Politics of Change:

Energy Efficiency Policy in Britain and Germany

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Abstract

Britain and Germany are two countries that are internationally recognised for their energy efficiency policies in the area of domestic buildings. Although pursuing similar objectives, the two countries have quite different flagship policies: Germany put in place a large loan and grant scheme to finance residential energy efficiency measures in 2001, the CO_2-Building Rehabilitation Programme. The UK was the first country in Europe that introduced Energy savings obligations in 1994. Since then the policy instruments in both countries experienced significant change. This thesis explores the politics of the changes that occurred, and investigates the policy processes that led to the modifications. Mainstream theories of policy change emphasise short-term crisis-like events when it comes to explaining why policies change significantly. However, more recent theoretical approaches suggest that gradual mechanisms, including accumulating external pressures and slowly developing consequences of the policies themselves, play an important role as well. In order to approach the two cases theoretically, this thesis draws on the concept of friction developed in Punctuated Equilibrium Theory and the policy feedback literature. This thesis investigates how long-term pressures, for example the perceived impact of climate change and rising energy prices, affected the evolution of the key home energy efficiency policies in Britain and Germany. Combined with assessing the impact of institutional changes and policy feedback, a comprehensive analysis of long-term policy change is carried out. A set of different methods is employed to undertake the investigation including qualitative and quantitative research methods such as semi-structured interviews with more than 25 experts followed by qualitative content analysis, complementary document analysis, and the review of data sets. The analysis provides a detailed historical case study of the key home energy efficiency policy instruments in Germany and the UK with a focus on the causal mechanisms of gradual pressures. Wider conclusions are drawn for the theories of policy change and how gradual pressures might be accounted for in those theories in a more meaningful way.

Preface

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Rosenow, J., Eyre, N., Rohde, C., Buerger, V. (2013): Overcoming the upfront investment barrier - comparison of the German CO2 Building Rehabilitation Programme and the British Green Deal. *Energy & Environment* 24 (1&2), pp. 83-103

Rosenow, J. (2013): The Politics of the German CO2-Building Rehabilitation Programme. *Energy Efficiency* 6 (2), pp. 219-238

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Rosenow, J. (2012): Understanding policy change: the case of energy savings obligations in the UK. *Proceedings of World Sustainable Energy Days 2012*. Wels, 28 February 2012.

Rosenow, J. (2011): An ecological economics approach to energy efficiency. UK Energy Research Council Sparks Network, PhD Symposium. Imperial College, 20 October 2011.

Rosenow, J. (2011): Different Paths of Change: Home Energy Efficiency Policy in Britain and Germany. *Proceedings of ECEEE Summer Study 2011*, pp. 261-272.

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Abbreviations

ACF: Advocacy Coalition Framework

BEEF: British Energy Efficiency Federation

BERR: Department for Business, Enterprise and Regulatory Reform

BMU: Bundesministeriums für Umwelt, Naturschutz und Reaktorsicherheit [Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit]

BMWi: Bundesministerium für Wirtschaft und Technologie [Federal Ministry of Economics and Technology]

BMVBS: Bundesministerium für Verkehr, Bau und Stadtentwicklung [Federal Ministry of Transport, Building and Urban Development]

CBRP: CO_2 Buildings Rehabilitation Programme

CDU: Christlich Demokratische Union Deutschlands [Christian Democratic Union of Germany]

CESP: Community Energy Savings Programme

CERT: Carbon Emissions Reduction Target

CFLs: compact fluorescent lamps

CHP: combined heat and power

CO_2: carbon dioxide

CSU: Christlich Soziale Union [Christian Social Union]

DECC: Department of Energy and Climate Change

DEFRA: Department for Environment, Food and Rural Affairs

DENA: Deutsche Energieagentur [German Energy Agency]

DETR: Department of the Environment, Transport and the Regions

DTI: Department of Trade and Industry

ECO: Energy Company Obligation

EEC: Energy Efficiency Commitment

EESoP: Energy Efficiency Standards of Performance

EPCs: Energy Performance Certificates

ERA: Energy Retail Association

EST: Energy Saving Trust

FDP: Freie Demokratische Partei [Free Democratic Party]

FPAG: Fuel Poverty Advisory Group

GHG: greenhouse gas emissions

HECA: Home Energy Conservation Act

IEA: International Energy Agency

IPCC: Intergovernmental Panel on Climate Change
KfW: Kreditanstalt für Wiederaufbau [German Development Bank]
kWh: Kilowatt hour
LCP: Least-Cost-Planning
mt: million metric tonnes
MS: Multiple Streams
MWh: Megawatt hour
NEA: National Energy Action
NIA: National Insulation Association
NGO: Non-governmental Organization
OFFER: Office of Electricity Regulation
OFGAS: Office of Gas Supply
OFGEM: Office of Gas and Electricity Markets
PET: Punctuated Equilibrium Theory
PES: Public Electricity Suppliers
PG: Priority Group
PIU: Performance and Innovation Unit
ppm: parts per million
RECs: Regional Electricity Companies
RO: Renewables Obligation
SO: Supplier Obligation
SPD: Sozialdemokratische Partei Deutschlands [Social Democratic Party of Germany]
TWh: Terawatt hour
UK: United Kingdom
US: United States of America

1 Introduction

> *Practical politics consists in ignoring facts.*
>
> Henry Adams (1918)

The above quote by the American historian and novelist Henry Adams suggests that politics is not driven primarily by 'objective' information and 'facts', but, instead, is a messy and rather unpredictable process. However, the aspect of politics is often treated lightly in energy studies – a field predominantly composed of research trying to identify facts including technological questions, the cost of different technologies, the economics of policy instruments, and their distributional impacts. This is no different for the academic literature on energy efficiency policy – key points of interest regard the technical potential of energy efficiency measures, the economic aspects of energy efficiency, and the policy apparatus that should be adopted theoretically.

A lot of work can be classified as analysis *for* rather than *of* policies. Very few studies, though there are some exceptions, analysed *actual* policies from a public policy perspective. Although it is useful to debate the effectiveness of existing policies and appraise the theoretically possible range of various instruments, it is equally important to understand why we end up with some policies and not with others, what the determinants of policy change and stagnation are, and whether policy change follows certain patterns and is driven by specific causal mechanisms. Such an investigation can help explain why despite factual evidence policy change takes its own direction, often to the frustration of the expert.

This raises the question what, if not 'facts', does determine policy change. Politics is all about change. Thus, in order to understand change, one has to comprehend the significance of politics. A better understanding of past policy trajectories and the political drivers is crucial for the future design of effective long-term policies. Alas, in the past, energy efficiency policies were often designed for rather short time horizons lacking a long-term framework. Considering the magnitude of change required, there is evidence that a structural transformation will be necessary in order to achieve long lasting reductions of energy consumption and their associated carbon emissions (Boardman 2012; Ekins 2004; Eyre 1997; Skea 2012; Unruh 2000; Verbong and Geels 2007). Short-term policy design is ill suited to achieve such a transformation and more substantial and long-term policies are required that focus not only on technological measures, but also explicitly consider the politics associated with particular instruments. Therefore, the rationale behind this investigation is to understand why we ended up with those policies in the first place and what kind of mechanisms caused the changes over time.

1.1 Subject of investigation

This thesis analyses the dynamics of domestic energy efficiency policy in the UK and Germany where ambitious policies have been implemented over the last decades. It asks the question:

How and why did domestic energy efficiency policy change?

By default, the analysis required to answer this question needs to focus on depth rather than breadth. There are numerous energy efficiency policies in place and it would be a herculean task to analyse the politics of change for all of them in one doctoral thesis. Instead, this thesis focuses on two policy instruments only, the German CO_2-Building Rehabilitation Programme (CBRP) and energy savings obligations in Britain.

The CBRP is a large loan and grant scheme for financing energy efficiency refurbishments. It is funded by the tax payer and administered by the Kreditanstalt für Wiederaufbau (KfW), a publically owned bank with a focus on providing finance for infrastructure projects in Germany and developing countries. Energy savings obligations in Britain oblige large energy suppliers to implement energy efficiency measures in homes and is funded by energy bills.

The rationale for choosing these two policy instruments is as follows: First, both instruments are established and have been in place for some time, a requirement for observing long-term changes. Second, they constitute the key policy instrument in the policy area of energy efficiency and thereby represent the overall policy approach in the respective countries well. A detailed justification for case selection is provided in Chapter 3.

1.2 Theoretical approach: a brief introduction

There is a rich literature on the theories of policy change, a lot of which evolved over the last two decades. Three theories of policy change are particularly prominent: the *Advocacy Coalition Framework* (ACF), the *Multiple Streams* approach (MS), and the *Punctuated Equilibrium Theory* (PET) (Capano 2009; John 1998, 2003). All three theories are a response to *incrementalism*, a theory that dominated public policy analysis in the 1960s and 1970s and predicted that most policy changes would be relatively minor. Chapter 2 discusses these theories in detail, but it is worth mentioning that the three mainstream theories of policy change, ACF, MS, and PET, emphasise short-term crisis-type events as the main drivers for significant policy change. This is at odds with the observation that many policy changes seem to be driven by more gradual, long-term pressures opposed to short-term events.

More recently, more comprehensive theories of gradual pressures and policy change have emerged. This thesis will build on these theories and apply them to the policy area of energy efficiency. These theories include the concept of *friction* developed by scholars of PET (Baumgartner 2011; Baumgartner et al. 2009; Baumgartner and Jones 2009; Jones and Baumgartner 2005, 2012) and the *policy feedback* literature (Béland 2010; Pierson 1993a, 2004b; Skocpol 1992; Weaver 2010). Together, the theories can help explain how pressures accumulate and eventually result in policy change (friction), but also how existing policies have slowly developing consequences affecting the policies themselves (policy feedback). Given their suitability to explain more gradual and long-term change, the thesis builds on the concept of friction and the policy feedback literature in order to approach the research question conceptually.

1.3 Importance of the domestic sector for climate change policy

Studies indicate that buildings alone contribute more than 30% to energy-related global CO_2 emissions (GEA 2012), which is similar to what the entire industrial sector emits (IPCC 2007; Stern 2007). A large share of this comes from residential buildings, which are responsible for almost one quarter of global energy demand and are the most important contributing segment within the building sector (GEA 2012). This means that any attempts to reduce GHG emissions in industrialised countries must include measures to reduce emissions from residential buildings, particularly because the potential is substantial (Boardman 2007, 2012; Ekins et al. 2002). According to the IPCC, energy efficiency in the building sector plays a key role for climate change mitigation policy and can deliver significant reductions of GHG emissions. The IPCC estimates that of the projected baseline emissions at least 29% can be reduced cost-effectively in the residential and commercial sectors by 2020, the highest reduction potential among all sectors studied in the latest IPCC mitigation report (IPCC 2007).

Even though historical trends in Germany (AG Energiebilanzen 2012; DIW and ISI 1997) and the UK (DECC 2012c) show that all energy use in domestic buildings increased substantially since the 1970s, in more recent years energy consumption has fallen significantly in both countries. In Germany, households consumed 15% less compared to 2000. For heating oils, the reduction is even higher and amounts to 22% (Statistisches Bundesamt 2012b). The UK shows similar trends – in 2011 households consumed 17% less energy compared to 2000 with gas consumption dropping by 20% (DECC 2012d). Domestic electricity consumption did increase in both countries though. The observed reduction of energy demand for household heating clearly is the result of energy efficiency policies (Centre for Economics and Business Research 2011; Schlomann and Eichhammer 2012).

1.4 Research questions and aim

The aim of this research is twofold: First, to understand the conditions under which energy efficiency policies have changed in the past to inform future policy development and help more realistic planning of those. Second, to contribute to the policy change literature putting the emphasis on gradual pressures, including feedback mechanisms, and their impact on policy instruments. More specifically, the key objectives of this research are:

- conceptualising the role of long-term pressures in policy change;
- describing and understanding the different kinds of long-term pressures in two case studies (the SO and the CBRP); and
- comparing and analysing the causal mechanisms of long-term pressures.

Following the above, this thesis asks a number of more specific research questions:

1) How did the key domestic energy efficiency policy instrument in the UK and Germany change since their inception?

2) What kind of pressures were the most important drivers of policy change?
3) How did the principal policy instrument of the policy subsystem of domestic energy efficiency policy respond to gradual pressures?
4) How well can the concept of friction explain those processes? If there is evidence for friction, which factors caused friction?
5) What role did policy feedback processes play in policy change?

1.5 Approach

The focus of the analysis will lie on the policy subsystem of domestic energy efficiency policy. A policy subsystem 'consists of actors from a variety of public and private organizations who are actively concerned with a policy problem or issue […] and who regularly seek to influence public policy in that domain' (Sabatier 1998, p. 99) The challenge of this thesis is to understand what drives change in the policy subsystem of domestic energy efficiency policy focusing on the two policy instruments mentioned before. Rather than simply determining the *causes* of policy change it has been argued that 'research could identify more precisely the *causal mechanisms* driving policy change [my emphasis]' (John 2003, p. 481). Causal mechanisms refer to the process by which an independent variable impacts on a dependent variable. For example, an energy crisis is often cited as a *cause* of policy change. In order to explain why an energy crisis actually drives policy change, i.e. the *causal mechanism*, one needs to understand the underlying processes that connect the crisis with the outcomes of change such as the response of actors to the crisis and the way those actors make decisions that eventually lead to policy change. Hence, causal mechanisms encompass the causal chain that leads to an outcome.

Methodologically, an approach known as *systematic process analysis* (also called process tracing) (Hall 2003, 2008) is followed. Systematic process analysis involves the following steps:

1. Theory formation: approach each case with a range of theories and potential causes to test one theory against another;
2. Deriving predictions: develop predictions that are consistent with one theory but inconsistent with its principal rivals;
3. Making observations: observation of correlation as in conventional comparative method but also of the processes whereby an outcome is caused; and
4. Drawing conclusions: assessment of the extent to which the theories explain the outcome.

The thesis is organised along these four steps as outlined in the next section.

1.6 Organisation of the thesis

On the basis of the four steps of systematic process analysis, the thesis contains the following chapters:

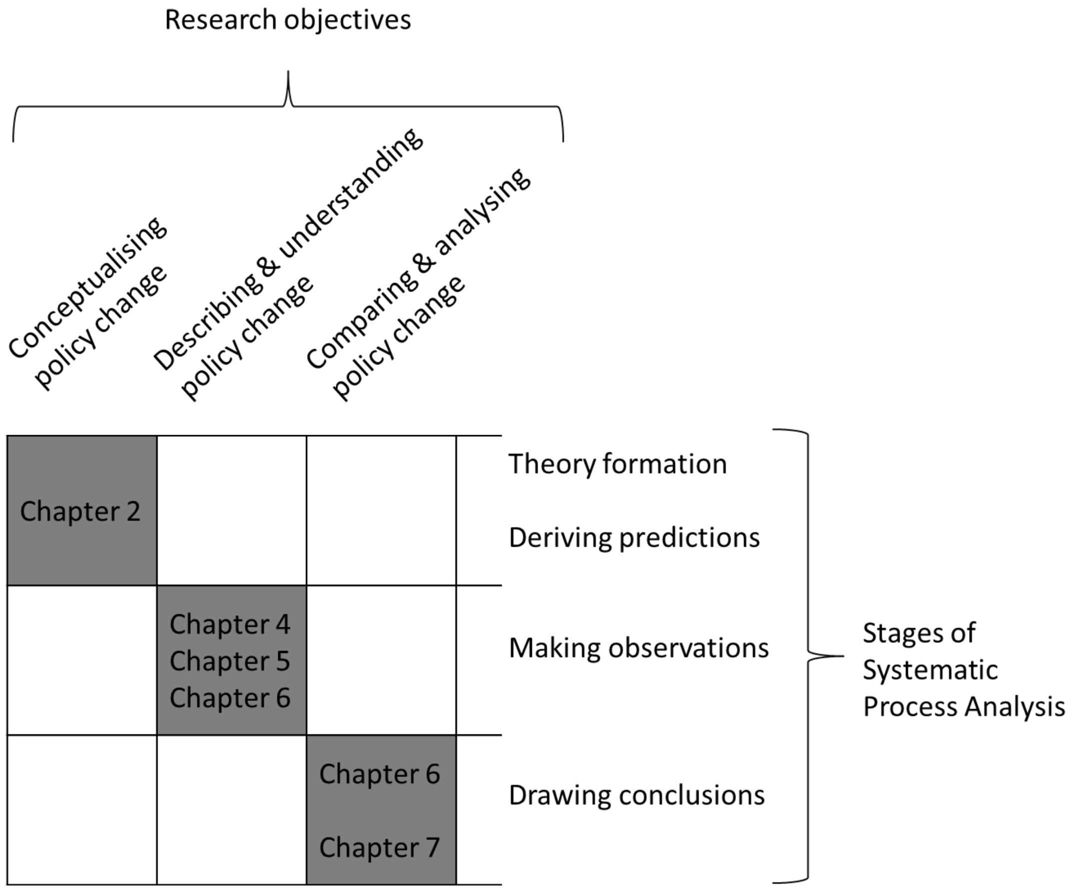
- **Chapter 2 Theories of policy change: friction and policy feedback**: Chapter 2 introduces the theoretical underpinning of this thesis. It starts with a critique of existing theories of policy change and moves on to developing a conceptual framework based on the policy feedback literature and the concept of friction coming out of Punctuated Equilibrium Theory.
- **Chapter 3 Methodology**: Chapter 3 provides the methodology used in this thesis. It explains the research design chosen, the rationale for opting for a case study approach, and justifies the case selection. Furthermore, the chapter spells out the data sources and

research methods used in detail including their limitations. Finally, the chapter presents how the analytical framework is operationalised.

- **Chapter 4 and Chapter 5:** The empirical part of this thesis is located in chapters 4 and 5 and consists of two cases. Chapter 4 covers the first case, energy savings obligations in the UK, whereas Chapter 5 focuses on the German CO_2-Building Rehabilitation Programme. Chapter 4 is longer than Chapter 5 for the simple reason that the UK case covers a longer time span.
- **Chapter 6 Effectiveness of the two policies**: This chapter is dedicated to the question of effectiveness i.e. which policy instrument is 'better' in terms of reducing carbon and saving energy.
- **Chapter 7 Mechanisms of long-term policy change: cross-case analysis**: This chapter links the empirical research to the theoretical presumptions and discusses how the processes of policy change identified in the two cases compare with the expectations based on the theory presented in Chapter 2. Furthermore, the chapter derives a more general model of long-term policy change based on the results of the analysis.
- **Chapter 8 Conclusions**: The final chapter summarises the main argument, answers the research questions, and reflects on the limitations of the analysis. Avenues for further research and policy implications are discussed.

The chapter structure is aligned with both the key objectives and the stages of systematic process analysis. Figure 1 illustrates how each chapter responds to the objectives and relates to the four stages of systematic process analysis.

Figure 1: Organisation of the thesis according to the main objectives and the stages of systematic process analysis



2 Theories of policy change: friction and policy feedback

> *He who loves practice without theory is like the sailor who boards ship without a rudder and compass and never knows where he may cast.*
>
> Leonardo da Vinci (quoted in Kline 1990, p. 224)

A great deal has been written about the causes of policy change. Theories trying to conceptualise these causes became more and more sophisticated, covered an increasing number of issues, were tested both quantitatively and qualitatively, and subsequently improved their robustness. Therefore, any inquiry into the causes of policy change is well advised to start by considering what these theories have to say about the drivers of policy change. Hence, this research project started with a review of the literature on policy change in search for potential theories that might help guide and interpret the case study results. At the same time, suitable case studies were identified that would provide an interesting and promising object of investigation. While the choice of cases was challenging, the decision for or against various theories was a major hurdle: Initial analysis of both case studies showed that the policy instruments investigated changed substantially over the years. And both cases indicated that it was *long-term* pressures such as the perceived impact of climate change and effects of the policy itself that fuelled the changes observed. However, the initial review of the theories of policy change suggested that substantial change was generally conceptualised as the result of *short-term*, exogenous pressures such as crises. In the absence of such events, only incremental change appeared to be likely.[1] Advocates of the various theories of policy change often point out precisely this weakness of many theories as will be shown below. Fortunately, there are now first theoretical approaches that conceive of long-term pressures as important mechanisms of policy change. This thesis utilises and expands these concepts to make sense of the case study results at a more general level and contribute to the theoretical discussions around the politics of long-term change.

This chapter is comprised of four sections. First, it introduces and critically discusses the most prominent theories of policy change. Second, while the strengths of the theories discussed are acknowledged, they are also criticised for overemphasising the role of external events and underplaying the importance of long-term pressures. Third, in search of promising theoretical approaches that relate to long-term policy drivers, the chapter introduces the concept of *friction* and draws on the literature around *policy feedback*. Finally, the conceptual framework of this thesis is presented combining both the friction concept and the policy feedback literature. The operationalisation of the conceptual framework and its application to the case studies (including the methodology chosen) is presented in a separate chapter before the case study analysis is carried out.

