TemplateView.aspx?p=Energimyndigheten&view=default&id=b4cea7b00212456b9bdbdbe47a009474

Statistics Finland (2011). 'True Finns the biggest winner in the elections. Coalition Party the biggest party in the Parliamentary elections.' ONLINE [Accessed 12.09.2014].
Available from:
http://www.stat.fi/til/evaa/2011/evaa_2011_2011-04-29_tie_001_en.html

Statistics Finland (2012). 'Total Energy Consumption only fell by 5 per cent in 2011'. ONLINE [Accessed 14.07.2014].
Available from:
http://www.stat.fi/til/ehk/2011/04/ehk_2011_04_2012-03-22_tie_001_en.html

Steinberg, P. F. & VanDeveer, S. D. (2012). *Comparative Environmental Politics: Theory, Practice, and Prospects*. (Massachusetts: MIT Press).

Stern, D. I. (2004). 'The Rise and Fall of the Environmental Kuznets Curve'. *World Development*. **32** (8), pp.1419-1439.

Stern, N. (2010). *A Blueprint for a Safer Planet*. (London: Vintage).

Sundberg, J. (2008). 'Finland'. *European Journal of Comparative Research*. **47**, pp.969-975.

Taagepera, R. & Shugart, M. S. (1989). *Seats and Votes: The Effects and Determinants of Electoral Systems.* (New Haven, CT: Yale University Press).

Tálos, E. (1996). '4: Corporatism- The Austrian Model.' *In:* Lauber, V. *Ed.* (1996). *Contemporary Austrian Politics*. (Boulder, Colorado: Westview Press).

Tálos, E. (2008). *Sozialpartnerschaft. Ein Zentraler Gestaltungsfaktor in der Zweiten Republik* [Social Partnership. A Key Design Factor in the Second Republic]. (Innsbruck: StudienVerlag).

Taylor, P. W. (1981). 'The Ethics of Respect for Nature'. *Environmental Ethics*. **198** (3), pp.197-218.

Teräväinen, T. (2010*a*). 'Political Opportunities and Storylines in Finnish Climate Policy Negotiations'. *Environmental Politics*. **19** (2), pp.196-216.

Teräväinen, T. (2010*b*). 'Ecological Modernisation and the Politics of (Un)sustainability in the Finnish Climate Policy Debate'. *In:* Simard, S. *Ed.* (2010). *Climate Change and Variability*. ONLINE. [Accessed 07.10.2013].
Available from:
http://www.intechopen.com/books/climate-change-and-variability/ecological-modernisation-and-the-politics-of-un-sustainability-in-the-finnish-climate-policy-debate

Teräväinen, T. (2012). *The Politics of Energy Technologies: Debating Climate Change, Energy Policy, and Technology in Finland, the United Kingdom, and France*. (Helsinki: Into).

Teräväinen , T., Lehtonen, M. & Martiskainen, M. (2011). ‘Climate Change, Energy Security, and Risk- Debating Nuclear New Build in Finland, France and the UK’. *Energy Policy*. **39**, pp.3434-3442.

Thelen, K. (1999). ‘Historical Institutionalism in Comparative Politics’. *Annual Review of Political Science*. **2**, pp.369-404.

Tobin, P. (2014). 'Inter-‘State’ Conflict: The Clash of Priorities Between the Green State and the Low Carbon State'. *Presented at* 'The PSA Annual Conference', Manchester, UK.

Toke, D. & Vezirgiannidou, S.-E. (2013). ‘The Relationship Between Climate Change and Energy Security: Key Issues and Conclusions’. *Environmental Politics*. **22** (4), pp.537-552.

Tosun, J. & Knill, C. (2009). ‘Economy and Sustainability – How Economic Integration Stimulates Stringent Environmental Regulations’. *Sustainability*. **1**, pp.1305-1322.

Townshend, T., Fankhauser, S., Aybar, R., Collins, M., Landesman, T., Nachmany, M. & Pavese. (2013). *The GLOBE Climate Legislation Survey*. (Chippenham: CPI Antony Rowe).

Tsebelis, G. (1995). ‘Decision-Making in Political Systems: Veto Players in Presidentialism, Parliamentarism, Multicameralism and Multipartyism’. *British Journal of Political Science*. **25** (3), pp.289-325.

Tsebelis, G. (1999). ‘Veto Players and Law Production in Parliamentary Democracies: An Empirical Analysis.’ *American Political Science Review*. **93**, pp.591-608.