2.1 Theories of policy change

There are various theories about policy change, each with different perspectives on the policy process emphasising particular elements or mechanisms. Hence, no single theory can explain policy change in all circumstances and some theories have more explanatory power concerning certain aspects of policy change than others. All of these theories can be used to shed light on the causal mechanisms of policy change. Although

[1] This is, of course, a stylisation of the literature and the theories are much more complex. However, the overall picture can be characterised in such a two-dimensional way.

different theories of policy change make diverse assumptions on the causal mechanisms, they share an implicit critique of the idea that public policy follows an ideal 'policy cycle' (Lasswell 1971), also called the stages heuristic (Sabatier 2007b), and try to explain how political processes *are* rather than how they *should be*. While the policy cycle has been criticised for its lack of causal explanation, it is a useful analytical map of the policy process and all of the theories refer to the importance of different the stages in the policy process.

The list of theories focusing on policy change is long and one can easily get lost in the multiple facets of the different concepts. Here, initially only the three most prominent theories are analysed with regard to their conceptualisation of the causes of policy change. These are the *Advocacy Coalition Framework* (ACF), the *Multiple Streams* approach (MS), and the *Punctuated Equilibrium Theory* (PET) (Capano 2009; John 1998, 2003). It is, however, useful to include the theoretical starting point of these theories in the review because a substantial component of the theories discussed is still based on an early theory of policy change, namely *incrementalism*. Starting with incrementalism, each theory will be introduced followed by a short review of its limitations particularly with regard to accounting for long-term pressures.

2.1.1 Incrementalism

Incrementalism is the basis on which most, if not all, of the theories of policy change rest and it is important to acknowledge its lasting influence on today's theoretical accounts. The incrementalist approach is mainly associated with Charles Lindblom's work (Dahl and Lindblom 1953; Lindblom 1959, 1979) who argued that the rational policy model in the sense of policy makers assessing the problems, finding suitable solutions, and then implementing them, did not stack up in the real world of policy making. He wanted to separate the '*ought* from the *is* [my emphasis]' (Lindblom 1979, p. 517).

At the basis of incrementalism lies the assumption that policy change follows a logic of 'muddling through', and that decision makers cannot make rational decisions due to the complexity of all the different alternatives and their bounded rationality, a concept first developed by Herbert Simon (1959). Hence, decision makers tend to choose among the alternatives already at hand and make only slight adjustments. As a result, political change happens slowly due to a status quo bias and the constraints under which decision makers make their decisions (Lindblom 1959). In sum, incrementalism suggests that incremental change is the norm whereas more radical change is rather unlikely.

For many decades, incrementalism was the dominant theory of policy change (Howlett and Migone 2011) and formed the basis of subsequent theoretical approaches conceptualising policy change. Incrementalism attracted many supporters but of course also had its critics. Assessing the criticism voiced by other scholars, Weiss and Woodhouse (1992) summarise the key points raised and stress that most critics accuse incrementalism of being a) insufficiently proactive, goal oriented, and ambitious; b) excessively conservative; c) only useful in too limited a range of decision contexts; and d) too hostile to analysis. A further problem of incrementalism is that it is not clearly defined – what magnitude of change over which time span can be classified as 'incremental' and at what point does it exceed incremental change? The ranges used varied considerably, for example when investigating budgetary changes, scholars used definitions for changes expected under incrementalism from 2% to 30% (Anderson and Harbridge 2010).

Probably the point that advanced theory development most was the critique that incrementalism is too conservative – this triggered the search for alternative theories that could explain both incremental and radical change. It is probably fair to say that all of the major theories of policy change appreciated the contribution of incrementalism to the literature, but also tried to develop more comprehensive accounts of policy change based on incrementalism.

2.1.2 Advocacy Coalition Framework (ACF)

ACF is an influential theoretical concept used by scholars studying policy change and there are a large number of studies employing ACF (Weible et al. 2009). The main idea of the ACF is that the actors of a given policy subsystem (for example domestic energy efficiency policy) form *advocacy coalitions* consisting of stakeholders who share the same normative and causal beliefs related to policy objectives (Sabatier 1988; Sabatier and Jenkins-Smith 1993). Those beliefs are classified into deep core beliefs, policy core beliefs, and secondary aspects.

Deep core beliefs refer to fundamental normative and ontological axioms (e.g. belief in free markets). Deep core beliefs are extremely difficult to change and Sabatier (1988) compares a change in those beliefs to religious conversion.

Policy core beliefs are defined as the position concerning the strategies for achieving the goals of the deep core (e.g. belief in deregulation of energy markets). The policy core beliefs are difficult to change, but change can happen as a result of external pressures such as major socio-economic change, crises such as wars and energy price shocks (e.g. the 1973 oil crisis), system-wide change due to electoral shifts (e.g. election of Ronald Reagan and Margret Thatcher) but also subsystem spillovers (i.e. when policy change in another sector impacts on the policy subsystem in question).

Secondary aspects cover narrower beliefs about specific aspects of the problem and policy implementation (e.g. in favour of energy efficiency building standards and opposed to white certificate trading schemes). Secondary aspects change fairly easily in a process of policy learning as a result of growing experience, new information, or if their alteration can help to protect the policy core beliefs from criticism.

Whereas earlier versions of the ACF focused only on two forces of policy change, namely external subsystem events and policy learning, more recent versions introduced two additional paths of policy change (Weible et al. 2009). A third force of change is internal subsystem events due to failure of the current policies. The fourth path to policy change refers to negotiated agreements between advocacy coalitions. Within this approach nine conditions are presented as determining the likelihood of policy change: a hurting stalemate, effective leadership, consensus-based decision rules, diverse funding, duration of process and commitment of members, a focus on empirical issues, an emphasis on building trust, and lack of alternative venues (Sabatier and Weible 2007).

The ACF is a comprehensive framework to investigate policy change. But there has, of course, also been some criticism of the ACF: In the ACF, external perturbations and policy learning are the two main phenomena that lead to policy change. However, policy learning and external perturbations do not always lead to change (Mintrom 1996). Sabatier and Jenkins-Smith (1999) responded to such criticism by adjusting their framework to conceptualise external perturbations as necessary, but not sufficient causes of policy change. Furthermore, they introduced internal shocks and negotiated agreements between coalitions as factors influencing policy change (Sabatier and Weible 2007). Nevertheless, in their work some causal mechanisms remain underspecified, particularly concerning the role of policy entrepreneurs (Mintrom 1996). Another point of critique is that ACF scholars mainly focus on how *beliefs* change, but not how *policy* decisions are made (Schlager 1999). Also, it is not clear how beliefs lead to collective action of an advocacy coalition and what strategies coalitions are pursuing to press for political change (Schlager 1995).

2.1.3 Multiple streams (MS)

Another influential theory used by scholars investigating policy change is the MS approach. Drawing on the Garbage Can Model by Cohen et al. (1972), MS conceptualises the policy process as three unrelated streams: problems, policies, and politics (Kingdon 1984, 1995, 2002; Zahariadis 1992, 1995, 1996, 1999).

The *problem stream* refers to issues of concern. Only if an issue is perceived as a problem, will actors look for solutions and alternatives. There are various ways by which issues can become a problem. Actors monitor data and look for potential problems such as the number of car accidents, the rate of global warming, budget deficits and the like. Focusing events such as wars and natural catastrophes can draw attention to a particular problem, as can feedback from existing policies (Zahariadis 1999). However, whether a problem finds recognition also depends on how it is framed (Kingdon 2002), and on the beliefs and values of the people interpreting it (Zahariadis 1999).

The *policies stream* is conceptualised as a ‘primeval soup’ where ideas float around bump into one another, combine and recombine in different ways. The concept originated in biology and the idea of natural selection. Kingdon (1984) argues that various actors try out different ideas and that some of these ideas survive the process of selection whereas others fail to do so. An idea must mature before adoption and be ‘ripe’ for the policy process. Hence only certain ideas will conform to the values of policy makers and find recognition (Zahariadis 1999).

The *politics stream* is composed of three elements: national mood, pressure group campaigns, and administrative or legislative turnover (Kingdon 2002; Zahariadis 1999). Each of these elements can prevent or help an idea to find recognition in policy making. The national mood remains somewhat underspecified and does not only refer to public opinion as measured by opinion polls (Kingdon 1984) but ‘the notion that a fairly large number of individuals in a given country tend to think along common lines and that the mood swings from time to time’ (Zahariadis 1999, p. 76). Pressure group campaigns can also affect whether policy makers support or disregard ideas of policy change. For example, if there is widespread interest group support of market-based instruments in the area of energy efficiency policy makers are more likely to pursue such ideas and vice versa. Change in government as happens during ‘critical elections’ (Brady 1988; Burnham 1970; Key 1955) can also have a major impact on the likelihood that an idea is adopted. A good example is the election of Ronald Reagan in 1980; Reagan subsequently blocked attempts at introducing energy efficiency standards in the US that had been supported by his predecessor (Varone and Aebischer 2001). In order to be able to operationalise the politics stream, Zahariadis (1999) proposes to merge the three elements national mood, pressure group campaigns, and administrative or legislative turnover into the single variable ‘ideology of governing parties’. Zahariadis argues that such amalgamation is justified because parties dominate the politics stream.

Policy change is more likely to happen when all three streams are joined together and a ‘policy window’ or ‘window of opportunity’ is created. Those windows are situations in which a ‘problem is recognised, a solution is developed and available in the policy community, a political change makes the right time for policy change, and potential constraints are not severe’ (Kingdon 1984, p. 174). Policy entrepreneurs can take advantage of those policy windows by ‘hooking their solutions to problems or by ensuring that proposals from the policy stream are considered when the political conditions are right' (Kingdon 2002, p. 102). Kingdon compares this process to a surfer waiting for the big wave. The surfer has to be ready to paddle when it comes, and if he isn't he is not going to ride the wave.

While being very popular amongst scholars dealing with policy change, MS also received some criticism. One of the problems of MS was that it concentrated mainly on agendas and not on policy implementation and outcomes (Capano 2009; John 1998). While providing a compelling approach for explaining agenda setting, Kingdon (1984) did not provide a framework to understand the impact of agenda setting on policy implementation. There have been attempts to extend MS to the decision-making process (Zahariadis 1995, 1996) and even the whole of the policy process (Saint-Germain 1996). In a revised version of MS, Kingdon (1995) extended the framework to the entire policy cycle. Drawing on ACF, Kingdon's model has been further developed by Ness (2010), who added two additional elements namely the *policy milieu* and the *policy field*, representing the governance structures and the policy environment in which decisions are made. A focal point of criticism is also the interplay of the three streams. As shown above, MS conceptualises three streams independent from each other. However, this has been criticised for ignoring the fact that the three streams are actually interdependent and linked to each other (Capano 2009; Mucciaroni 1992). Finally, MS has been attacked for not really being a theory, but rather a heuristic device that can be used in policy analysis (King 1985). For the reasons cited above, it has been argued that scholars found it difficult to operationalise MS and, in contrast to PET and ACF, few empirical studies were carried out (Sabatier 2007a), although Nowlin (2011) identified at least three studies published in 2009 and 2010 that successfully tested hypotheses based on MS. However, MS is probably the least applied of the three main theories of policy change – both PET and ACF were used in numerous studies and continue to be used by many researchers.

2.1.4 Punctuated Equilibrium Theory (PET)

The PET model is borrowed from evolutionary biology (Eldredge and Gould 1972) and assumes that the political system (like biological systems) reaches equilibrium, a time of stability, which is then ruptured by exogenous events (Baumgartner and Jones 1991, 1993, 2002a; John 1998, 2003; True et al. 2007b). Radical policy change happens at certain critical points. As a result of the disruption a new equilibrium is reached which remains more or less stable until it is ruptured again. During times of stabilisation, processes such as positive feedback keep the system in equilibrium. Baumgartner and Jones (1993) introduce the concepts of policy image and policy venue as central explanations for the punctuated equilibrium model:

A *policy image* refers to 'how a policy is understood and discussed' by the actors involved in the policy process (Baumgartner and Jonesp. 25). If the policy image is altered significantly, the system is ripe for punctuation. PET differentiates between those images favourable and those that are detrimental to proponents of a given policy. In the case of domestic energy efficiency policy, positive images of policy measures might be energy savings, cost reduction, carbon mitigation etc. Negative images can include administrative burden, rebound effect, interfering with consumption habits etc. Public attention can focus on negative or positive images for long periods of time, but ultimately may shift at some point (Baumgartner and Jones 1991). Proponents of a given policy tend to focus on one set of images in favour of their proposals whereas opponents are likely to refer to another set of images discrediting those proposals. Policy makers are inclined to try to establish *policy monopolies* by ensuring the dominance of those policy images that support their policies and reject alternatives

(Baumgartner and Jones 2009). It follows that there is a constant struggle about policy images affecting the policy process in which actors try to champion or mould particular policy images that are in line with their proposals.

Policy venues are conceptualised as the 'existing set of political institutions' or 'the venues of policy action' (Baumgartner and Jones 1991, p. 1045). Hence venues are the 'institutional locations where authoritative decisions are made concerning a given issue' (Baumgartner and Jones 2009, p. 32). Some policy images find a favourable reception in certain policy venues but not in others. For example, the image of energy efficiency as a means to reduce carbon emissions might not be considered by a government department mainly interested in economic efficiency, but another agency with a focus on environmental protection might be very supportive. Consequently, actors will try to find a policy venue that is receptive to the policy image they want to foster by what is called 'venue shopping' (Pralle 2003). Furthermore, actors pursue image manipulation in order to find recognition with their ideas (Baumgartner and Jones 1991). For example, framing energy efficiency as a cost-saving opportunity rather than a means to protect the environment might draw support from venues that previously would not consider energy efficiency activities. Hence policy images are linked with policy venues in the sense that some venues are more receptive to certain images than others and vice versa. However, policy venues and decision-making structures themselves may also change over time with significant impact on policy outcomes (Baumgartner and Jones 2009). For example, in the UK energy policy was mainly the responsibility of the Department of Business, Enterprise and Regulatory Reform (BERR) until the creation of the Department of Energy and Climate Change (DECC) in October 2008. DECC brings together both energy policy and climate change policy which was previously the responsibility of the Department for Environment, Food and Rural Affairs (DEFRA). It is very likely that the coupling of the two issues in one department will have a significant impact on policy decisions.

As a result, venues and images reinforce themselves: When the policy images change, venue change becomes more likely and when policy venues change, image change is more likely to happen. Such feedback mechanisms can lead to 'the rapid creation, destruction, or alteration of policy subsystems' (Baumgartner and Jones 1991, p. 1045). This can happen when a change outside of the subsystem impacts on either policy image or venue (for example a major crisis such as the accident at the Fukushima nuclear power station in 2011 which radically transformed the image of nuclear power in Germany across the spectrum of political parties). Negative feedback, as defined by PET, leads to stability and incrementalism in situations 'where pressures from one side lead to counter-pressures from another side, and in general where self-corrective mechanisms keep the system on an even keel' (Baumgartner and Jones 2002b, p. 6). Negative feedback in PET can be compared to a thermostat adjusting to outside temperatures, it counter-balances external pressures. An example of negative feedback is policies aimed at controlling inflation in order to keep the economy stable. The pattern of policy change thus follows long periods of incremental change ruptured by external pressures leading to short-term (but long lasting) policy change.

PET has been criticised for suggesting that major change always needs to come from outside of the policy subsystem in the form of exogenous shocks leading to punctuation (Lieberman 2002; Streeck and Thelen 2005). Even if external pressures create new policy venues and images, policy change does not always take place. Actors might block policy change with the result that it never happens or gets delayed (Walgrave and Varone 2008). However, recent revisions of PET ('second generation PET') added mechanisms such as the notion of *friction* that account for policy change driven by long-term pressures and the build-up of these over time (Jones and Baumgartner 2005). Therefore, in second generation PET it does not have to be a major exogenous event, but can equally be 'relatively minor events that add up over longer periods of time' (True et al. 2007b, p. 160). The concept of friction will be explained in great detail at a later point in this thesis because it is one of the two building blocks of the theoretical framework of this thesis. Furthermore, PET-based studies have been criticised for concentrating on the quantitative aspects of policy change and neglecting the qualitative elements (Howlett 1997). PET was first developed in the US and applied to American politics, which is why the majority of studies focussed on policy change in the US. It is questionable to what extent PET can be applied in its original form to other political systems. However, there are now serious efforts to apply PET to countries other than the US, mainly facilitated by the Comparative Agendas Project (John 2006), and applications of PET in Europe in recent years indicate that it can also be applied successfully outside the US. Another point of critique is that PET research concentrates on agendas and on the tone of political debates. However, when looking at policy outcomes there is less evidence in support of PET (Givel 2010).

2.2 General critique

The four theories (ACF, MS, PET, incrementalism) make a substantial contribution to the understanding of the dynamics of public policy and provide sophisticated frameworks for policy analysis. There is a certain degree of overlap among the theories and many scholars argue that ACF, MS, and PET are complementary (Cairney 2009; John 2003; Meijerink 2005; Zahariadis 1998), although the focus of each theory lies on different elements of the policy process and their underlying conceptualisation of the mechanisms of change is not always the same. One important similarity is that all of the theories of policy change except incrementalism rely heavily on exogenous events as the key driver of major policy change (Capano 2009; Wood 2006):

ACF hypothesises that ‘significant perturbations external to the subsystem are a necessary, but not sufficient, cause of change in the policy core attributes of a governmental program’ (Sabatier and Weible 2007, p. 220). Hence the main driver of significant policy change is exogenous events such as major socioeconomic changes, public opinion shifts, changes in the system-governing coalition, and policy decisions and impacts from other subsystems (Cairney 2007; Lowry 2006; Nohrstedt 2005; Nowlin 2011; Schlager 1999; Smith 2000). As already mentioned, more recent versions of the ACF, however, do also account for internal shocks (within the subsystem) and negotiations between advocacy coalitions as additional mechanisms for change (Sabatier and Weible 2007). So far, these factors remain underplayed in the ACF literature.

Also depending to a large extent on external events, MS refers to ‘focusing events’ such as crises and critical elections as one of the key reasons for the opening of windows of opportunity, which are a prerequisite for policy change (Kingdon 1984, 1995, 2002; Meijerink 2005; Zahariadis 1992). In fact, in MS ‘focusing events and crises are essential to the coupling process that facilitates the opening of policy windows’ (Wood 2006, p. 420). Hence it seems that in MS there is an ‘excessive role played […] by external factors in determining the opportunities for change’ (Capano 2009, p. 22). However, MS also acknowledges that a focusing event may as well be the tipping point of a longer process and that ‘focusing events are not always so straightforward’ (Kingdon 1995, p. 96). Still, MS does not provide a conceptual approach to analyse these processes and relies to a large extent on focusing events in the classical sense.

First-generation PET also relies heavily on external events as the key driver of policy change (Baumgartner and Jones 1991, 1993; Boushey 2012; Breunig and Koski 2006; Givel 2006, 2010; John 2003). External events may challenge policy monopolies, which previously provided the source for stability, in the sense of highlighting attention, mobilising interest groups, changing policy images (see above), and altering policy venues (Baumgartner 2006; Baumgartner and Jones 1991, 1993, 2009; Givel 2006; True et al. 2007a; Wood 2006). In this context, PET theorists refer to 'focusing events' and 'positive feedback' as important mechanisms of sudden and dramatic policy change (Baumgartner and Jones 2002b). External events therefore play an important role in PET and 'for punctuated equilibrium theories of agenda setting, the role of shocks or crises cannot be understated' (Pump 2011, p. 2). However, second generation PET offers additional explanations and is much less dependent on external events. Particularly the introduction of the concept of *friction* provides a theoretical explanation of more gradual processes during which pressures build up until they reach a tipping point (see section 2.3.1).

As shown above, all three mainstream theories of policy change rely on external events, although not exclusively, as a cause of major policy change. The problem of such an approach is that it puts the focus on the key external events that create pressures for change, but not on the complex search process that follows whereby actors actually determine what changes to make (Campbell 2004). This is not to say that external pressures including crises do not trigger policy change - they do. But 'policy change itself is still largely influenced by factors normally thought to be endogenous to the subsystem' (Williams 2009, p. 48). Also, there is evidence that despite a crisis and the expectation of major policy change sometimes no or only minor change takes place (Birkland 1997; Givel 2008; Nohrstedt 2008; Walgrave and Varone 2008). Scholars of all the three theories of policy change discussed recognise the need for a better account of the role of external pressures for policy change. Reviewing the ACF, Weible et al. (2009, p. 128) admit that 'there is much to learn about the intervening steps between an external perturbation and major policy change'. Similarly, John (2003, p. 489) asks PET scholars 'what is the relationship between the nature of the policy input and the character of the policy output'? On a similar note, Weir (1992) stresses that MS is ahistorical because it does not sufficiently acknowledge the policy legacy of the past and how that impacts on policy making in the present. Responding to such criticism, Zahariadis (1999) acknowledges that more empirical research is required to better understand how processes such as incrementalism and path dependency affect MS. This is not to say that external events do not matter – there is plenty of evidence that they do, and analysis became much more sophisticated in understanding the causal mechanisms that relate external events such as crises to policy change (Birkland 1997; Hansen 2007; Nohrstedt 2008; Walgrave and Varone 2008).

In contrast to ACF, MS, and PET, incrementalism does not depend on external events as a trigger for major policy change. While incrementalism had been accused of being excessively conservative (1992), Lindblom argued that incrementalism is well placed to explain more substantial policy change as well because 'a fast-moving sequence of small changes can more speedily accomplish a drastic alteration of the status quo than can an only infrequent major policy change' (Lindblom 1979, p. 520). Also Weiss and Woodhouse (1992, p. 261) maintain that a 'series of small steps obviously can lead to significant change if there are enough of them coming quickly enough'. With regard to the theoretical pattern of policy change this is certainly the case, but incrementalism does not offer a comprehensive causal explanation under which circumstances major policy change in frequent small steps is likely to happen and when it is not. Rather, incrementalism stresses that there is no reason why it should not happen while focusing on mechanisms that prevent more abrupt and significant policy change.

In sum, ACF, (first-generation) PET, and MS focus on *short-term* exogenous events when explaining policy change – how *long-term* pressures affect policy outcomes remains underspecified. Incrementalism does not depend on external events, but fails to provide a convincing account of mechanisms that can lead to major policy change. In search for promising theories of long-term policy change the chapter now turns to two theoretical approaches that provide the basis for the conceptual framework of this thesis.

2.3 A new lens on policy change

Looking for a theoretical approach that captures more than the impact of external events or incremental changes, this thesis looks through a relatively new lens at policy change by employing the concept of *friction* that was developed recently by PET scholars in response to some of the criticism their work received (Baumgartner et al. 2009; Jones and Baumgartner 2005, 2012). Friction can be used to understand the build-up of gradual pressures resulting in significant policy change. Similar ideas have been explored by scholars of historical institutionalism such as Paul Pierson (2004b). In addition to friction, the literature on policy feedback (Béland 2010; Pierson 1993a; Weaver 2010) is used and merged with the friction framework. In the following, the concept of friction is introduced and supplemented with the policy feedback literature. Based on the two literatures, a set of research questions and hypotheses are developed.

2.3.1 Friction

> *'When policies change, they will shift in a disjoint and episodic manner; as a consequence, policymaking will appear to be in a period of exception to the general rule of stability—or simply responding to unspecified "exogenous forces." But in fact the disjoint policy*

responses are part and parcel of the same policymaking process that generated the periods of stability.' (Jones and Baumgartner 2012, p. 7)

This quote from Jones and Baumgartner shows that PET has developed and attempts to provide a much more comprehensive account of policy change over time. Part of this is the development of the concept of friction, which addresses the question of how long-term pressures affect policy outcomes.

The concept of friction

The concept of friction is based on the idea that policy makers (because of their bounded rationality and cognitive limits) can only deal with a limited number of questions at a time and the multiple institutional venues constrain and slow down the policy response to policy inputs. Hence, there is a misbalance between policy inputs and policy outputs. As a result, some issues are not dealt with and pressure starts to build up in the system (Baumgartner et al. 2009; Jones and Baumgartner 2005). Baumgartner et al. compare the mechanism to earthquakes:

> *Violent earthquake results from the friction and the associated buildup of pressure, not any momentary increase on the forces pushing to overcome the friction. At any given time, the response to the pressure is out of sync with the level of pressure applied: friction causes the linkage between inputs and outputs of the system to be disproportionate - underresponse because of friction, then overresponse in response to built-up pressures. (Baumgartner et al. 2009, p. 607)*

Another metaphor for friction is a sandpile. The steady drop of sand grains on a flat plate does not lead to a constant flow of grains falling off the plate. In contrast, usually when one grain is added to the pile nothing happens and a sandpile builds up. But sometimes when one grain is added to the pile the system collapses in rapid landslides.

This pattern is due to the friction of the sand and would not occur if material with no friction was used (Jones and Baumgartner 2005).

Friction and the policy process

The policy process follows a similar logic of such 'stick-slip dynamics', Jones and Baumgartner (2012, p. 8) argue. Policy makers need to prioritise some policy inputs and neglect others. As a result, decision makers underrespond to issues if they remain below a certain threshold and only concentrate on those areas where concern is great requiring immediate attention. After an issue passes the threshold, over-response may happen as a result of past negligence and the built-up pressures, a form of positive feedback (Baumgartner and Jones 2002b). Therefore friction 'is not an absolute barrier to action, but rather a major hindrance. As it operates, pressure can mount, making change when it does occur, more profound' (Jones and Baumgartner 2005, p. 88). In essence, friction is driven by negative feedbacks keeping the status quo, in other words a homeostatic process preventing change (Baumgartner and Jones 2002b).

Jones and Baumgartner (2005) provide two causal explanations of why there is disproportionality between policy inputs and outputs: cognitive limits of organisations and institutional procedures.

Cognitive limits of organisations result in disproportional information-processing. There are three components of Jones' and Baumgartner's (2005) disproportional information-processing model: First, the issues themselves to which one pays attention or ignores. Second, the way these issues and their dimensions are interpreted. Third, the choice of competing potential solutions one has to make. The concept is based on Simon's (1983) behavioural model of individual decision making and extended to organisations such as governmental bodies. Because organisations can only process a limited number of issues, most issues do not get the attention of major policy makers for most of the time. Therefore, the ‘cognitive architecture of institutions creates an inevitable bottleneck of attention’ (Walgrave and Vliegenthart 2010, p. 1149).

'Resistance built into the *institutional structure* of policymaking [my emphasis]’ (Jones and Baumgartner 2012, p. 4) is a second reason for friction. Past legacies of institutions can add friction due to sunk costs, long-term budgetary commitments, and bureaucratic inertia. Another source of friction is that policies are often not terminated even if the severity of a problem has declined significantly. Therefore, ‘rather than well-oiled, smoothly churning cogs, political institutions are more like rusted gears - that is, they do not move easily’ (Workman et al. 2009, p. 80). This makes the reallocation of resources to other areas more difficult and the response is slow (Baumgartner et al. 2009).

The effect of friction can be compared to a bottleneck that limits the amount of policy inputs to policy outputs. A good metaphor for the effect of bottlenecks can be found in the transport literature (e.g. Vickrey 1969): Imagine a stretch of motorway between two interchanges during the morning rush hour commute. On a relatively short route segment road works take place, two-way traffic flow is still possible, but slowed down from say 70 km/h to just 50 km/h allowing for a fixed maximum number of cars to pass. This is the bottleneck - as long as the traffic flow remains below the capacity of the road segment with the road works, there is no congestion. But once the traffic flow exceeds the capacity of the bottleneck, traffic is slowed down, and when the number of cars continuously surpasses the maximum capacity queues accumulate. In case of policy change, the narrowness of the bottleneck (the degree of friction) determines whether policy inputs result in policy outputs.

As a result of this, policy change is expected to follow patterns of PE:

> *If and when these issues have won the attention of the primary policymaking institutions, errors have often accumulated, and punctuations must occur to "catch up" with a changing reality. While institutions can parallel process numerous policy matters simultaneously, the processing system is imperfect, and these imperfections lead to punctuations. (Jones and Baumgartner 2005, p. 6)*

Jones and Baumgartner (2005) refer to the importance of *threshold effects* i.e. situations when the policy inputs (or signals as they call it) cross a limit and receive attention by policy makers. Thresholds can either be reached by accumulation of pressures or very strong external pressures (Jones and Baumgartner 2012).

However, Jones and Baumgartner (2005) stress that thresholds are contingent for two reasons: First, new issues require agenda space and depending on how crowded the agenda already is they only find that space in some situations. Second, different institutions respond to policy inputs differently because they are biased (e.g. different political parties). Hence for some institutions a threshold might be reached whereas others only respond to a much higher threshold. Also, the capability of institutions to respond to signals and generate policy change differs. While in some cases existing institutions might be well equipped to deal with the issues arising, in other cases an institution simply is not able to respond to a problem and even poses a barrier to policy change.

Research gaps

There is a particular need for comparative work applying the concept of friction to different institutional settings. John (2006, p. 983) asks 'why are political solutions and outcomes different in countries that share many background problems, and what is the impact of different political institutions on policy choices?' The concept of friction might help answer some of these questions. Assessing the role of institutions for policy change in PET theory remains one of the promising avenues for more research (Baumgartner et al. 2009; John and Jennings 2010; Schlager 1999).

So far the concept of friction has mainly been used in quantitative studies and there is a lack of qualitative work shedding light on the causal mechanisms of friction requiring 'more in-depth fieldwork-based studies of actual policy processes as these are worked out on the ground' (Jones and Baumgartner 2012, p. 13). This is why Baumgartner et al. (2009, p. 615) call for studies 'using more qualitative methods to understand the processes which lead to friction in greater detail, and why it is lower in some institutions than in others'. In light of this, a comparative study seems to be particularly promising, an approach this project incorporates.

Because the concept of friction is based on both positive and negative feedback processes, another avenue for discovering causal mechanisms that lead to friction is the wider literature on *policy feedback*. The thesis will explore potential feedback mechanisms and merge those with the existing friction approach presented above in a comprehensive conceptual framework.

2.3.2 Policy feedback

Obviously, the choice and calibration of policy instruments depends on politics (Freeman 1985), but 'new policies [also] produce new politics' (Schattschneider 1935, p. 288), a claim famously rephrased as 'policies determine politics' by Lowi (1972, p. 299). This is because 'policy choices have political consequences' (Pierson 1993b, p. 597) and 'policies, once enacted, restructure subsequent political processes' (Skocpol 1992, p. 58) such as rearranging resources and opportunity structures. Hence 'policies […] have their own lives, their own internal logic and goals: they not only passively adapt to external inputs, but indeed they actively influence external factors' (Capano 2009, p. 27). In a nutshell, 'policy feedback simply refers to how policies affect politics over time' (Béland 2010, p. 569). However, politics also determines the choice of policy instruments and therefore the 'direction of causation between policy and politics is […] two-way' (John 1998, p. 8).

The literature on policy feedback is vast and covers many areas. More recently, Béland (2010) undertook a comprehensive literature review, 17 years after Paul Pierson (1993a) wrote his seminal paper on policy feedback. According to Béland, there are at least three types of policy feedback mechanisms: state building, interest group mobilisation, and lock-in effects.

State building refers to an expansion of the administrative capacity of the state as a result of implementing a new policy which requires additional skills and systems. Once the administrative capacity of the state expands, future policies that require similar capabilities are potentially more likely to be implemented compared to a situation where no such capabilities exist (Pierson 1993a; Skocpol 1992). For example, the UK implemented a domestic emissions trading scheme long before the start of the EU Emissions Trading Scheme whereas Germany did not. As a result, the administrative capabilities of how to run such a scheme already existed in the UK before the EU Emissions Trading Scheme started in 2005. In Germany, in comparison, the government departments and agencies had no such experience. As a result, the UK government strongly supported the EU European Emissions Trading Scheme in contrast to Germany where parts of the government and administration tried to prevent the start of the EU European Emissions Trading Scheme until the very end (Engels et al. 2008). There were of course other reasons for the different reaction of the two countries such as different regulatory styles and traditions (Wurzel 2008).

Interest group feedbacks describe the effect that ‘policies provide both incentives and resources that may facilitate or inhibit the formation or expansion of particular groups’ for example by creating ‘"spoils" that provide a strong motivation for beneficiaries to mobilize in favo[u]r of programmatic maintenance or expansion’ (Pierson 1993a, p. 599). In other words, if the government establishes a new policy that benefits a certain group, it is likely that the beneficiaries of that policy will not only push for keeping that policy in place, but demand to expand the policy in order to increase the benefits they enjoy. A good example is the case of the wind energy industry in Germany, which benefited from the Electricity Feed-In Law introduced in 1991. The policy instrument guaranteed wind power producers a fixed price per unit of electricity produced and obliged utilities to accept power produced from renewable sources including wind. However, in 1997 the Electricity Feed-In Law almost came to a close, but strong pressure from the wind energy industry lobby mobilised public opposition resulting in the maintenance of this policy instrument (Michaelowa 2005). Additional to providing resources to interest groups, policies can also help the organisation and formation of interest groups (Pierson 1993a) because ‘[p]rogram resources also create material incentives for groups to band together in political activity’ (Mettler and Soss 2004, p. 62). Again, the wind power industry example can be used to illustrate such effects: Because wind power in Germany was mainly deployed in structurally weak regions where it created jobs and income, the wind energy industry successfully formed alliances with local politicians, farmers, and trade unions, all which are very influential in the political processes of increasing the share of renewable energy. This alliance helped the wind energy industry a great deal to push government for the maintenance and expansion of the Electricity Feed-In Law (later the Feed-In Tariff) (Michaelowa 2005). At the same time, other interest groups that do not benefit from a policy instrument but are affected by negative consequences are likely to mobilise against the introduction or expansion of such a programme. In fact, the utilities did mobilise against the German policy on renewable energy but did not succeed (Lauber and Mez 2004).

Existing policies often cause *lock-in effects* that constrain, or even prevent, policy change (North 1990, 1998, 2005; Pierson 1993a, 1994, 2000a, 2001, 2004b, 2009). This is because 'public policies operating in a context of complex social interdependence will often generate increasing returns as well as high fixed costs, learning effects, coordination effects, and adaptive expectations' (Pierson 1993a, p. 608). In the energy literature, lock-in effects are often restricted to technology lock-in and analysis focuses on how technological and socio-economic aspects are intertwined creating powerful systemic barriers to change (Unruh 2000). However, the same applies to policies: Often new government agencies are created as a result of new political instruments, staff need to be retrained, complex administrative procedures need to be established etc. Diverting from the status quo implies potentially costly changes within government organisations. Also, the regulated entities get used to a certain type of policy and learn how to deal with it effectively. These factors make it increasingly difficult to replace or significantly amend an existing policy instrument.

In addition to the three types of policy feedback described above, Béland suggests three supplementary types of policy feedback mechanisms based on more recent literature: private institutions, political participation, and ideational and symbolic legacies.

Ideational and symbolic legacies embedded in existing policies may influence subsequent policies in multiple ways, for example by enabling or preventing actors to use symbols, categories, and ideas that are represented in the policies that prevail. A good example is the UK's Renewables Obligation, a policy instrument which obliged the energy utilities since 2002 to generate a certain proportion of energy from renewable sources. For each MWh of renewable energy the utilities received a Renewable Obligation Certificate that they could sell to other energy suppliers or brokers. The Renewables Obligation was heavily criticised for not being effective and too costly compared to alternative policy instruments such as Feed-In Tariffs (Mitchell 2009; Mitchell et al. 2006; Toke 2005; Wood and Dow 2011; Woodman and Mitchell 2011). Despite mounting criticism, the responsible Business Secretary, John Hutton, argued that the RO 'has overseen a rapid increase in renewable energy in the UK and we should stick with what works'. One reason why the UK government decided to keep the RO constituted the firm belief in market based instruments and the Renewable Obligation's fit with the dominant regulatory approach (Toke and Lauber 2007). Quoting John Hutton again, this also comes out very clearly: 'The Renewables Obligation is a genuine market mechanism and that is why it has been successful' (Hansard 2008, Column 527). Hence, in this case lock-in occurred due to the firm rooting of the RO in marked-based regulation obstructing the replacement of the policy instrument.

Private institutions providing resources to particular groups can also generate feedback effects with relevance for public policy. A prominent study on private social programmes and feedback was conducted by Hacker (2002) who showed how private social schemes impacted on subsequent public policies. *Political participation* can be stimulated by existing policies and create pressures for policy change. This is different to top-down organised interest group mobilisation and refers to bottom-up political participation of individuals (Campbell 2002a).

In addition to the types of policy feedback outlined by Béland, there are also *negative feedback mechanisms*, i.e. processes as a result of policies that undermine the *status quo* (Weaver 2010). The English novelist Arnold Bennett once said that 'any change, even a change for the better, is always accompanied by drawbacks and discomforts' (Bennett

1912, p. 103). Drawbacks and discomforts of policies are precisely how negative feedback mechanisms are understood. Opposition from organised vested interests against the new policy regime is an obvious type of negative feedback (Schrad 2010). A well-known example is the lobbying activities of the oil industry in the US with the aim to undermine climate change policies.

Other negative feedback mechanisms are more subtle. For example, the German Feed-in Tariffs for renewable energy are financed via electricity bills and due to the rapid increase in deployment of renewable energy generation consumers pay an increasing proportion of their bills for the support of Feed-in Tariffs (Frondel et al. 2010). While it is too early to predict the political consequences, complaints about rising prices and the negative impact on social equity has already been a focal point of recent debates in Germany. At some point resistance against rising electricity prices might pose a serious challenge to the Feed-in Tariffs model.

2.4 Combining punctuated equilibrium theory and policy feedback literature

The challenge of applying both the friction model and the policy feedback literature lies in the complexity and conditionality of the predicted policy processes. Hence 'the real analytical problem from the point of view of the framework's theoretical coherence, is the feedback interaction between the endogenous and exogenous sets of factors. The feedback sequence and loops make the difference here' (Capano 2009, p. 17).

This section starts with assessing the compatibility of the friction approach and the policy feedback literature before it develops the conceptual framework of this thesis.

2.4.1 Compatibility of friction and policy feedback literature

When combining different theories in a common framework as done in this thesis, the compatibility of the theories needs to be considered. Although they have different origins, their basic assumptions are not that different. With regard to policy feedback, however, the definitions used are inconsistent and require clarification.

Origins

Policy feedback mechanisms are mainly rooted in the theory of historical institutionalism (Campbell 2004; Pierson 1993a, 1994, 2004b; Pierson and Skocpol 2000; Skocpol 1979, 1992; Steinmo et al. 1992; Thelen and Steinmo 1992; Weir 1992), whereas the friction concept originates from the literature on policy change and particularly PET (Baumgartner et al. 2009; Baumgartner et al. 2006; Baumgartner and Jones 1991, 1993, 2002a, 2002b, 2009; Jones and Baumgartner 2005, 2012; True et al. 2007a; Walgrave and Varone 2008; Walgrave and Vliegenthart 2010).

In the past, the policy change literature (including the three main theories ACF, MS, and PET) and the historical institutionalism literature have been quite separate, the main reason probably being that policy change scholars looked at policies and historical institutionalists looked at institutions, although this was not always that clear-cut.

However, the fact that the two literatures have been detached does not mean they cannot be used collectively and scholars of both theories indicate complementarity. For example, Pierson makes a convincing case for treating ‘public policies as institutions’, encouraging historical institutionalists to look at policies as well (Pierson 2006). Also, historical institutionalists such as Hall (1993, p. 277) write about ‘‘punctuated equilibrium’ that often applies more generally to political change’. Reviewing Hall’s seminal 1993 paper on policy change, Baumgartner stresses that PET theorists ‘reach the same conclusions from different approaches, and to demonstrate the validity of similar ideas with very different methodologies’ (Baumgartner 2011, p. 5).

Basic assumptions

With regard to the basic processes of the friction concept, PET refers mainly to two phenomena: First, to the bounded rationality of individuals and organisations and their limited cognitive ability to process information, and second, to institutional friction due to the limited capability of institutions to deal with issues. Both mechanisms lead to failure to translate policy inputs into policy outputs (Baumgartner et al. 2009; Jones and Baumgartner 2005, 2012). Historical institutionalists also stress the inability of individuals to make purely rational decisions taking into account all possible effects of their actions (Hall 1983; Katznelson 1998; Steinmo 1989; Steinmo et al. 1992). In fact, historical institutionalism is heavily influenced by the work of organisational theorists (Koelble 1995), particularly the work of March and Olsen (1984, 1989) who draw on the work of Simon (1957, 1959) on bounded rationality. Similarly to the friction model of Jones and Baumgartner, Pierson (2004b) stresses the cognitive limits of actors and the multiple biases affecting decision-making. Furthermore, he argues that individuals often (although not always) have short time horizons not considering long-term consequences. However, historical institutionalists do attribute explanatory power not only to cognitive limits, but also to the institutions setting the context in which decisions are made (Katznelson 1998). To some extent, friction does capture the effect of institutions with regard to their capability to deal with issues, but the emphasis of friction lies on cognitive limits whereas historical institutionalists stress institutional aspects.

Furthermore, historical institutionalism spent a great deal of effort on explaining why institutions and policies persist over long periods of time, whereas PET focuses on abrupt change while acknowledging that institutions and policies may persist for very long periods of time (Jensen 2009).