Tubi, A., Fischhendler, I. & Feitelson, E. (2012). ‘The Effect of Vulnerability on Climate Change Mitigation Policies’. *Global Environmental Change*. **22**, pp.472-482.

Uba, K. (2010). 'Who Formulate Renewable-Energy Policy? A Swedish Example'. *Energy Policy*. **38**, pp.6674-6683.

Umbach, F. (2014). 'Rising costs of 'alternative' energy threaten German industry'. *World Review*. ONLINE. [Accessed 25.03.2014].
Available from:
http://www.worldreview.info/content/rising-costs-alternative-energy-threaten-german-industry

UNFCCC [United Nations Framework Convention on Climate Change] (1997). 'Kyoto Protocol to the United Nations Framework Convention on Climate Change'. ONLINE [Accessed 10.09.12].
Available from:
http://unfccc.int/resource/docs/convkp/kpeng.html

UNFCCC [United Nations Framework Convention on Climate Change] (2014*a*). 'Parties to the Convention and Observer States'. ONLINE [Accessed 31.08.2014].
Available from:
http://unfccc.int/parties_and_observers/items/2352.php

UNFCCC [United Nations Framework Convention on Climate Change] (2014*b*). 'List of Annex I Parties to the Convention'. ONLINE [Accessed 05.09.2014].
Available from:
http://unfccc.int/parties_and_observers/parties/annex_i/items/2774.php

Valkila, N. & Saari, A. (2010). 'Urgent Need for New Approach to Energy Policy: The Case of Finland'. *Renewable and Sustainable Energy Reviews*. **14**, pp.2068-2076.

Van Asselt, H. (2011). '6: Emissions Trading: the Enthusiastic Adoption of an 'Alien' Instrument?' *In:* Jordan, A., Huitema, D., van Asselt, H., Rayner, T. & Berkhout, F. *Eds*. (2011). *Climate Change Policy in the European Union: Confronting the Dilemmas of Mitigation and Adaptation?* (Cambridge: Cambridge University Press).

Van Der Linden, N. H., Uyterlinde, M. A., Vrolijk, C., Nilsson, L. J., Khan, J., Åstrand, K., Ericsson, K. & Wiser, R. (2005). 'Review of International Experience with Renewable Energy Obligation Support Mechanisms'. *Energieonderzoek Centrum Nederland* [Energy Research Centre of the Netherlands]. ONLINE [Accessed 03.07.2014].
Available from:
http://emp.lbl.gov/publications/review-international-experience-renewable-energy-obligation-support-mechanisms

Vattenfall (2012). 'Ownership'. ONLINE [Accessed 14.07.2014].
Available from:
http://corporate.vattenfall.com/investors/key-facts/ownership/

Verbruggen, A. (2008). 'Renewable and Nuclear Power: A Common Future?' *Energy Policy*. **36**, pp.4036-4047.

Vogler, J. & Stephan, H. R. (2007). 'The European Union in Global Environmental Governance: Leadership in the Making'. *International Environmental Agreements*. **7**, pp.389-413.

Wagner, L. M. (2005). 'A Commission Will Lead Them? The UN Commission on Sustainable Development and UNCED follow-up.' *In*: Kallhauge, A. C., Sjöstedt, G. & Corell, E. *Eds*. (2005). *Global Challenges: Furthering the Multilateral Process for Sustainable Development.* (Sheffield: Greenleaf.)

Wang, Y. (2006). ‘Renewable Electricity in Sweden: An Analysis of Policy and Regulations’. *Energy Policy*. **34**, pp.1209-1220.

Ward, A. (2010). ‘Finnish Parliament Backs Nuclear Reactors’. *Financial Times*. ONLINE [Accessed 30.06.2014].
Available from:
http://www.ft.com/cms/s/0/eb942cec-853c-11df-9c2f-00144feabdc0.html#axzz367T7qoPN

Warner, R. (2010). ‘Ecological Modernisation Theory: Towards a Critical Ecopolitics of Change?’ *Environmental Politics*. **19** (4), pp.538-556.

Watanabe, R. (2011). *Climate Policy Changes in Germany and Japan: A Path to Paradigmatic Policy Change*. (Abingdon: Routledge).

WCED [World Commission on Environment and Development] (1987). *Our Common Future*. (Oxford: Oxford University Press).

Weale, A., Pridham, G. & Cini, M. (2000). *European Environmental Governance*. (Oxford: Oxford University Press).