So although the two approaches do have quite different origins and emphasise particular elements, there is no apparent fundamental incompatibility in terms of the basic assumptions.

Definitions of feedback mechanisms

While both literatures refer to positive and negative feedback mechanisms, they use the terms in opposite ways:

Positive feedback is referred to by the historical institutionalism literature as processes that stabilise and reinforce existing policy regimes, which may eventually result in lock-in situations (Campbell 2002a; Mettler and Soss 2004; Pierson 1993b, 2004a; Skocpol 1992). PET turns this definition on its head and describes positive feedback as a mechanism that drives rapid policy change rather than reinforcing existing policy regimes. Hence positive feedback 'can lead to a cascade or a spiral of subsequent events that dramatically change the status quo' (Baumgartner and Jones 2002b, p. 15).

Historical institutionalists define *negative feedback* as the 'consequences of policy that tend to undermine rather than reinforce the political, fiscal or social sustainability of a particular set of policies' (Weaver 2010, p. 137). In contrast, PET scholars use the term negative feedback for processes that are self-correcting and status quo stabilising. According to PET, the 'key element of any negative feedback system is simply that the system reacts to counter-balance, rather than reinforce, any changes coming in from the environment' (Baumgartner and Jones 2002b, p. 9).

Hence the two literatures use opposite terms for processes that lead to an expansion and contraction of a policy regime respectively (Table 1).

Table 1: Positive and negative feedback in Punctuated Equilibrium Theory and historical institutionalism

	Theoretical approach	
Type of policy feedback	*Punctuated Equilibrium*	*Historical institutionalism*
Positive	undermining of policy regime	expansion of policy regime
Negative	expansion of policy regime	undermining of policy regime

In order to conceptualise policy feedback in a consistent manner I stick to the natural science definition of positive and negative feedback: Positive feedback exacerbates particular changes whereas negative feedback dampens and inhibits change (Holling 1973).

However, it is important to think of positive and negative feedback mechanisms not as one-directional pressures, but as forces that can both exhilarate and retard policy change. While positive feedback effects (negative in PET) are often thought of as change inhibiting factors, they can also put further pressure on policy makers to do more of what they do (for example because it benefits a certain interest group demanding an expansion of current policies). Similarly, negative feedbacks (positive in PET) do not necessarily lead to policy change: If, for example, a new policy instrument is introduced and negative feedback effects are apparent immediately, these effects may simply result in reverting back to the status quo (Patashnik 2008).

It is important not to think of change or no change as a generally positive or negative development. In some instances policy stability (no change) is important to allow for a policy being effective whereas in other situations change is a prerequisite in order to increase the efficacy of a policy.

2.4.2 Conceptual framework and hypotheses

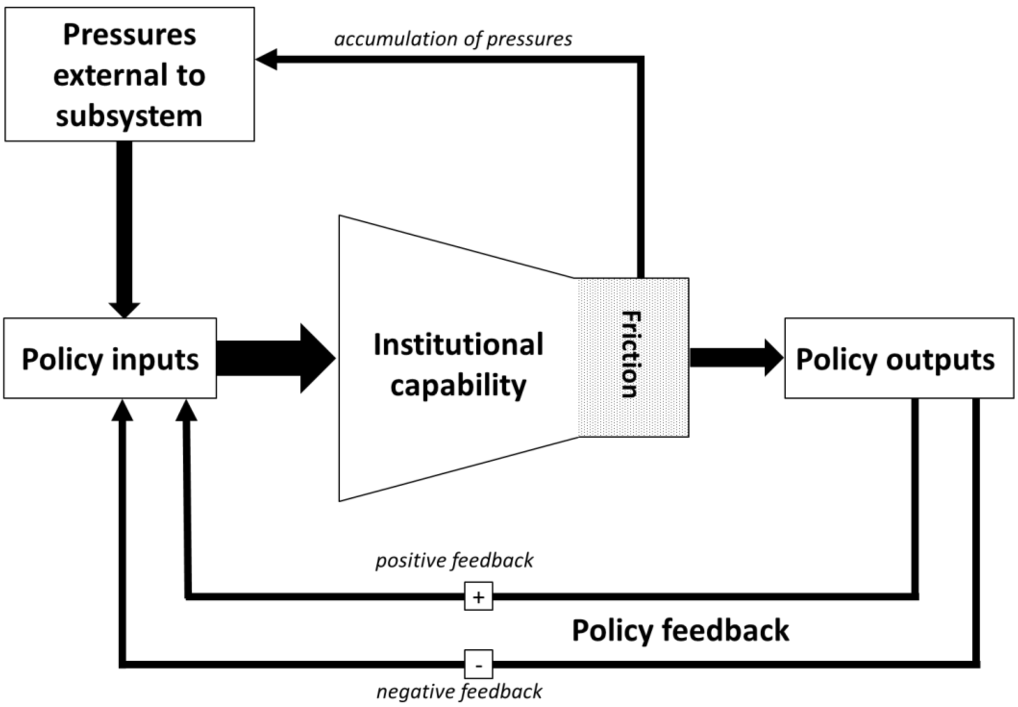
The conceptual framework of this project is based on the literatures of PET and historical institutionalism. Coming back to the introduction of this chapter, the conceptual framework is supposed to illuminate how long-term pressures (both external but also internal to the policy subsystem) impact on policy change. The following elements are integrated in the framework:

- *Pressures external to the subsystem* are conceptualised as drivers from a wide range of possible sources that put pressure on the policy subsystem to change. These pressures may only operate for a very short period of time, for example a few days, but may also last several years or even decades. Short-term events are referred to as *systemic perturbations* whereas long-term pressures are called *subsystem spillovers* (Williams 2009).
- *Policy inputs* can be defined as 'information relating to the state of affairs "out there" that actually comes to the attention of government' (Baumgartner et al. 2009, p. 605). Information comes in various shapes such as indicators (e.g. new scientific research on environmental problems), focusing events (e.g. an energy crisis), and feedback from existing policies (Kingdon 1984, 1995). It can be provided by the media, lobby groups (including non-governmental organisations (NGOs)), experts, and government agencies, amongst others (Baumgartner et al. 2009).
- *Policy outputs* include budgets, new regulations, modification of existing regulations, and other authoritative decisions (Baumgartner et al. 2009). Hence they comprise any changes in policy goals, objectives, or instruments (Hall 1993). The primary focus of this thesis lies on two selected policy instruments, namely the SO and the CBRP, and changes in their settings over time.

- *Institutional capability* puts the process of friction at the core of the conceptual framework – the ability of the system to respond to pressures and policy feedback is a function of the degree of friction. The larger the degree of friction, the higher the proportion of policy inputs which are not translated into policy outputs.
- *Policy feedback* encapsulates both expansion driving and status quo undermining effects from existing policies (in the case of this thesis the selected policy instruments). In the conceptual framework these processes are treated as policy inputs.

Figure 2 schematically represents the conceptual framework and can be thought of as a flow diagram. The size of the arrows is indicative only and shows the magnitude of pressures, inputs, and outputs. Depending on the context, the importance of the different processes will be different.

Figure 2: Conceptual framework



2.4.3 Hypotheses

Based on the principles of regression analysis some scholars argue that ideally, a set of clearly defined hypotheses predicting the causes, and causal mechanisms of change should be developed and then be tested (King et al. 1994). Such an approach is based on the 'linear-additive view of causality, which assumes that there is a clear separation between independent and dependent variables' (Capano 2009, p. 17). Outspoken advocates of this view called for more formal models and even demanded to 'put an end to […] hopelessly vague theories about the policy process' (Dowding 2001, p. 102). The underlying assumption is that if you cannot formally test a theory, it is obsolete.

However, 'there is more than one way of doing political science' (Marsh and Smith 2001, p. 528) and different approaches make different epistemological and ontological assumptions. More recent theories of policy change have become increasingly complex; variables are interdependent and do not operate in a straightforward linear manner (Capano 2009; Hall 2003; John 2003; Marsh and Smith 2001; Pierson and Skocpol 2002; Rayner 2009). It is for this reason that Peter Hall (2003, p. 375) argued that 'the ontologies of comparative politics have substantially outrun its methodologies'. This is not to say that approaches based on regression analysis are not valid, but that depending on the context of the investigation different types of methodologies are more or less suitable.

Because the variables looked at in this project are in fact interdependent and related to each other in multifaceted ways, a formal model categorising the causal factors into independent, dependent, and intermediary variables is not appropriate. In such cases a different approach called *systematic process analysis* (or process tracing)[2], is

[2] See the detailed description of this method in the methodology chapter.

recommended (Hall 2003, 2008). The steps of such an approach are to formulate a set of theories and make predictions of causes and the processes by which these causes have an effect on outcomes. Hall suggests using more than one theory and deriving rival hypotheses in order to assess a variety of potential explanations and not to narrow the scope of the investigation from the outset. Such a strategy addresses the danger that if using one theory one just identifies the facts that fit with that theory. Following Hall's approach, a number of hypotheses are developed in the next section. Each hypothesis is contrasted with a counterhypothesis.

Pattern of policy change in response to gradual pressures

There are various ways in which policy might change in response to gradual pressures. Recent PET concepts such as friction assume that the system responds in a non-linear fashion to such forces of discontent, when over long periods of time, policy inputs (i.e. demands for change) are not in line with policy outputs (changes in policies). Pressures build up over time as a result of inadequate responsiveness in the system due to institutional friction. At some point a tipping point may be reached, and rapid policy change may be triggered. In such situations, the system is expected to over-respond.

Following the above, the first hypothesis is as following:

> *H1/1: Long-term gradual pressures lead to changes to policy instruments that follow a pattern of punctuated equilibrium. The scale of change is substantial compared to the status quo.*

The rival hypothesis to this is that policies change gradually in line with the pressures, keeping a balance between the policy inputs and outputs:

> *H1/2: Policy instruments change incrementally as a result of gradual pressures. The scale of change is minor compared to the status quo.*

Friction

PET predicts that friction leads to the building up of pressures over time as a result of bottleneck effects. The hypothesis thus is:

> *H2/1: Friction significantly limits the capability of institutions to respond to gradual pressures and creates a misbalance between policy inputs and policy outputs. The result is the accumulation of pressures.*

While the friction concept is compelling, there may as well be no evidence for friction of any kind and policy inputs are linearly translated into policy outputs.

> *H2/2: Friction does not limit the capability of institutions to respond to gradual pressures and there is a balance between policy inputs and policy outputs. Pressures do not accumulate as a result.*

PET also provides two causal mechanisms that lead to friction:

> *H3/1: Friction is caused by a) the limited ability of institutions to deal with information i.e. policy inputs, and b) prohibitive institutional structures that do not allow for effective translation of policy inputs into policy outputs.*

An alternative hypothesis is:

> *H3/2: Friction is caused by other factors.*

Feedback

Both PET and historical institutionalism emphasise the importance of feedback mechanisms, including positive and negative policy feedback.

> *H4/1: Existing policy instruments create positive and negative feedback processes. Positive policy feedback leads to an expansion of the policy whereas*

> *negative policy feedback results in a dampening of the expansion or contraction of the policy.*

However, one could also argue that these processes are absent and do not contribute to change of policy instruments. Rather, politics independent of the policy instrument may determine its modification.

> *H4/2: Existing policy instruments do not create positive and/or negative feedback processes. Policy change is a result of political processes not influenced by existing policies.*

Conclusions

This chapter started with a dilemma: An initial screening of the cases under investigation showed that the drivers of policy change appear to be long-term pressures (e.g. the perceived impact of climate change) or feedback effects of the policy itself (e.g. increasing reliance on public expenditure). However, the main theories of policy change either seem to suggest that external events such as crises account for substantial policy change or, in the case of incrementalism, that significant policy change is unlikely to take place. In contrast, this chapter proceeded with a search for theories that could help explain the impact of more long-term pressures on policy change. It started by critically discussing four theories of policy change, namely incrementalism, ACF, MS, and (first-generation) PET, and demonstrated that the theories that explain major policy change rely heavily on external crisis type events. In search for more comprehensive theoretical accounts two types of literature were identified: Recent developments in (second generation) PET resulted in the notion of friction which conceptualises the impact of long-term policy drivers and the building up of pressure over time eventually leading to policy change. This literature was blended with theories of policy feedback mechanisms coming out of historical institutionalism and a critical assessment of their compatibility showed that in general the two types of literature are complementary. Subsequently, the conceptual framework of this thesis was developed based on both the literature of friction and policy feedback. Finally, the chapter derived a number of rival hypotheses in order to guide the research and focus the analysis. The logical next step in the following chapter is to establish the methodology used in order to evaluate the hypotheses and to operationalise the different elements of the conceptual framework.

3 Methodology and research design

The investigation of the truth is in one way hard, in another easy. An indication of this is found in the fact that no one is able to attain the truth adequately, while, on the other hand, we do not collectively fail, but everyone says something true about the nature of things, and while individually we contribute little or nothing to the truth, by the union of all a considerable amount is amassed.

Aristotle (Metaphysics 993). Quoted in Feyerabend (1981)

'There is no such thing as a social science' some argue (Hutchinson et al. 2008), believing in the premise that scientific methods and approaches are inappropriate for the study of social phenomena, although a significant amount of social science is based on precisely these methods. Even if one accepts the notion that there is no such thing as social science, the question remains, however, which sort of method is appropriate for studying politics. Being trained as a scientist, I was used to fairly straightforward methods such as statistics and relatively few controversies around the general approach to scientific analysis. Looking at the social sciences, the breadth of viewpoints on the question of methodology and the divide between different schools of thought is striking. Given the range of possible choices, it is the task of this chapter not only to present, but also to position and justify the methodology selected for this study.

Considering that many of the disputes about method stem from disagreements about ontology and epistemology, this chapter starts by locating this thesis in ontological and epistemological terms. Turning to more practical matters, the chapter discusses the case study approach used in this project and provides reasons why such a technique has been chosen and not others. It will then present the method of systematic process analysis, which will be used to analyse the case studies. Subsequently, a justification for the selection of countries and the time horizon looked at in the research is provided. This is followed by an introduction to the methods used including semi-structured interviews and document analysis. Finally, the chapter concludes with operationalising the key theoretical concepts developed in the previous chapter.

3.1 Ontological and epistemological assumptions

In order to enable others to critically assess this thesis the main ontological and epistemological assumptions need to be spelled out. Unfortunately, this part is often missing in doctoral theses and the ontological and epistemological assumptions can be second-guessed only from the theoretical frameworks employed and the methods used. By being clear about ontology and epistemology, an approach recommended by scholars working on policy change (Capano 2009), the suitability of the approach taken in this thesis can be judged more adequately.

3.1.1 Ontology

Ontology 'relates to the nature of the social and political world' (Hay 2007, p. 117), it

> *'refers to the claims or assumptions that a particular approach to social enquiry makes about the nature of the social reality – claims about what exists, what it looks like, what units make it up and how these units interact with one another' (Blaikie 1993, p. 6).*

By choosing a certain theoretical framework or by developing a specific research design, implicit ontological assumptions about the political world are made such as structure and agency, institutions, material and ideas, political actors, and in particular the causal relationships in this world. Hays argues that

> *'no political analysis has ever been ontologically neutral; rather fewer political scientists are prepared to proceed on the basis of this once unacknowledged and unchallenged presumption' (Hay 2006, p. 78).*

Therefore the ontological presumptions of the theoretical framework adopted in this thesis are laid open. The two main streams of theory used in this thesis are recent concepts of PET and the literature on policy feedback, which is based in historical institutionalism. PET places the policy process 'on a dual foundation of political institutions and boundedly rational decisionmaking' (True et al. 2007b, p. 156), both small and large-scale change comes from interaction of multilevel political institutions and behavioural decision making. Similarly, historical institutionalism 'see[s] the world not as a terrain marked by the operation of timeless causal regularities, but as a branching tree whose tips represent the outcomes of events that unfold over time' (Hall 2003, p. 385) opposed to equilibrium concepts of rational choice theories. Variables are not independent but often bundled depending on the particular context. The sequence of events matters and has a significant impact on the outcomes of processes. Therefore, a historical institutionalist perspective rejects functional explanations which claim that institutions only exist because they fulfil a certain function, often institutions evolve in a complex causal chain over time (Pierson and Skocpol 2000). In sum, this thesis looks at political processes from a perspective that assigns particular importance to institutions, actors, time and sequence.

3.1.2 Epistemology

Ontology conceptualises our assumptions on the nature of the world; epistemology relates to 'to what we can know about it' (Hay 2007, p. 117).

This thesis adopts a critical realist epistemological perspective. It follows Cruickshank (2003, p. 2) who supports the view that 'research [is] from the very start influenced by assumptions' and research is 'about gaining knowledge of a reality that exists independently of our representations of it' (p. 3). That knowledge then is interpreted through the theoretical lens of the researcher. Because of that limited access to knowledge of a reality, 'causal mechanisms can exist independently of our knowledge of them' (McAnulla 2005, p. 32).

The theoretical framework adopted is consistent with a critical realist perspective. As Marsh convincingly shows, historical institutionalism can be located in a critical realist position (Marsh 2008). This is probably less clear for PET and there are few if any references to epistemology. However, PET assumes limited ability to process information and cognitive limits of actors (Jones and Baumgartner 2005), which surely must also apply to PET scholars placing PET comfortably within a critical realist perspective. Furthermore, acknowledging the limitations of theoretical predictions, Jones and Baumgartner stress that 'the most important aspect of a theory or framework is not whether it is right or wrong, but the extent to which it is fruitful; that is, the extent to which it stimulated further research' (Jones and Baumgartner 2012, p. 1). Again, this statement suggests a critical realist perspective.

Both historical institutionalism and PET stress the importance of time when investigating policy change (Pierson 2000b; True et al. 2007b). This thesis carries out an analysis in line with the widely accepted presumption that studies looking at policy change should cover several years or even decades (Sabatier 1993). Paying particular attention to the dimension of time is an important feature of a critical realist approach and '[t]here cannot be any [critical realist] analysis of change without reference, whether implicitly or explicitly, to a conceptualization of time' (Bates 2006, p. 145).

Furthermore, the importance of causal mechanisms is one of the key concerns of this thesis trying to link empirically observable causes to effects by better understanding the way these causes have an impact on outcomes. This is at the heart of critical realism (Bhaskar 1978). Finally, critical realism is also reflected by the method of investigation chosen for this project, it follows an approach called systematic process analysis, which is firmly rooted in the critical realist perspective (Hall 2008).

3.2 Case study approach

This thesis aims to provide an advanced understanding of how long-term pressures affect policy change putting the emphasis on the causal mechanisms associated with those changes. Having to choose between qualitative or quantitative methods, or a mixture of the two, advice given by Fischer et al. is taken into account:

> *'the key to explaining how [policy] change comes about has to be grounded in a detailed contextual examination of the circumstances at play in specific cases. For this purpose quantitative methods have to take a back seat to qualitative research' (Fischer et al. 2003, p. 108).*

Also Bennett argues that case studies are particularly well suited for the

> *'explanation of a sequence of events that produce a particular historical outcome in which key steps in the sequence are in turn explained with reference to theories or causal mechanisms' (Bennett 2004b, p. 21).*

This is precisely what this research is about by asking questions focusing on the drivers and causal mechanisms of policy change. Therefore, this thesis will use the case study method in order to evaluate the hypotheses derived from the theory and answer the research questions posed above.

The case study method has other advantages compared to a quantitative statistical approach in a number of areas (Collier 1993; Mahoney 2007). Case study methods can operationalise qualitative variables, identify heuristically new or omitted variables and hypotheses, and examine potential causal explanations within particular cases (George and Bennett 2005). This is not to say that quantitative methods are inferior, the case study method just has a different focus and is better suited to explain phenomena that involve complex causal chains.

Using Lijphart's (1971) well-known categorisation of different types of case studies, the type of case study this thesis conducts can partly be classified as *theory-confirming/ theory-infirming* (because it tests hypotheses based on existing theories), and partly as *hypothesis-generating* (because it adjusts existing and proposes new hypotheses).

3.2.1 Potential pitfalls of the case study method

Case studies run the risk of selection bias and there are tradeoffs concerning the number of cases, hypotheses and variables (Bennett 2004b). The case study method has been criticised for suffering from the *degrees of freedom problem*, which refers to a problem in statistics when the number of independent variables is greater than the number of cases (Goldstone 1997; King et al. 1994; Lijphart 1971). However, as Bennett (1991) convincingly argues, the concepts of case, variable and observation cannot simply be transferred from statistics to qualitative case study based research. Mahoney (1999; 2000a) presents three strategies used in the case study method in order to reduce the problems of a small number of cases: nominal comparison, ordinal comparison, and within-case analysis.

Nominal comparison refers to John Stuart Mill's method of agreement and difference (Mill 1843). Based on Mill, the Most Similar Systems Design compares similar cases with different political outcomes. Such an analysis can reveal those explanatory factors (e.g. causes of policy change) that differ across similar cases (e.g. countries with similar level of economic development, similar political systems etc.) and produce different outcomes (e.g. different degrees of policy change). The Most Different Systems Design compares countries that share few common features but show similar political outcomes (Landman 2008). However, Mill himself pointed towards the difficulties of using the method of agreement and difference in practice. Mill's methods work well when several demanding requirements are fulfilled: First, all causal relevant variables must be identified prior to the empirical research. Second, cases representing all potential causal paths must be available for study. Finally, the causal relation of the independent and dependent variable needs to involve only one condition, and be either sufficient or necessary (George and Bennett 2005). These conditions are very hard to meet in practice. In particular, the multiple causality of outcomes i.e. the equifinality poses a challenge to research design. Different causal mechanisms can lead to similar outcomes making it very difficult to specify the causes at work. Also, if not all causal paths are identified there is the danger of 'spurious correlation' (Mahoney 2007). Spurious correlation refers to the phenomenon when an independent variable seems to drive a dependent one but in fact both are dependent on an antecedent variable that has been omitted.

Ordinal comparison is based on Mill's method of concomitant variation and ranks the cases based on the degree to which explanatory factors and expected outcomes are present. Each case is scored in terms of the presence of the explanatory variables and the outcomes. By exploring the covariation between causes and outcomes the degree of causality can be assessed (Mahoney 2000a). Applied to the research on policy style change, covariation between the causes of policy style change (explanatory variables) and change of policy style (outcome) is tested. The higher the degree of covariation, the more plausible it seems that the hypotheses prove an adequate explanation. However, deviation from the expected pattern does not necessarily mean that a hypotheses can be rejected (Mahoney 1999). Often ordinal comparison does not provide a clear basis for eliminating potential explanatory variables because causal patterns are assumed to be partial and probabilistic (Mahoney 2000b).

A third strategy that can be used to prevent potential pitfalls of small-n case studies is the *within-case analysis*. This approach deals with some of the problems of nominal and ordinal comparison. It is different from nominal and ordinal comparison in terms of the level of aggregation: both the ordinal and nominal approach entails aggregated comparisons across cases whereas within-case analysis involves disaggregated comparisons within cases (Mahoney 2000b). Due to the central research question of this thesis, within-case analysis is deemed most suitable to generate the results needed.

3.2.2 Within-case analysis as a means to avoid pitfalls

Within-case analysis focuses not on the analysis of variables across cases but on the causal mechanisms in a single case. Doing within-case analysis can prevent spuriousness which can be a problem in both nominal and ordinal comparison. Within-case analysis can compensate for the limitations of small-n studies by examining multiple features of a case. By doing so, multiple observations of similar processes (e.g. processes of policy change) are possible within one case leading to greater validity of the results (Mahoney 2000a). In the context of a comparative study,

> *'the results of individual case studies, each of which employs within-case analysis, can be compared drawing them together within a common theoretical framework without having to find two or more cases that are similar in every respect but one' (George and Bennett 2005, p. 179).*

Hence within-case analysis does not need to follow Mill's method of agreement and difference. In a later section of this thesis a discussion of the implications of choosing a within-case analysis approach on case selection is provided.

There are various methods that can be chosen when doing within-case analysis and it is important to be clear which method is used when carrying out the analysis. One of the methods that is particularly attractive in the context of this thesis is *systematic process* *analysis*. Systematic process analysis is probably the most important tool when the aim is to uncover causal mechanisms and reconstruct historical events or sequences of events (George and Bennett 2005) which is the aim of this thesis. Therefore, this thesis will employ systematic process analysis to analyse the cases chosen.

3.3 Systematic process analysis

Systematic process analysis, a term coined by Hall (2008), is one of the key tools available when doing within-case analysis. Some refer to it as process tracing (Bennett 2004a; George and Bennett 2005; George and McKeown 1985), others use the label pattern matching (Campbell 1975). Systematic process analysis can be particularly useful to employ theories

> *'whose conceptions of the causal structures underlying outcomes are at odds with the assumptions required for standard regression techniques and conventional comparative method to provide valid causal inferences' (Hall 2003, p. 375).*

Systematic process analysis can be used when several theories refer to different causal mechanisms to explain the same phenomenon (Hall 2008). Hence systematic process analysis is not just assessing the causes of a phenomenon but also the causal process whereby these causes operate (Bennett 2004a; George and Bennett 2005). Such a method contains a deductive and an inductive element: It is deductive because it evaluates hypotheses based on existing theories and inductive because the research might come across unexpected explanations and variables overlooked so far (Bennett 2004a).

The following steps are part of systematic process analysis (Hall 2008):

1) Theory formation: approach the case with a range of theories and potential causes, test one theory against another;

2) Deriving predictions: develop predictions that are consistent with one theory but inconsistent with its principal rivals;
3) Making observations: observation of correlation as in conventional comparative method but also on process whereby an outcome is caused; and
4) Drawing conclusions: assessment to which extent the theories explain the outcome.

Steps 1 and 2 are already carried out in the theory chapter; It starts from a critical review of the three most prominent theories on policy change and establishes a new lens on policy change that takes account of more gradual long-term pressures. Based on existing theoretical frameworks a number of hypotheses are derived. In addition, as suggested by Gläser and Laudel (2004), a number of research questions have been developed to guide the research.

Step 3 will involve an indepth-analysis of the processes that led to policy change paying particular attention to long-term pressures. Key long-term pressures will be identified as well as short-term events that caused policy change, making sure more conventional explanations of policy change are also covered in the analysis. When a factor is identified as being an important causal driver the causal mechanisms by which this factor affects the outcome are investigated further. A detailed overview of the methods used to make observations is provided in section 3.5.

Step 4 will use a rigid method of analysis that is called Qualitative Content Analysis. This will link the results of the qualitative research to the theoretical predictions made during steps 1 and 2. Details of this approach are presented in section 3.5.4.

3.4 Selection of cases

Selecting the cases for the investigation is not straightforward. There is a lively debate on the selection of cases for small-n studies. As outlined above, the case study method has been criticised for having a degrees of freedom problem, when the number of independent variables is greater than the number of cases (Goldstone 1997; King et al. 1994; Lijphart 1971). However, as Bennett (1991) convincingly argues, the concepts of case, variable, and observation cannot simply be transferred from statistics to qualitative case study based research. First, within one case multiple observations of the same phenomenon can be made. Second, the case study method allows an in-depth investigation of the *causal mechanisms* of a few cases in contrast to merely testing whether the independent variable x can explain the independent variable y statistically. This thesis employs the approach of systematic process analysis, a method that 'is fundamentally different from methods based on covariance or comparisons across cases' (George and Bennett 2005, p. 207). Systematic process analysis does not rely on establishing causation through comparison and covariation. Therefore, the critique of selection bias is misguided when it comes to studies employing methods such as process analysis (Bennett and Elman 2006).

When trying to uncover causal mechanisms cases should not be chosen to be statistically representative but because they display a high degree of the phenomenon that is investigated (Pettigrew 1990). This thesis followed a strategic sampling approach when selecting the cases.

Although a single case study can provide interesting insights regarding the causal mechanisms, 'increasing the number and diversity of the cases increases the investigator's confidence that the causal process observed is not idiosyncratic to one of them' (Hall 2008, p. 315). This is why a comparative approach is chosen for this thesis.

3.4.1 Geographical scope

This thesis investigates the principal home energy efficiency policies of Germany and the UK. The reasons for choosing policies of these countries are manifold:

First, both countries have been very active in the area of energy efficiency policy. They have had a lot of change in the energy efficiency domain and there is sufficient material that can be used to evaluate the hypotheses and predictions on policy change. It is expected that the dynamics of energy efficiency policy in the two countries provide an excellent case for applying theories of policy change.

Second, selection of cases with background knowledge allows a stronger research design and cases can be selected with an expectation whether they will be valuable for theory testing and/ or making (George and Bennett 2005). Both the author and the supervisors of the thesis have preliminary knowledge of energy efficiency policy in both countries.

Third, by choosing Germany and the UK some degree of control for several critical variables can be established. For example, domestic energy consumption per household is similar in both countries. Also, the political system in both countries is democratic. Energy markets in both countries are liberalised. Furthermore, both countries have strong climate change targets with energy efficiency as a strong pillar.

Fourth, the two countries have quite distinct institutional structures. One of the research questions is how institutional differences affect how long-term pressures impact on policy change. This includes obvious formal differences such as Germany being a federal state and the UK not, or that there are different agencies operating in the two countries.

3.4.2 Time horizon

Not just the geographical scope but also the time horizon needs to be carefully selected. When selecting the cases for this study, three aspects with regard to timescales were considered.

First, there is widespread agreement that policy dynamics should be studied over periods of several years or even decades (Sabatier 1993).

Second, the availability of data is likely to be inferior for periods further in the past than for more recent periods. For example, older documents are not published online or might not be available altogether. Also, it is more challenging to identify interviewees who were observers of events that happened more than 20 years ago and even if they could be found their memory of those events may be poor (Wengraf 2001).

Third, significant policy change occurred after the 1992 Rio Earth Summit and new gradual pressures such as climate change really started to have an effect in the 1990s. The 1980s do not show similar turbulences in energy efficiency policy (see analysis below). As outlined above, it is sensible to select cases that display a high degree of the phenomenon under investigation (Pettigrew 1990). Therefore the time horizon is set after 1990.

3.4.3 Unit of analysis

When selecting the unit of analysis one needs to make sure 'that the site and unit of investigation are *suitable* for the type(s) of problem(s) that shall be investigated [emphasis in original]' (Diefenbach 2009, p. 879).

When approaching policy change, one needs to be clear which elements of policy are actually looked at. Scholars focusing on policy change often took 'policy' as a dependent variable of their research without specifying what they mean by policy (Heclo 1976; Rose 1976). Peter Hall (1986, 1993) made an attempt at decomposing the term 'policy' into its different elements, namely the *goals* of policy making, the *instruments* deployed to attain those goals, and the *setting* of those instruments. Hall argued that different types of change occur at the various levels of policy in a different manner. Hall's typology of policy elements is widely used in the policy change literature.

However, although Hall significantly advanced the understanding of policy change and in particular the conception of policy as a dependent variable, Hall's model struggles to capture the difference between *ends* and *means* as well as the distinction between more abstract goals/ logics and more specific settings/ calibrations (Cashore and Howlett 2007; Howlett and Cashore 2009). There have been attempts to reconceptualise policy as a dependent variable with the aim of providing a more coherent framework for analysis that allows a better understanding of the elements affected by policy change, the direction of change and the interaction among the different elements. Building on Hall, Howlett and Cashore (2007; 2009) propose a six-dimensional taxonomy of policy components disaggregating between ends and means as well as three different levels of abstraction (from high levels of abstraction to specific on-the-ground measures). The following table presents this framework and provides examples related to energy efficiency policy to illustrate what is meant by each element:

Table 2: Taxonomy of policy components with examples

	High level abstraction	**Programme level operationalisation**	**Specific on-the-ground measures**
Policy ends or aims	Goals: What general types of ideas govern policy development? (e.g. energy security, economic efficiency, climate change mitigation)	Objectives: What does policy formally aim to address? (e.g. reducing total energy consumption by x%, reducing carbon emissions related to energy use in homes by x%)	Settings: What are the specific on-the-ground requirements? (e.g. amount of grants and loans, savings target defined in Supplier Obligation, requirements of building regulations)
Policy means or tools	Instrument logic: What general norms guide implementation preferences? (e.g. preference for market based instruments or coercive instruments, preference for cost-effective instruments)	Mechanisms: What specific types of instruments are utilized? (e.g. Supplier Obligation, grant and loans scheme, building regulations)	Calibrations: What are the specific ways in which the instrument is used? (e.g. publication of building regulations and guidelines)

Source: Modified from Howlett and Cashore (2007; 2009)

For the purpose of this thesis the Howlett and Cashore taxonomy of 'policy' will be used in the empirical research. While this thesis does not look at all the elements of policy when analysing policy change it will refer to the taxonomy to provide clarity as to which element is meant. Policy change is defined as a modification of the elements of policy as defined above. Hence policy change is not simply the modification of existing policies but also the creation of new policies. Change can be measured by looking at individual elements over time. While some change is quantitative in nature (e.g. doubling the target for policy x, increasing the budget for a certain policy), other types of change can only be described qualitatively (e.g. change of policy goals and instrument logic).

When determining the unit of analysis the following rationale was adhered to: First, the unit of analysis had to display long-term policy change with regard to the central research question of this thesis. Second, the interest of this thesis lies with home energy efficiency policy and the unit of analysis had to capture key features of this policy area. Third, the unit of analysis had to be suitable to carry out systematic process analysis. It would be a herculean task to carry out systematic process analysis for all the home energy efficiency policies in the UK and Germany. Therefore only one policy instrument per country could realistically be analysed. By making this choice, this thesis focuses on both ends and means of specific on-the-ground measures (shaded column in Table 2).

The policy instruments chosen represent some of the most important features of home energy efficiency policy. In the UK, the Supplier Obligation (SO) is the most important instrument to deliver energy and carbon savings in the domestic sector. A review of the first Energy Efficiency Commitment scheme, EEC 1, describes the SO as ‘the Government’s key energy efficiency policy for existing households’ (OFGEM 2005). Both the 2004 and 2007 Energy Efficiency Action Plan highlight the SO as the principal policy mechanism to deliver energy savings in the domestic sector (2004b, 2007b). As outlined in the Low Carbon Transition Plan, future GHG emission reductions in the domestic sector are assumed to come mainly from an extension of the SO with an increasing target going forward (DECC 2009c).

In Germany, the KfW loans and grants schemes for energy efficiency measures are the most important policy instruments for saving all energy in the domestic sector. For delivering energy efficiency in the existing housing stock the Integrated Climate Programme highlights the CO_2 Buildings Rehabilitation Programme as the principal policy instrument (BMU 2007). Also Eichhammer et al. (2006) stress that German home energy efficiency policy is dominated by the KfW schemes.

Therefore the unit of analysis in the UK is the Supplier Obligation and in Germany it is the CBRP.

3.5 Research methods

This thesis uses a mix of qualitative methods as suggested for studies including systematic process analysis (George and Bennett 2005). Quantitative methods play an important role when investigating relationships of different factors statistically. However, when trying to uncover causal mechanisms, which this thesis is aiming to do, qualitative research methods are the only approach that can be taken in a meaningful way (Gläser and Laudel 2004).

Qualitative research methods such as semi-structured interviews and document analysis have been criticised for not being sufficiently rigorous. Some of this critique is relevant for this thesis and will be considered in the following.

3.5.1 Critical assessment of qualitative research methods

Diefenbach (2009) presents a list of 16 potential methodological problems raised by critics. The most relevant issues with general regard to qualitative research put forward by Diefenbach are briefly discussed below while more specific problems of doing interviews are addressed in the relevant section on interviews.

First, the research question may be biased due to the implicit assumptions, worldviews, preconceptions, and single-mindedness of the researcher (Collins 1992). While quantitative research suffers from similar problems, one way of dealing with these issues in qualitative research is to make the position of the researcher explicit (Pyett 2003). Second, the research question may not be clearly defined at the beginning of the investigation and is likely to change over the course of the research (Maso 1989). However, this is not necessarily a weakness of qualitative research and can even be a strength. As Diefenbach (2009, p. 877) puts it, 'the (re-) formulation of the research question (or adding new ones) is a sign for progress, for an increasingly better and deeper knowledge and understanding of the objects of reasoning and recognition of emerging patterns'. Third, the research methods used in qualitative research are not as precise and clear-cut as quantitative methods (Whittemore 2001). Too often qualitative researchers do not state explicitly the methods that have been used and in which manner. This thesis makes the methods used explicit and highlights any methodical problems and areas of potential bias. Fifth, interpretation of results is biased by the researcher's subjectivity. While this is certainly the case one way of taking a critical perspective is to use a range of different potential explanations and test their explanatory power. Finally, qualitative research may produce merely an endless number of case studies that do not advance social science and theory development. While this certainly may be a problem of certain types of research, systematic process analysis type research is very much theory led and aims at testing as well as reformulating existing theories (George and Bennett 2005). Qualitative research can go beyond simple testing of cause and effect and uncover the causal mechanisms that link (or does not link) an effect to a cause. However, this thesis also makes use of quantitative data where appropriate (e.g. energy price data). Such an approach can help to support claims made based on qualitative research and provide additional evidence (Gläser and Laudel 2004).

Further methodological problems specific to the methods used in this thesis are discussed below. The two main methods used in systematic process analysis are interviews and document analysis:

> *'In process tracing, the researcher examines histories, archival documents, interview transcripts, and other sources to see whether the causal process a theory hypothesizes or implies in a case is in fact evident in the sequence and values of the intervening variables in that case. (George and Bennett 2005, p. 6)*

Following George and Bennett's suggestion, both document analysis and interviews are used in this research. Both are critically discussed in more detail below.

3.5.2 Document analysis

To begin with, published documents will be analysed and the long-term change of the policies under investigation in this thesis will be reconstructed as far as possible. Documents that will be used in the analysis include relevant academic literature, various publications by government departments such as DECC, BERR, DEFRA, BMU and BMVBS, regulators' publications such as the annual reports issued by OFGEM on the Supplier Obligation, the reports commissioned by KfW on the German programmes for building rehabilitation, party manifestos, speeches by politicians and stakeholders, parliamentary hearings, newspaper articles, and other literature offering historical accounts of domestic energy efficiency policy.

However, documents often do not contain all the information required. For example, official documents often only contain limited information on an issue because certain aspects of information were not considered as being important. Documents may also get lost, although this is less of a problem for research dealing with fairly recent policies. Some documents may also be withheld from public analysis for secrecy reasons. If documents are available, they may only contain an incomplete or distorted account of the events in question. Government documents, for example, may present issues in a manner that implies consensus and agreement while in fact a lot of decisions in policy making are characterised by conflicts and disagreements. In some cases there are simply too many documents to analyse making it difficult to identify the most relevant ones (Tansey 2007).

Document analysis is often used together with other research methods as a means of triangulation i.e. 'the combination of methodologies in the study of the same phenomenon' (Denzin 1970, p. 291). Using it in combination with qualitative interviews is common practice in social science research (Bowen 2009). As Kramer et al. (1990, p. 214) put it, 'documents can enrich, and be enriched by, oral history'. Hence interviews can complement document analysis and help address some of the problems described above.

3.5.3 Interviews

George and Bennett (2005) outline various purposes of interviews in systematic process analysis. First, interviews can be a means of gathering basic information about a case. Some information may simply not be available in published documents or the researcher may have been unable to identify the relevant documents. Second, interviews can fill in gaps in existing historical accounts. The documents available may not provide all the information required and interviews can help with providing missing bits of information. Interviews can help 'to establish the decisions and actions that lay behind an event or series of events' (Tansey, p. 766-767). Respondents' testimonies can be used to reconstruct political episodes 'stitching together various accounts to form a broader picture of a complex phenomenon' (p. 767). Third, interviews may serve theoretical purposes such as finding omitted variables and hypotheses. As outlined above, this is one of the advantages of systematic process analysis. Finally, interviews can help the researcher to uncover causal processes. For example, high energy prices may go hand in hand with new policy initiatives in home energy efficiency but in order to understand how high prices translated into policy change interviews can provide valuable information.

The people interviewed are experts in the area of the policies investigated in this study. However, research aiming to reconstruct past political processes does not analyse the experts as the main object of investigation (e.g. their backgrounds etc.) but makes use of their knowledge of these processes putting the processes at the centre of the research (Gläser and Laudel 2004). An expert is a person who had or has responsibilities for areas relevant to the case investigated or who has privileged access to specialist knowledge. This person often represents an organisation without being necessarily at the top of the hierarchy in an organisation but he or she may as well be part of the middle management or an even lower level (Meuser and Nagel 1991).

In total, 26 interviews were carried out as part of this research project. Note that in Germany members of parliament were interviewed whereas in the UK this was not the case. The reason for this lies in the different responsibilities of members of parliament in both countries: In Germany, the budget and other features of the CBRP require approval and go through a complex parliamentary process as outlined in Section 7.1.2. As part of this process members of parliament decide on any modifications the CBRP is subject to. In Britain, however, the responsible government department sets out the secondary legislation which specifies the design features of the SO. Parliament can only outright reject or accept the proposed secondary legislation but rejection happens very rarely - the last time a piece of secondary legislation was not approved by the House of Commons was more than 40 years ago (House of Commons Information Office 2008). Because the parliamentary process is merely a formality with no significance for the development of the SO no members of parliament were interviewed in Britain.