Weart, S. R. (2003). *The Discovery of Global Warming*. (Massachusetts: Harvard University Press).

Weaver, R. K., & Rockman, B. A. (1993). ‘Assessing the Effects of Institutions’. *In*: Weaver, R. K. & Rockman, B. A. *Eds*. (1993). *Do Institutions Matter? Government Capabilities in the United States and Abroad*. (Washington, DC: The Brookings Institution).

Weidner, H. (2002). ‘Environmental Policy and Politics in Germany’. *In:* Desai, U. *Ed*. (2002). *Environmental Politics and Policy in Industrialized Countries*. (Massachusetts: Massachusetts Institute of Technology Press).

Weidner, H. & Mez, L. (2008) ‘German Climate Change Policy. A Success Story with some Flaws’. *The Journal of Environment Development* **17** (4): 356-378.

Weisehomeier, N. & Benoit, K. (2009). ‘Presidents, Parties and Policy Competition’. *Journal of Politics*. **71**, pp.1435-1447.

WHO [World Health Organisation] (2010). ‘Climate Change and Health’. ONLINE. [Accessed 28.08.12].
Available from:
http://www.who.int/mediacentre/factsheets/fs266/en/

Widfeldt, A. (2006). ‘Sweden’. *European Journal of Political Research*. **45**, pp.1270-1274.

Widfeldt, A. (2007). ‘Sweden’. *European Journal of Political Research*. **46**, pp.1118-1126.

Wilenius, M. & Tirkkonen, J. (1998). ‘Building a Regime for Climate Protection: Finland and International Climate Policy’. *Global Environmental Change*. **8** (4), pp.291-308.

Withnall, A. (2014). ‘Vladimir Putin ‘wants to regain Finland’ for Russia, adviser says’. *The Independent*. ONLINE [Accessed 22.04.2014].
Available from:
http://www.independent.co.uk/news/world/europe/vladimir-putin-wants-to-regain-finland-for-russia-adviser-says-9224273.html

WNA [World Nuclear Association] (2014). 'Nuclear Power in Sweden'. ONLINE [Accessed 16.09.2014].
Available from:
http://www.world-nuclear.org/info/Country-Profiles/Countries-O-S/Sweden/#.UfZ3yo3rxAc

World Bank (2014). 'CO2 Emissions (kt)'. ONLINE [Accessed 05.10.2014].
Available from:
http://data.worldbank.org/indicator/EN.ATM.CO2E.KT/countries

Wurzel, R. K. W. (2002). *Environmental Policy-Making in Britain, Germany and the European Union: The Europeanisation of Air and Water Pollution Control*. (Manchester: Manchester University Press).

Wurzel, R. K. W. (2008). *The Politics of Emissions Trading in Britain and Germany*. (London: Anglo-German Foundation for the Study of Industrial Society).

Wurzel, R. K. W. (2010). 'Environmental, Climate and Energy Policies: Path-Dependent Incrementalism or Quantum Leap?' *German Politics*. **19** (3-4), pp.460-478.

Wurzel, R. K. W., Brückner, L., Jordan, A. & Zito, A. R. (2003). 'Struggling to Leave Behind a Highly Regulatory Past? 'New' Environmental Policy Instruments in Austria'. *Environmental Politics*. **12** (1), pp.51-72.

Wurzel, R. K. W. & Connelly, J. *Eds*. (2011). *The European Union as a Leader in International Climate Change Politics*. (Abingdon: Routledge).

WWF [World Wide Fund for Nature] (2010). *Climate Policy Tracker for the European Union 2010*. ONLINE [Accessed 23.04.2014].
Available from:
http://www.ecofys.com/files/files/wwf_ecofys_2011_%20eu_climatepolicytracker.pdf

WWF [World Wide Fund for Nature] (2011). *Climate Policy Tracker for the European Union 2011*. ONLINE [Accessed 23.04.2014].
Available from:
http://www.ecofys.com/files/files/wwf_ecofys_2011_%20eu_climatepolicytracker.pdf

Young, S. C. (2000). *The Emergence of Ecological Modernisation: Integrating the Environment and the Economy? (*London: Routledge).

Zannakis, M. (2009). *Climate Policy as a Window of Opportunity: Sweden and Global Climate Change*. (Gothenburg: University of Gothenburg Press).

Zilliacus, K. O. K. (2001). ‘‘New Politics’ in Finland: The Greens and the Left Wing in the 1990s’. *West European Politics*. **24** (1), pp.27-54.