Drawbacks of interviews

However, as with any research method, there are certain drawbacks to interviewing. Interviewees may present false or misleading information because of their particular interests (Diefenbach 2009). For example, if interviewing politicians, interviewees may slant their accounts and provide a misleading picture of their role in a particular event (Kramer et al. 1990). They may overstate or downplay certain factors, frame issues in a manner that is favourable to them and the organisation the interviewee worked for at the time of the event in question. These issues may be even more important if the interviewee is working for an organisation at the time of the interview. The interviewee may merely present an official position of that organisation rather than providing the sort of insights that are required to answer the research questions. The background of an interviewee is likely to have a major impact on the way issues are remembered and framed. Furthermore, if the interview takes place years or even decades after the event under investigation, lapses of memory may lead to partial and even misleading information (Kramer et al. 1990). Hence there is no such thing as truly objective information that can simply be extracted in interviews.

However, this does not mean that information gathered in interviews cannot provide important insights. George and Bennett (2005) provide a framework that can help the researcher to assess the evidentiary value of the information gathered. They suggest that one should ask who is speaking, to whom, for what purpose, and under what circumstances. Furthermore, interview results can be cross-checked with other sources (Diefenbach 2009), for example when documents exist that contain similar information.

Sampling

It is also crucial to identify the right people when doing interviews in the context of systematic process analysis. While many interviewing techniques include random sampling, systematic process analysis requires that only those who have in-depth knowledge about very specific events and issues are interviewed. In contrast to random sampling, no clear-cut and well-developed concepts are available for non-probabilistic sampling (Wengraf 2001). When selecting interviewees, the researcher can use different sampling techniques. First, he or she may choose people because it is convenient to do so. Existing contacts can serve as a pool of potential interviewees. However, the danger of this approach is that important people may be missed. Second, quota sampling may be used where representatives of each group are interviewed according to the proportion of this group to the total number of actors. This approach requires detailed knowledge about the population of actors and may not always be feasible. Third, in an approach using purposive sampling, only those people who are deemed most appropriate in the context of the case study and research question are interviewed. The problem with purposive sampling is that the researcher may not identify key interviewees either because of a lack of information or because the selection is biased in a one-directional way. Finally, snowball or chain-referral sampling can be used where individuals are identified via suggestions by other interviewees. However, because interviewees may tend to suggest other people who share similar views, the results obtained may be skewed in one particular direction (Tansey 2007).

Another issue is the number of interviews carried out; qualitative researchers have been criticised for relying on too few interviews. Yet, there are trade-offs between depth and breadth and there is no perfect number of interviewees. It is up to the researcher to determine how many interviews are needed to answer the research questions (Diefenbach 2009). In sum, there is no perfect non-probabilistic sampling approach.

To avoid some of the problems of non-probabilistic sampling, the approach chosen for this thesis is a mix of purposive sampling and snowball sampling. The aim is to identify interviewees who fulfil the criteria for interviewee selection presented by Tansey (2007): they have been significant players, they have good memory of the events, and they are willing to disclose their knowledge of events in an impartial manner. Prior knowledge of the case and the document analysis will be used to develop an initial list of potential interviewees deemed most appropriate i.e. those who are likely to be able to provide the information needed in order to answer the research questions. Thereby a critical number of people will be reached to begin with. The list of people identified during purposive sampling will be crosschecked with experts in those areas to ensure good coverage. The initial list of potential interviewees will then be used to identify further interviewees by doing what is called reputational snowball sampling (Goodman 1961). This method can be particularly useful when trying to identify key policy makers (Farquharson 2005). The approach outlined above, i.e. purposive sampling in combination with snowball sampling, has been suggested for case study research using systematic process analysis (Tansey 2007).

Semi-structured interviews

In light of the above, semi-structured interview techniques are the most appropriate form of interviews for systematic process analysis (Tansey 2007). Expert interviews should be semi-structured following an interview guide when very specific information is required and a range of topics needs to be covered. The reason for this is that a non-structured interview, such as is used in narrative interviews, is unlikely to cover all the aspects of the case investigated when trying to reconstruct past events and processes. A fully structured interview on the other hand might exclude certain issues from the start because only those points can be covered that are part of the questionnaire (Gläser and Laudel 2004).

Semi-structured interviews require a number of initial questions to be prepared but probably more than half of responses to what the interviewees say may be improvised during the interview. This does not mean that less preparation is necessary – to the contrary, the interviewer needs to be extremely well prepared to be able to ask the right questions spontaneously. Good knowledge of both the theories used and the case study area is an obligatory prerequisite of a successful interview (Wengraf 2001).

Following Wengraf's suggestion, interview questions are derived from the theory questions presented above, are tailored towards the type of interviewee, and presented in a way that is as clear as possible to the interviewee. Questions should ideally echo the theory questions without revealing too much about them. Also, interview questions should not be suggestive or framed in a way that is favourable to one's preferred hypotheses (Kvale 2007; Wengraf 2001).

Pilot study

It is generally recommended to test the interview questionnaire in a short pilot study (Wengraf 2001). If there is only a limited number of people that can be interviewed, for example when only a very few persons were involved in a particular process or only a small number of people understand the issue of concern sufficiently well, pilot studies can be crucial for avoiding unsatisfactory results (Gläser and Laudel 2004). Testing the questionnaire with someone who is not one of the key interviewees but still has enough expertise in the area can eliminate questions that are unclear or misleading.

Prior to conducting the interviews the list of questions used for the purpose of this thesis was tested with one pilot interviewee. Following the interview the list of questions was modified taking into account the feedback by the interviewee and the ability of the initial questions to generate the data needed.

3.5.4 Qualitative content analysis

Qualitative content analysis is an excellent way of analysing interviews when investigating causal mechanisms (Gläser and Laudel 2004). This section provides an overview of qualitative content analysis in general and the specific approach chosen for this study.

Overview

Qualitative content analysis is 'the use of replicable and valid method for making specific inferences from text to other states or properties of its source' (Krippendorff 1969, p. 103). It is particularly useful for coping with large amounts of data and helps analysing it in a structured manner (Krippendorff 2004). According to Babbie, qualitative content analysis is 'essentially a coding operation' (2001, p. 309). Coding is 'the process of transforming raw data into a standardized form' (ibid.) making it possible to analyse a text in a systematic manner.

The transcripts of the interviews are analysed step-by-step following clearly defined procedures devising the material into content analytical units. Based on the research question the different elements of the text are categorised. A category is 'a group of words with similar meaning or connotations' (Weber 1990, p. 37). The categories are revised in the process and there may be several feedback loops in the process. Qualitative content analysis is led by the criteria of reliability and validity. The process of analysis should be inter-subjectively comprehensible so the results can be compared to other studies and to carry out checks of reliability (Mayring 2000). This can be ensured by describing the process of analysis in detail uncovering how the categories have been constructed and how inferences have been made. Authentic citations also help increasing the trustworthiness of the research (Elo and Kyngäs 2008).

There is no clearly defined way of doing qualitative content analysis as it is very case specific and depends very much on the type of investigation. However, there are two approaches in general that can be followed: First, an inductive approach may be chosen when the different categories cannot be specified prior to the analysis. Inductive content analysis is a reiterative process whereby the researcher identifies categories based on the text, groups and organises those categories, and finally analyses the text with a final list of categories. Second, a deductive approach is more suitable when a well-defined theory that can be operationalised in variables to be tested (Elo and Kyngäs 2008; Mayring 2000).

Drawbacks

Similar to other methods, there are limitations and drawbacks to qualitative content analysis. According to Mayring (2000), qualitative content analysis is less suitable in cases where the research question is highly open-ended, explorative, variable and where working with categories would be a restriction. In the case of this study, however, a theory-guided step-by-step approach is chosen making qualitative content analysis a suitable means of deriving results.

Qualitative content analysis has also been criticised for being susceptible to the effects of researcher biases (Kolbe and Burnett 1991). Reliability problems can occur due to the 'ambiguity of word meanings, category definitions, or other coding rules' (Weber 1990, p. 15). Because the analysing process requires a significant amount of interpretation by the researcher it is important to critically reflect the context in which the interviews were conducted. According to Dey (1993), when reading the data the questions one has to bear in mind are: Who is telling? Where is this happening? When did it happen? What is happening? Why? The reliability problem can be addressed by being explicit about the coding process and by developing a set of clear recording instructions (Stemler 2001).

Furthermore, there may be problems with the validity of the results of qualitative content analysis. When it comes to the reconstruction of historical processes a single person's claims cannot always be relied upon. Hence inferences made on the basis of interview data need to be validated by using multiple sources and by triangulation of methods (Erlandson 1993).

Approach of this study

This thesis followed the approach by Elo and Kyngäs (2008) who propose to use inductive coding when preliminary knowledge is limited or fragmented, which was the case in this research project. In a first stage of open coding the interview transcripts were coded freely without predefined categories. The software package NVivo was used for the coding process. In order to limit the number of categories, open coding was followed by grouping the categories identified depending on whether they were similar or dissimilar. Finally, in an abstraction process more general conceptual categories were developed which could then be used to refine the conceptual framework and evaluate the hypotheses.

3.6 Operationalisation

In order to operationalise the conceptual framework and its components, this thesis follows Peter Hall's advice on the use of systematic process analysis for the purpose of theory-oriented explanations. This approach 'attaches less value to securing precise parameter estimates for a few key variables seen as the 'ultimate causes' of the outcome and more value to identifying regularities in the causal chain through which the relevant outcome is generated' (Hall 2008, p. 3). Rather, the 'focus is on elucidating the *process* whereby the relevant variables have effects [my emphasis]' (ibid.).

Key processes and mechanisms of the conceptual framework developed in section 2 include pressures external to the subsystem, friction, accumulation of pressures, positive and negative policy feedback processes.

External pressures manifest themselves in the shape of information that is provided by the media, lobby groups (including NGOs), experts, and government agencies. For example, climate change research generates scientific reports. These reports are then analysed with regard to policy implications in structured (for example through the IPCC reporting procedures including summaries for policy makers) or unstructured ways (for example NGOs using new academic studies to make a case for stricter climate policy). Other pressures may be more immediate and can be experienced by the wider public directly. Rising energy prices, for instance, regularly lead to discussions about the appropriate policy response.

The conceptual framework assumes that external pressures accumulate due to the limited capability of the system to deal with these pressures. *Pressure accumulation* implies that over time the stress on the system continues (or even increases) because the measures taken to ease the pressure are not sufficient. For example, if energy prices continue to rise and government programmes on fuel poverty are unambitious fuel poverty is likely to remain at high levels or increase. This would not be the case if the policy system addressed the problem of rising energy prices and low incomes comprehensively. Furthermore, pressure accumulation is likely to be highlighted by the media, NGOs, and interest groups pointing out the inability of existing policies to deal with the problems created by external pressures. Finally, the accumulation of pressures may also show in falling behind on meeting policy objectives.

The concept of *friction* is based on two causal mechanisms: First, the limited cognitive ability of actors and institutions to process information and translate policy inputs in policy outputs. Second, the limited capability of institutions to deal with policy inputs due to institutional structures and legacies. While it is difficult to observe friction directly, there are indirect indicators. One can assume that the constrained administrative capability of institutions responsible for policy instrument implementation may be highlighted at some point by media, government, experts, interest groups, and scientists. In this case an investigation of the reasons for the constraints can unveil the causal mechanism such as rules not allowing the institution in question to act more swiftly or limited staff to deal with the issues. Also, friction is expected to result in certain issues being more prevalent whereas others are ignored.

The third mechanism of the conceptual framework is *policy feedback*. If *positive feedback* processes are at work, these can show in a number of ways. For example, if the policy instrument is supported by various actors it is likely that these actors point out the positive aspects of the existing policy instrument in order to maintain or expand the existing policy. The existence and expansion of interest groups that benefit from an existing policy instrument form another indicator for positive policy feedback. The same should be the case for the contraction of interest groups that do not benefit from the existing policy instrument. Increasing administrative capability is another type of positive policy feedback and may show up in increasing confidence with the operation of the existing policy instrument expressed in official documents or interviews. Also, if the existing policy instrument has positive fiscal effects highlighted by various actors it is likely that positive feedback mechanisms are at work. Finally, compatibility of the existing policy instrument with the prevailing ideational legacy generates positive feedback effects i.e. the higher the ideational fit, the more likely it is that the policy instrument will prevail. The ideational fit may show in government documents, interviews, parliamentary hearings etc. stating a preference for particular types of policy instruments (e.g. market based or command and control).

Following this logic, *negative feedback* comprises the respective opposite indicators: interest group opposition to an existing policy instrument, existence and expansion of interest groups that are disadvantaged by and contraction of interest groups that benefit from the existing policy instrument, diminishing confidence with operation of an existing policy instrument due to worsened administrative capabilities, negative fiscal effects of an existing policy instrument, ideational misfit.

Ultimately, this thesis aims to explain *policy change* focusing on policy instruments (see section 3.4.3). Thus any changes in the calibration of the policy instruments analysed indicate policy change. Changes may relate to the overall target of the policy instruments, the funding levels, technical specifications, eligibility criteria, and other aspects.

The following summary table presents indicators and sources of information for these processes and mechanisms.

Process / Mechanism	*Indicator*	*Sources of information*
Pressure external to subsystem	Issues raised by media, government, experts, interest groups, scientists	Government documents Parliamentary hearings Commissioned reports Media articles Secondary sources Statistics
Accumulation of pressures	Continued pressure indicated as above Inability of existing policy to deal with pressures highlighted by media, government, experts, interest groups, scientists Existing policy instrument falls behind its initial objectives	Interview transcripts Media articles Secondary sources Government documents Parliamentary hearings Commissioned reports Statistics
Friction	Constrained administrative capability of institutions responsible for policy instrument implementation highlighted by media, government, experts, interest groups, scientists Prevalence of other issues and ignorance of pressures	Interview transcripts Media articles Secondary sources
Positive policy feedback	Positive aspects of existing policy instrument highlighted by various actors Existence and expansion of interest groups that benefit from existing policy instrument Contraction of interest groups that do not benefit from existing policy instrument Increasing confidence with operation of existing policy instrument due to improved administrative capabilities Positive fiscal effects of existing policy instrument Existing policy instrument fits with prevailing ideational legacy	Interview transcripts Consultation responses Evaluations Statistics Secondary sources Government documents Parliamentary hearings
Negative policy feedback	Negative aspects of existing policy instrument highlighted by various actors Contraction of interest groups that benefit from existing policy instrument Existence and expansion of interest groups that are disadvantaged by existing policy instrument Diminishing confidence with operation of existing policy instrument due to worsened administrative capabilities Negative fiscal effects of existing policy instrument Existing policy instrument does not fit with prevailing ideational legacy	Interview transcripts Consultation responses Secondary sources Government documents Parliamentary hearings Statistics

Process / Mechanism	*Indicator*	*Sources of information*
Policy change	Changes in the setting of the policy instrument including overall targets, funding levels, technical specifications, sub-targets, eligibility criteria etc.	Government documents

Conclusions

In light of the breadth of potential methodological approaches in political science, this chapter presented and justified the methods and the research design employed. At a more general level, the chapter positioned the research project in ontological and epistemological terms determined by the theories used and the conceptual framework developed in chapter 2. With regard to ontology, this thesis attributes particular explanatory power to institutions, actors, time and the sequence of events. Epistemologically, the thesis is firmly rooted within the critical realist perspective acknowledging the limitations of theories and methods to capture reality sufficiently. Following the ontological and epistemological positioning, the chapter continued with the introduction and justification of the case study method discussing its potential as well as its limitations. It argued for a particular (qualitative) case study method, namely systematic process analysis developed by Peter Hall, because it is particularly suitable for unveiling causal mechanisms. After elaborating on systematic process analysis, the chapter provided the rationale for the case selection including the countries chosen, the time frame, and the unit of analysis. In a research methods section the chapter critically discussed the validity of qualitative methods in general and introduced the methods used in this thesis including document analysis, semi-structured interviews, and qualitative content analysis. Finally, the chapter concluded by operationalising the conceptual framework identifying indicators and potential sources of information. In the next chapter, the methodology discussed will be applied to the first case study, the Supplier Obligation in the UK.

4 Case I: Supplier Obligation in the UK

Of course, one should bring order into history […]. Every science is, among other things, a method of ordering, simplifying, making the indigestible digestible for the mind. […] To study history means recognising and accepting chaos, and nevertheless retaining faith in order and meaning.

Hermann Hesse (1972)

'[M]aking the indigestible digestible for the mind', as Hermann Hesse put it, is the task of this chapter. Of course, describing and analysing the 16 years of history of the Supplier Obligation (SO) within one chapter cannot do justice to all its aspects. Hesse's quote suggests that ordering comes at the cost of simplifying. Fully aware of this, I focus on key issues and changes rather than aiming to provide an analysis covering every detail. While much of the following is based on my interpretation of the course of events, I draw on 14 interviews with experts who observed the SO's history either as analysts or as practitioners. In addition, I look at previous academic work. Hence, my analysis is heavily indebted to other people's interpretations.

The chapter consists of two distinct parts, one is descriptive and the other analytical. Before an in-depth analysis of policy change and the SO is carried out, background information on the SO and the main changes is provided in a descriptive section.

4.1 Background and main changes of the Supplier Obligation

This part of the thesis looks in detail at the past development of the principal policy instrument in Great Britain in the area of home energy efficiency, the Supplier Obligation (SO). First, the basic architecture of the SO is introduced. Second, the main changes that happened since its inception in 1994 are laid out. This section is then followed by a detailed analysis of the drivers and patterns of change from 1994-2010.

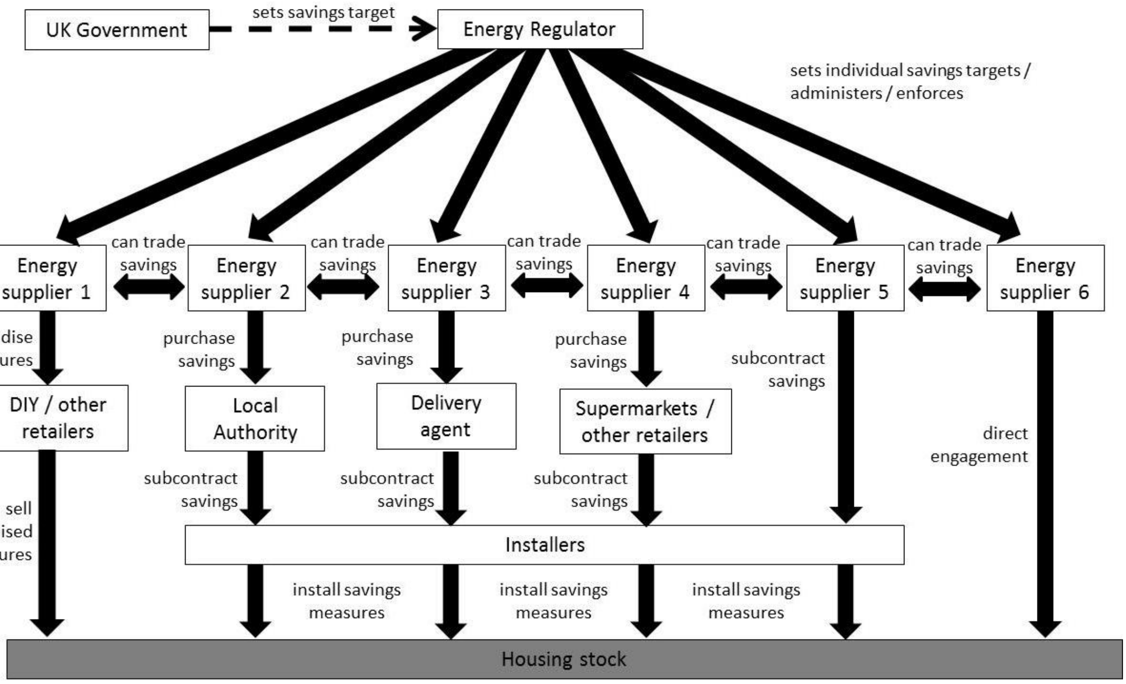
4.1.1 Basic architecture of the SO

In 1994, the government introduced an obligation on electricity suppliers to deliver a certain amount of energy savings at the customer end. Although the initial obligations were set at a low level and covered only electricity suppliers, the instrument became one of the key features of UK energy efficiency policy eventually covering all suppliers with more than 250,000 gas and/ or electricity customers in Great Britain. Northern Ireland is not covered by the SO.

The basic concept of the SO is that Government imposes a savings target on energy companies that has to be achieved at the customer end. This target may relate to all energy consumption or carbon emissions. Businesses and industrial end-users are not covered by the scheme; they are targeted by other policy instruments such as the Climate Change Levy and Climate Change Agreements, as well as the recently introduced Carbon Reduction Commitment. The target is set by the Department of Energy and Climate Change (DECC) for a defined period of time using a bottom-up approach assuming an illustrative mix of various energy saving measures that is likely to be used in order to deliver the obligation. Note that it is established in comparison to a baseline and does not require a reduction of final all energy use. Rather, it is defined in terms of lifetime savings achieved by the measures likely to be promoted by the energy suppliers. The energy regulator, the Office of Gas and Electricity Markets (OFGEM), is responsible for administering the SO and enforcing it. OFGEM defines individual savings targets for each energy supplier and checks whether the obligated companies achieve them. There are various routes the energy suppliers use (Figure 3): First, the energy suppliers contract installers of energy saving measures (for example cavity wall insulation) that carry out the work in homes according to a defined standard and with a certain benchmark for energy and/or carbon savings. Second, they may subsidise energy efficient products (for example insulation material) sold via ‘do it yourself’ (DIY) and other retailers. Third, energy suppliers deliver their obligation through work with managing agents, Local Authorities, supermarkets and other retailers, which in turn subcontract installers and manage the delivery process. Finally, energy companies may choose to work with the home occupants directly. In the past, energy companies have for example promoted the use of compact fluorescent lamps (CFLs) via mass mail-outs of free light bulbs, although this is now prohibited. More recently, some energy companies, such as British Gas, set up their own insulation business and deliver most of their obligation themselves. In theory, the energy suppliers can trade their obligations amongst themselves. In practice, this has not happened on a large scale. Suppliers can combine the various delivery routes and may choose to focus their efforts on one particular route or spread their activities.

The SO is based on self-reporting and a certain degree of trust: While OFGEM review the figures provided by the energy suppliers, they do not check measure by measure given the administrative burden this would involve. In theory, energy suppliers could inflate their figures, but the potential fine for doing this and for not achieving the target is significant: up to 10% of global turnover of the obligated companies in case they miss their target.

Figure 3: Mechanism of the Supplier Obligation in Great Britain



Source: Rosenow (2012)

While there was a succession of different SO schemes, the basic logic remained the same. The first SO scheme was called Energy Efficiency Standards of Performance (EESoP) and ran from 1994 to 1998. Its successors, EESoP 2 and EESoP 3, ran from 1998 to 2000 and 2000 to 2002, respectively. In 2002 the scheme's name was changed to Energy Efficiency Commitment (EEC). EEC 1 was in place from 2002 to 2005 and EEC 2 from 2005 to 2008. EEC was eventually renamed in 2008 to the Carbon Emissions Reduction Target (CERT) that operated from 2008 to 2012.

4.1.2 Main changes of SO from 1994 to 2010

As already indicated, the SO is characterised by a history of quite significant policy change. This section only describes those changes without analysing the political dynamics behind them – a detailed investigation of the policy processes behind the modifications that occurred follows in a later section.

The most important changes are to the elements listed in the following table:

Table 3: Main elements of policy change in case of the SO

Main elements of policy change
target size and changing target metric
costs of the SO
coverage
share and definition of the Priority Group
trading and carry-over
administering and target setting body
qualifying measures
monitoring and verification

Those changes will be explained in detail below.

Table 4 summarises how the scheme changed since its inception in 1994:

Table 4: History of the SO in Great Britain

Name of scheme	EESoP 1	EESoP 2	EESoP 3	EEC 1	EEC 2	CERT
Inception year	1994	1998	2000	2002	2005	2008
Period*	1994-1998	1998-2000	2000-2002	2002-2005	2005-2008	2008-2012
Target	6.1 TWh (lifetime)	2.7 TWh (lifetime)	4.9 TWh Electricity & 6.1 TWh Gas (lifetime)	62 TWh (lifetime)	130 TWh (lifetime)	293 million t CO2 (lifetime) = 494 TWh (lifetime)
Implicit annual target	1.5 TWh (lifetime)	1.4 TWh (lifetime)	5.5 TWh (lifetime)	21 TWh (lifetime)	43 TWh (lifetime)	~104 TWh (lifetime)
Target group	Public Electricity Suppliers (PESs)	Public Electricity Suppliers (PESs)	all licensed gas and electricity suppliers with at least 50,000 domestic customers	all suppliers with over 15,000 gas and/or electricity domestic customers	all suppliers with over 50,000 gas and/or electricity domestic customers	all suppliers with over 250,000 gas and/or electricity domestic customers
Coverage	Domestic and small business electricity customers	Domestic and small business electricity customers	Domestic and small business electricity and gas customers	Domestic electricity and gas customers	Domestic electricity and gas customers	Domestic electricity and gas customers
Cost of the programme	£101.7 million	£48.1 million	£110 million (indicative)	£500 million (indicative)	£1,2 billion (indicative)	£5.6 billion (indicative)
Annual expenditure	£25 million	£24 million	£55 million	£167 million	£400 million	£1,158 million
Expenditure allowance	£1 per franchise customer per year allowed through the supply price control	£1 per franchise customer per year allowed through the supply price restraint	£1.20 per customer per fuel per annum, indicative in target setting model	£3.60 per customer per fuel per annum, indicative in target setting model	£9 per customer per fuel per annum, indicative in target setting model	£51 per customer per annum, indicative in target setting model
Allowance for R&D and energy monitoring	3%	0.42%	0.5% for monitoring and 0.25% for R&D	not applicable	not applicable	not applicable
Percent of savings in priority group	30% (expected, not compulsory)	65% of expenditure (expected, not compulsory)	67% of expenditure (expected, not compolsary)	50%	50%	40% 15% in Super Priority Group
Carry over	none	none	none	10%	unlimited	unlimited
Trading	none	none	none	yes	yes	yes
Mix of measures	requirement to use variety of measures	requirement to use variety of measures	requirement to use variety of measures	not precribed	not precribed	minimum levels for some measures (68% from insulation)
Administering body	OFFER	OFFER	OFGEM	OFGEM	OFGEM	OFGEM
Target setting body	OFFER	OFFER	OFGEM	DEFRA	DEFRA	DEFRA and then DECC (since October 2008)

* period of schemes from 01 April in start year to 31 March in end year; different for CERT where period from 01 April in start year to 31 December in end year

Source: based on DECC (2010b, 2010c); DEFRA (2008); OFFER (1994, 1998a); OFGEM (2005, 2008c, 2009a, 2009c); OFGEM and Energy Saving Trust (2003)

In order to better understand the detailed changes that occurred, the different aspects of the SO that changed over time are presented below.

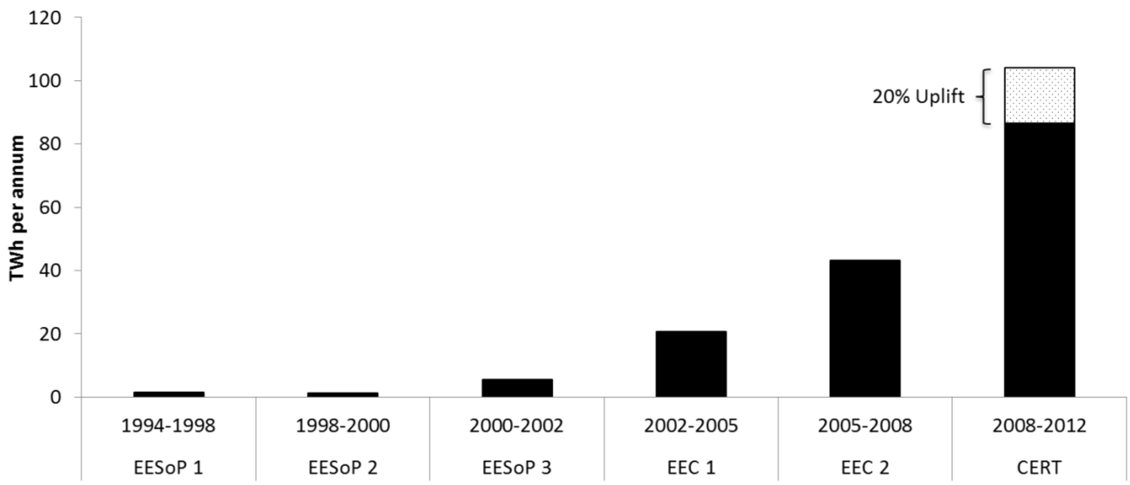
Target size

The target size of the SO increased significantly since 1994; the scale of change is really quite remarkable. It should be noted, however, that there are some caveats to comparing the different targets because of the different target metrics used.

The total energy saving target of the SO in 1994-1998 and 2008-2012 cannot be directly compared because the EESoP 1-3 target was defined in terms of money to be spent whereas EEC 1-2 defined the target in terms of TWh to be saved and CERT set the target in Mt CO_2. However, for the EESoP 1-3, the regulator published figures for the implicit energy savings target, i.e. the expected savings generated by the expenditure. This can be compared to the EEC 1-2 targets. According to OFGEM (2008d), the CERT target is equivalent to doubling the target under EEC 2, which was 130 TWh. Taking into account the 20% uplift in September 2008 and the extension of the scheme to December 2012, the total (implicit) energy savings target of CERT is almost 500 TWh. Given that the implicit EESoP 1 target was 6.1 TWh this means that the SO target increased eightyfold from 1994-1998 to 2008-2012.

However, these figures are not directly comparable either because the length of the different schemes differs. Therefore, an average *annual* energy savings target is calculated that allows direct comparison of the schemes (Figure 4).

Figure 4: Annual energy savings target of SO in TWh



Source: based on DEFRA (2008); OFFER (1998a); OFGEM (2005, 2008c, 2009a, 2009c); OFGEM and Energy Saving Trust (2003)

According to this calculation, the implicit annual energy savings targets increased almost seventyfold from 1994-1998 to 2008-2012. However, for a number of reasons the targets are not directly comparable. First, the initial target was set for electricity only and later targets covered both gas and electricity customers. Second, after EESoP 3 the target metric changed (see below) to fuel-weighted savings according to the carbon content. Third, the schemes used different discount rates, which makes direct comparison difficult. While it would be possible in theory to convert the targets to a more meaningful unit, it would not change the overall picture significantly. The key point to be made is the overall magnitude and pace of change rather than the precise target variation over time. Given the substantial readjustment that would be required and the limited additional benefit of such a process, no such conversion is undertaken as part of this thesis.

Target metric

As already indicated, the target metric changed several times:

- EESoP 1-3: EESoP 1-3 set the target in terms of money to be spent per customer. Under EESoP 1 and 2, the target only related to electricity. EESoP 3 set a target for both electricity and gas separately.
- EEC 1-2: The EEC 1 and 2 targets were set in terms of fuel-standardised energy savings, allowing suppliers to achieve savings in homes heated by gas, electricity, coal, oil or LPG. Energy savings were carbon weighted and discounted in line with the HM Treasury Green Book (guidelines for carrying out cost-benefit analysis), although the rate changed over time.
- CERT: CERT then changed the target from energy savings to carbon emissions and abolished the discounting procedure (OFGEM 2009a).

The reasons for changing target metrics are manifold and will be explored in more detail below.

Cost of programme

As a result of increasing targets, the cost of the programme to energy suppliers increased from just £101.7m in EESoP 1 (£25 million per year) to £5.5b in CERT (£1.2 billion per year). While EESoP 1 and 2 obliged energy suppliers to spend a certain amount of money, later versions of the SO only provided indicative figures that were nonbinding.

In competitive markets suppliers in theory pass on the costs of the SO to their customers. No real data is available to check whether this is actually the case (this is confidential information not shared by energy suppliers) but it can be assumed that suppliers treat the SO as any other cost imposed on their business, which will be reflected to some extent in the energy bills.

Whereas the costs of the SO were subject to supply price control (and the 1998 supply price restraint) in earlier versions of the SO (EESoP 1 and 2) prescribing how much money energy suppliers had to invest, expenditure in later versions did not fall under such tight control and only indicative figures were provided by the responsible government department. The average bill increased by only £1 per household per year during the early EESoP schemes, but by more than £50 per household per year under CERT, meaning a fiftyfold increase over 10 years.

However, it is difficult to estimate the exact increase in energy bills given that the above figures are based on modelling exercises and that suppliers do not provide such kind of information in a competitive market. Therefore, the reported figures on expenditure by the energy suppliers have to be taken with a pinch of salt because since EESoP 3 they represent the assumed expenditure. Research suggests that the actual expenditure levels for EEC 1 were 20% lower (Lees 2006) and for EEC 2 were 23% lower than the figures assumed by DEFRA (Lees 2008). However, even taking this into account the increase of expenditure is remarkable and the impact on energy bills not insignificant.

Target group

The definition of companies falling under the obligation changed over time. At the inception of the scheme, Public Electricity Suppliers (PESs) were the organisations covered under the SO. PESs were the 14 companies created when the electricity market in the United Kingdom was privatised in 1990. The individual targets for each PES were set in relation to its number of customers. In 2000, as part of further restructuring of the market under the Utilities Act 2000, the PESs were required to have separate licenses for their supply business and distribution networks, which were renamed distribution network operators (DNOs).

EESoP 2 also covered PESs and targets were set using a similar methodology to EESoP 1. However, greater regard was given to regional variations such as cost of supply (OFGEM and Energy Saving Trust 2003). While EESoP 1-2 only covered electricity suppliers, EESoP 3 put an obligation on all licensed electricity and gas suppliers with at least 50,000 domestic customers. As well as the 14 ex-PESs, four other suppliers were given targets. EEC 1 set the limit at 15,000 domestic customers and twelve suppliers were covered. OFGEM set progressively higher targets for suppliers with larger consumer numbers to take into account any economies of scale that they were expected to achieve. Since EEC 2, the threshold was raised again to 50,000 domestic customers. Due to consolidation in the energy market, only eight suppliers were covered by the scheme. The trend of consolidation continued and CERT covers just six suppliers with more than 250,000 customers.

Coverage

The coverage of customers changed as well. At first, energy savings had to be achieved at both domestic and small business customers (EESoP 1-3). EESoP 1 covered domestic and non-domestic customers with a maximum energy demand of 0.1 MW (OFFER 1994). EESoP 2 had a reduced scope covering only households and non-domestic customers with annual demand under 12,000 kWh (OFFER 1998a). EESoP 3 focused on domestic customers, but allowed energy suppliers to raise funds by energy charges to small business customers. Therefore, suppliers were permitted to provide some energy efficiency assistance through their projects but not to design projects specifically for small businesses (OFGEM 2000a). After EESoP 3 suppliers could only count savings in the domestic sector.

In the beginning, energy efficiency measures were restricted to suppliers' own customers, but eventually suppliers were able to target any household in Great Britain (since EESoP 3).

Share of Priority Group

CERT requires suppliers to achieve 40% of all savings in the so-called Priority Group (PG), a group covering customers believed to be vulnerable and disadvantaged. This requirement has not always been in place and earlier schemes did not set firm PG sub-targets. EESoP 1 did not set a specific target for disadvantaged customers or those that were in the PG of later schemes. OFFER argued that 'it would not be helpful to set specific quotas for savings to be achieved from projects covering [low income] customers' (OFFER 1994, p. 7). However, when the Standards were set in 1994, OFFER expected that 30% of the savings would be achieved in properties of low-income customers. For EESoP 2, 65% of the total expenditure was expected to benefit low-income households (OFFER 1998a). OFFER once again argued that it would not be appropriate to set a target for low income households and that 'each PES should take into account the needs of different customer groups' (OFFER 1998b, p. 10). For EESoP 3 OFGEM expected that about two thirds of all projects would benefit low-income households, but did not set an obligatory target either (OFGEM 2000a).

EEC 1 was the first scheme that put in place an obligatory target for the PG: 50% of all savings had to be achieved within the PG (OFGEM 2001). The target did not change in EEC 2 (OFGEM 2004a), but under CERT the target was reduced to 40% (OFGEM 2009c).

CERT also introduced a PG flexibility option allowing suppliers to reduce their PG target from 40% to 35% if they spent equivalent funds on certain measures that would benefit a sub-group of the PG. The measures eligible were ground source heat pumps in respect of a property that does not have a mains gas supply and solid wall insulation that lowers the U-value of the walls to 0.5W/m^{2}K or less. Suppliers received an uplift of carbon savings if they invested in those measures. The sub-group was defined as receiving benefits with income below a threshold (£16,040 in 2009) (OFGEM 2009a).

Building on the flexibility mechanism, the CERT extension in June 2010 introduced an additional Super PG (SPG). Suppliers were required to meet 15% of their total target within an on-going 40% PG target in a subset of low income households that were considered to be at high risk of fuel poverty (DECC 2010b).

Definition of PG

As outlined above, it was not before EEC 1 that a firm PG target was introduced. However, EESoP 1 called on suppliers to take into account 'in particular the interests of those consumers who are elderly or disabled, who are in rural areas or who may have difficulty in meeting their obligation to pay for electricity' (OFFER 1994, p. 20). The same definition of low income customers was used in EESoP 2 and 3 (OFFER 1998a; OFGEM 2000a). This definition of the group of disadvantaged customers is rooted in the 1986 Gas Act and 1989 Electricity Act, which put a duty on the respective Director General of the regulator to take into account the interests of those particular groups of customers.

An obligatory target for disadvantaged households was first introduced with EEC 1. The PG under EEC 1 were defined as recipients of one of the following benefits: council tax benefit; housing benefit; income support; an income-based jobseeker's allowance; an attendance allowance; a disability living allowance; working families tax credit or disabled persons tax credit; a war disablement pension which includes a mobility supplement or a constant attendance allowance; and a disablement pension which includes a constant attendance allowance (OFGEM 2001).

EEC 2 followed the PG definition of EEC 1, but excluded people on disabled persons tax credit and included people claiming child or working tax credits with income less than £14,600 and people receiving state pension credits (OFGEM 2004a).

CERT's PG definition was based on EEC 2 with slightly higher income limits for people on child and working tax credits of £15,592. One important change was, however, the inclusion of all people over 70 years old (OFGEM 2009a). As a result, PG activity in the first year of CERT was focussed on the over 70s and not necessarily on those on low incomes (OFGEM 2009c).

As already mentioned, the extension of CERT in 2010 also introduced a SPG target of 15%. The SPG focused on recipients of the following benefits:

- Pension Credit;
- Child Tax Credit under £16,190 income threshold; and
- Income-based Job Seeker's Allowance, Income-related Employment and Support Allowance or Income support and one of the following:
    - pensioner premium
    - disability or severe disability premium
    - award of child tax credit that also includes an element for a disabled, or severely disabled, child or young person
    - child under the age of five

The new SPG also replaced the previous sub-group definition of the PG flexibility mechanism.

Trading

Trading of energy saving obligations was first allowed in EEC 1. Suppliers were permitted to buy certificates from or sell those to other suppliers. Under EEC 1, only two suppliers were involved in trading obligations. Dee Valley traded its entire target with EDF Energy (OFGEM 2005). During EEC 2, trading activity increased slightly, but remained at a low level compared to the total share of the target. npower purchased PG savings from another supplier, this contributed to nearly 2% of npower's target. Opus Energy traded its entire target with Telecom Plus in order to comply with the obligation and Powergen met 1% of its target by trading savings with another supplier (OFGEM 2008c). During CERT, British Gas, SSE, ScottishPower and EDF traded a small share of their achieved carbon savings with other suppliers. However, even though higher than during previous schemes, the total share of traded carbon savings remained well below 5% (OFGEM 2012a).

Carry-over

Since EESoP 3 came into effect, suppliers were allowed to carry over energy savings from one period of the SO to another; for example when suppliers had overachieved their targets during EESoP 3, they could carry those savings over to EEC 1. In the beginning this was limited to just 10% of the total target, but the cap was lifted with the inception of EEC 1. About 3 TWh savings, equivalent to 5% of the EEC 1 target, were achieved by taking forward savings from EESoP 3 (OFGEM 2005).

Six suppliers chose to carry over their excess measures from EEC 1 into EEC 2, equating to roughly 25% of the EEC 2 target (OFGEM 2005). Therefore, energy suppliers were ahead of the EEC 2 targets in 2005. Although the scheme had just started, EDF Energy had already achieved more than half of its obligation for the next three years (ENDS 2005). In

August 2006, suppliers had already met about 60% of the obligation, just over a year after the start of EEC 2 (ENDS 2006d; OFGEM 2006).

Suppliers carried over excess savings from EEC 2 into CERT, which contributed to about 25% of the initial CERT target (OFGEM 2008c). Due to the CERT uplift in 2008 and the extension until December 2012, the share of carry-over savings was just about 13%.

To sum it up, in the beginning of the SO (EESoP 1-2) suppliers were not allowed to carry over savings from one scheme to another. However, from EESoP 3 onwards this option was implemented and suppliers made use of this possibility.

Administering and target setting body

As part of the energy market liberalisation, the Gas Act 1986 and the Electricity Act 1989 gave powers to the Secretary of State to set up independent regulators OFGAS and OFFER. OFFER set the energy saving targets and administered EESoP 1 and 2. OFGAS agreed to extend EESoP to gas suppliers in 1999 but never administered EESoP 3 because it was merged with OFFER resulting in the creation of OFGEM in 1999 (Bower 2003). OFGEM subsequently set energy saving targets and administered EESoP 3.

A remarkable change to the distribution of responsibilities happened in 2000 when the Utilities Act made provisions for energy saving targets to be set by DEFRA (following its creation in 2008, DECC has been responsible for the target setting). The first target under the new regime was set for EEC 1 in the Electricity and Gas (Energy Efficiency Obligations) Order 2001. The Order also obliged OFGEM to administer EEC 1, which included setting individual targets for suppliers, ensuring compliance, and reporting to the Secretary of State. This structure was maintained for subsequent schemes.

Throughout the different EESoP schemes, EST advised the regulator on how the standards should be set and on what scale (OFGEM and Energy Saving Trust 2003). EST continued to give advice to DEFRA and subsequently DECC on the SO. EST also ran some of the energy savings projects in the early days of the SO on behalf of the energy suppliers.

Qualifying measures

Energy suppliers were always allowed to determine themselves the mix of measures used to achieve their targets. There were, however, certain restrictions they had to follow. Under EESoP 1-3 energy suppliers had to get approval from EST for the proposed mix of measures and the regulator formally approved the proposed measures given EST's consent. Suppliers needed to demonstrate that they used a variety of measures in order to achieve their saving obligations (OFFER 1994, 1998a; OFGEM 2000a).

After the restructuring of responsibilities, OFGEM was in charge of assessing the measures that qualified for EEC 1 and its successors. OFGEM published lists of measures that were deemed as qualifying actions (e.g. OFGEM 2002), but suppliers also had the opportunity under EEC 1 to use new innovative measures not covered by the list. In order to get approval from OFGEM for such measures, suppliers needed to provide independent verification from a body accepted by OFGEM as being qualified to assess the savings (OFGEM 2002).

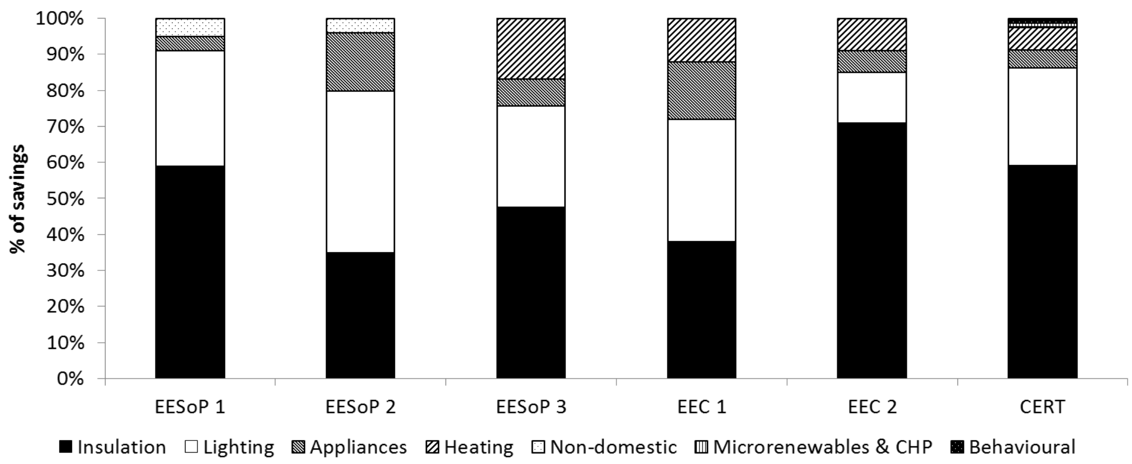
EEC 1 introduced some restrictions concerning compact fluorescent lamps (CFLs) and suppliers were only allowed to mail out four CFLs when provided for free or six when customers contributed to the costs (OFGEM 2001). EEC 2 introduced further restrictions and requirements regarding CFLs such as checking customer records to avoid multiple CFL deliveries and to maximise the energy savings (OFGEM 2004a). Similar restrictions were part of CERT, but CFLs were eventually banned from the scheme starting in January

2010 only permitting CFLs provided via retail (OFGEM 2009c). With the extension of CERT in June 2010, Government announced a total ban on CFLs under CERT (DECC 2010c). The main reason for this move was that incandescent bulbs are phased out under EU legislation, more than 300 million CFLs had been distributed through the SO since 2002, and CFLs could not be seen as additional measures any longer (DECC 2010b).

As part of the CERT extension and for the first time since the inception of the SO, the Government decided to set a minimum share for a particular type of measure. Suppliers were required to achieve 68% of the CERT target by investing in insulation measures. However, the minimum requirement only applied to the extension period and the associated uplift of the total target was not applied retrospectively (DECC 2010b).

The mix of measures used by energy suppliers in order to achieve the required energy savings changed over time (Figure 5). Insulation and lighting dominated the mix with an increasing share of insulation since the inception of EESoP 2; lighting measures declined. Earlier schemes (EESoP 1 and 2) had a 5% proportion of savings achieved in small businesses, later schemes concentrated on domestic customers only. Because of the inclusion of gas in EESoP 3, gas heating measures started to be part of the mix as well. From EEC 1 onwards, suppliers were allowed to promote measures leading to savings of any fuel used by households, not just electricity and gas. Note that not all measures approved under the SO were energy efficiency measures. Energy suppliers used combined heat and power energy generation (CHP) since the inception of the SO in 1994, although the share remained very low. Later versions of the SO also saw some activity of micro-renewables such as solar thermal, but so far this was, and still is, at a very low level (mainly a result of higher costs). Also, both ground and air source heat pumps were used as part of the heating measures, but only contributed a small proportion to the total savings achieved.

Figure 5: Mix of measures in different SO schemes



Source: based on OFGEM (2005, 2008c, 2010a); OFGEM and Energy Saving Trust (2003)

EEC 2 provided an incentive for energy suppliers to use innovative measures by increasing the accounted energy savings of certain measures by 50%. The share of the innovation measures of the total target was capped at 10%. All but one supplier used the incentive and installed innovation measures such as solar thermal, CHP, ground and air source heat pumps, highly energy efficient appliances, and window glazing (OFGEM 2008c).

CERT also contained provisions for innovative action and allowed up to 6% of a supplier's obligation to be met through them (8% where at least 2% was achieved by microgeneration). The CERT amendments announced in September 2008 included an increase of the cap to 10% (12% if 2% is met by microgeneration). In addition to the measures which already fell under the EEC 2 specification of innovative action and which CERT called 'market transformation measures', CERT allowed suppliers to try certain measures classified as 'demonstration actions' (OFGEM 2009b). The 20% uplift of CERT in 2008 also introduced the option to use behavioural measures such as real time displays

(RTDs) and home energy advice packages (HEAs) (OFGEM 2009a). However, behavioural measures are currently capped at 2% of a supplier's target (OFGEM 2011a).

In summary, the main policy change that took place was the introduction of firm sub-targets for insulation measures, the ban on CFLs, and the broadening of the eligible measures. The majority of savings was related to insulation and lighting measures with an increasing share of insulation measures over time. Other technologies included energy efficiency appliances and heating systems, but their share declined over time. Only a fraction of savings was achieved by promoting microgeneration/ CHP and behavioural measures.

Monitoring and verification

Because the SO always focused on small energy users, first households and small businesses and then just households, the approach taken to verify the savings was based on deemed savings rather than measured savings. The values for those deemed savings were generated by using models such as the BRE Domestic Energy Model (BREDEM). Measures for which reliable engineering estimates of energy savings exist were given a specific energy savings score (later carbon emissions savings) minus a reduction factor which addressed rebound effects, free rider effects, and technical shortcomings of the measures (for a detailed analysis of how this is done see chapter 6). However, suppliers were required from the inception of the SO to undertake limited monitoring of the measures installed in order to check that the energy savings assumed were in line with the actual savings achieved. Particularly for more innovative and unproven measures this had been the case.

During EESoP 1 to EESoP 3 5% of all insulation and heating measures had to be monitored for quality and customer satisfaction by energy suppliers and an allowance was made for a proportion of suppliers' expenditures to be allocated to fund monitoring projects.

Similar requirements were in place for EEC 1. Suppliers had to monitor the quality of installation of insulation or heating measures to a minimum of 5% of all measures; this did not include monitoring all energy use. For DIY and innovative schemes, quality monitoring requirements were determined by OFGEM on a scheme by scheme basis (OFGEM 2001). Customer satisfaction needed to be monitored for all measures involving CFLs but no specific procedures were prescribed. Suppliers were required to monitor 5% of all DIY loft insulation measures with regard to customer satisfaction. For innovative measures or other DIY schemes an appropriate monitoring methodology needed to be agreed with OFGEM (OFGEM 2001).

Monitoring requirements became more complex with EEC 2 because of an increasing number of eligible measures. Suppliers had to monitor the quality of 5% and customer satisfaction of 1% of all professionally installed insulation measures as well as draught proofing if combined with other insulation measures. The same requirements applied to boilers, ground source heat pumps, solar water heating and fuel switching. A statistically significant sample of DIY loft insulation and radiator panels had to be monitored and at least 1% of all schemes had to be checked for consumer utilisation (i.e. how many actually installed the insulation after purchase). Households that received CFLs free of charge were monitored regarding consumer utilisation and energy suppliers had various options to choose from to determine the sample size. Monitoring requirements of brown goods such as set top boxes were decided on a case-by-case basis. CHP installations were monitored by the provision of CHP Quality Assurance (CHPQA) certificates (OFGEM 2004a).

CERT requirements for monitoring were built on EEC 2 and looked quite similar. Changes include a cap at 1,000 customers on the requirement to monitor consumer utilisation for CFLs. No technical monitoring was required for microgeneration measures that were installed under the Microgeneration Certification Scheme. The CERT 20%-uplift introduced real time displays (RTDs) and home energy advice packages (HEAs) as additional measures qualifying for the scheme and required utilisation and evaluation monitoring of 5% - or a statistically significant sample, whichever was smaller. Evaluation monitoring was supposed to assess the effectiveness of the new measures (OFGEM 2009a).

4.2 Analysis of policy drivers

While the previous part was purely descriptive, the following delves deeper into the role of the mechanisms that caused the changes described above. One interviewee stressed how remarkably the SO changed over the years:

> *'I don't think anyone thought in 1993 'let's make the electricity suppliers spend a couple of million on energy saving projects'. I bet no one thought looking into the future when you had £1.2 billion obligation on the energy suppliers. You start with that little acorn and then it just snowballs and snowballs to where we've got to just following that route.' (Interview UK12)*

What this section does is to find answers to the question why the SO 'snowballed and snowballed'. While one could attempt to reconstruct the development of the SO chronologically, an approach that clusters different episodes according to themes seems more promising as a first step toward uncovering the causal mechanisms of change.

The following drivers of change have been identified:

Table 5: Main policy drivers of the SO

Main drivers of policy change
market liberalisation
change of key personnel
transfer of target setting powers
rising energy prices
climate change policy
fuel poverty policy
growing energy efficiency industry with increasing lobbying capability
perceived success of policy instrument

These mechanisms are not distinct but interrelated – for example the transfer of target-setting powers from the regulator to the Secretary of State is directly related to the debates that caused a change in personnel at OFGAS. Also, rising energy prices are a direct driver of fuel poverty. However, for the purpose of this analysis separate treatment of these mechanisms is more feasible and manageable due to the amount of information that is processed. Note also that some of the drivers are more institutional (such as the transfer of target setting powers) whereas others are more topical (such as climate change policy). However, no clear distinction between the two categories can be made because all drivers involve both topical as well as institutional aspects.

4.2.1 Market liberalisation

New energy paradigm

The beginnings of the SO can be found in the late 1980s and early 1990s. In the early 1980s, the new 'neoliberal energy paradigm' (Fudge et al. 2011) or the 'new utility regulatory regime' (Helm 2002) began to take shape and the newly elected Conservative government saw its task 'to set a framework which will ensure that the market operates in the energy sector with a minimum of distortion and energy is produced and consumed efficiently' (Lawson 1982). So energy efficiency was very much a means to achieve economic efficiency and maximise economic productivity of the economy at the time (Interview UK1, UK2, UK3, UK10, UK13) and it was not debated in the context of reducing carbon emissions as it is today (Interview UK13). The arrival of the new conservative government was followed by initiatives to liberalise the markets for energy and open them up for competition, as this was seen as the most suitable way of achieving efficient supply and consumption of energy (Helm 2003). In 1986, British Gas was privatised in the Gas Act 1986, followed by electricity in the Electricity Act 1989.

As a result of the energy market liberalisation in the 1980s two independent regulators were created: the Office of Electricity Regulation (OFFER) and the Office of Gas Supply (OFGAS). Their primary duty was to develop competitive markets and regulate prices in those areas where competition was not feasible (e.g. natural monopolies) (Owen 2006). However, the 1986 Gas Act also put a 'duty to *promote the efficient use of gas*' [my emphasis] on OFGAS (HM Government 1986). The 1989 Electricity Act made provisions for OFFER to 'determine … standards of performance in connection with the *promotion of the efficient use of electricity* by consumers as … ought to be achieved by … suppliers' [my emphasis] (HM Government 1989). Whereas OFFER already had powers to set standards of performance as laid out in the 1989 Electricity Act, the gas regulator was eventually given powers to complement this duty by enabling standards of performance to be set in the Competition and Service (Utilities) Act 1992.

Hence, the promotion of energy efficiency was enshrined in the primary legislation and regulators had the task to ensure energy was supplied and consumed efficiently. There was the assumption that once energy markets were fully liberalised energy efficiency services would just be offered by the energy companies as part of their portfolio to compete against each other. However, until full competition was actually reached some sort of intervention by the regulator to encourage greater efficiency on the demand side was deemed acceptable. Therefore, a lot of the discussions at the time were framed in a language of competition and economic efficiency:

> *You had to make a market regulation economic argument to the initial regulators. [...] It was very much 'we must get the market as efficient as possible'. So this was an argument that was constructed that this was a substitute for very effective competition for the delivery of energy efficiency services* (Interview UK1).

Energy prices were regulated by using the RPI-X formula, which allowed companies to increase their prices each year by an amount equal to the retail price index rate of inflation (RPI) minus an efficiency percentage (X). Gas or electricity purchase costs could be passed through 100% to customers. However, this was not the case for energy efficiency measures (Owen 2006) and energy suppliers had to bear the cost without being able to recoup the investment. Hence, some argued, here in the case of gas, that the RPI-X formula was 'an active disincentive operating on British Gas to undertake gas conservation and efficiency investments which could provide the least-cost gas services to consumers' (Brown 1990, p. 33).

There was, however, also the issue of limited public funding.

Public expenditure

In addition to the above, it was recognised that energy efficiency programmes would be difficult to fund with public expenditure (Owen 1997) and the SO provided a mechanism that generated funding through a premium on the energy bill (Interview UK1, UK2, UK3, UK4, UK7, UK8, UK10, UK11, UK14).

One interviewee argued that at the time ‘it was very clear sort of tactics by the environmental movement in general to think about ways outside of public expenditure’ (Interview UK1). For those involved in developing ideas for new energy efficiency policies ‘it was convenient in the sense of avoiding the constraints of public expenditure’ (Interview UK10) and a ‘covert way of making the market invest in public goods’ (Interview UK3) without consumers noticing who eventually pay for the policy (Interview UK14).

Subsequently, the SO not only persisted, but also, as discussed earlier, increased substantially in size and importance. One ‘reason it kept going in its form is that for government it was quite convenient, it was kept off the public books’ (Interview UK8).

Hence there were two important issues at the time: First, the market liberalisation and the existing quasi-monopolies of the utilities and second, the constraints of public expenditure to fund energy efficiency programmes. Both issues provided the basis for utility-run programmes rooted in ideas around LCP.

Least-Cost Planning

As a result of those debates in the 1980s, there was considerable interest in instruments to incentivise energy efficiency and in particular in the so called Least-Cost-Planning approach (LCP), which was used in the US for encouraging monopoly utilities to take into account the demand side and potential energy savings options at the customer end (Interview UK1, UK10, UK11). Because energy suppliers in the UK were privatised as monopolies rather than in a competitive market, there was considerable interest in LCP as a means of using utilities to promote energy efficiency (Eyre 2008).

The concept of LCP was originally coined by the former director of the Office of Conservation at the US Department of Energy, Roger Sant (1979). In short, LCP is based on the assumption that people do not want to buy energy but energy services, and those should be provided at lowest cost. Where it is cheaper to save a unit of energy rather than supplying it, utilities should opt for the demand reduction option and vice versa. LCP was heavily influenced by ideas postulated by Amory Lovins (1976, 1977), who advocated a 'soft energy path' utilising energy efficiency and renewable energy instead of just ramping up the supply of fossil fuels and nuclear energy. Lovins later on coined the term 'negawatts', which he defined as a unit of energy avoided due to efficiency improvements (Lovins 1985). It is easy to see why this particular policy instrument generated a lot of interest in the UK as it fitted very well with the dominant way of thinking at the time, even though it required some modification to fit the UK market (Eyre and Staniaszek 2005).

This idea of using utilities as the agents to roll out energy efficiency programmes was discussed in the UK context. For example, in the mid-1980s, in a series of reports called 'Lessons from America', ACE presented the US way of approaching energy efficiency in utility regulation. They conclude:

> *Perhaps the most vital lesson we can draw from these American programmes, and which has equal validity in the UK as in the US, is the suitability of gas and electric utilities as vehicles for promoting and delivering residential energy conservation programmes. (ACE 1985, p. 27)*

From the beginning, ACE was a strong supporter of utility energy efficiency programmes (Dawkins 1987). ACE can be classified as what policy change theorists call 'policy entrepreneurs' who push new policy ideas (Kingdon 1984, 1995, 2002; Mintrom 1996).

The idea of using a LCP-type instrument in the UK was investigated further, for example in a report by ACE commissioned by OFGAS, that generally deemed such an approach suitable and beneficial (Brown 1990). It also featured in an OFFER consultation on energy efficiency (OFFER 1991), although it was argued in the document that LCP might not fit with the UK context that well mainly because there was competition in supply. The then Director General of OFFER, Steven Littlechild, supported the general principle of LCP, but was sceptical about its applicability to the UK context because of a different industry structure. Therefore, he said, 'we should not rush into least-cost planning' (House of Commons Energy Committee 1991c).

Although there was some degree of scepticism around LCP, the general idea continued to play an important role in the discussions around energy efficiency. The House of Commons Energy Committee published a report in March 1991 calling for a reform of the regulatory approach in order to incentivise utilities to undertake energy efficiency measures following the LCP logic (House of Commons Energy Committee 1991a). Not surprisingly, British Gas opposed such a move, arguing that the commercial pressures already provided a strong incentive to promote the efficient use of gas, with or without LCP, and that it would involve a lot of unnecessary bureaucracy (House of Commons Energy Committee 1991b). Those concerns were repeated during an inquiry of the House of Commons Environment Committee:

> *[...] putting an overall imposition on all utilities, gas, electric, such as reducing gas consumption or electricity consumption by X per cent over Y years; such a target, or standard, occasionally gets suggested. We believe that that kind of overriding, simplistic, almost bureaucratic passing on of a duty is not actually a progressive way forward. (House of Commons Environment Committee 1993b, Q700).*

However, the idea to deliver energy efficiency through some sort of LCP approach using utilities was endorsed by the House of Commons Environment Committee in a report on energy efficiency which viewed 'energy utilities and their regulators as key players in funding and implementing energy efficiency programmes' and called for 'a fundamental shift in attitudes and approach on the part of the utilities and other power generators' (House of Commons Environment Committee 1993a, para 5). The Committee also travelled to the US to study LCP policies in various US states. NGOs such as Friends of the Earth and Greenpeace supported the LCP approach and the idea of using utilities as vehicles for the delivery of energy efficiency programmes. While British Gas clearly resisted any move into the direction of LCP, the electric utilities reacted in a more measured way with some utilities such as East Midland Electricity and Manweb supporting LCP and carrying out pilot projects in that area. Other electricity utilities, such as South Western Electricity and Eastern Electricity, were more concerned and reluctant to embrace the concept of LCP (House of Commons Environment Committee 1993a).

The discussions bore fruit and according to the second year report on the Environment White Paper, Government saw utilities in a good position to carry out energy efficiency measures at the customer end (HM Government 1992).

E factor – the predecessor of the SO in gas

As a result of those discussions, in May 1991, Sir James McKinnon, the Director General of OFGAS, announced a new gas price control formula to operate from April 1992 to March 1997 with the purpose to encourage British Gas to compare the costs of supplying gas with the option of investing in demand-reducing alternatives. This formula would include an 'E factor' allowing gas suppliers to pass 100% of the costs of energy efficiency projects approved by the Director General through to gas customers. McKinnon expected that around £50 million a year might be spent on energy efficiency measures (Owen 2006). Money raised via the E factor was supposed to help fund the Energy Saving Trust (EST) that was established by Government, British Gas and public electricity supply companies in 1992 to reduce home all energy use and the associated carbon emissions. In the early days after its creation EST ran four energy efficiency projects such as a condensing boiler scheme, a compact fluorescent lamps (CFLs) subsidy programme, residential combined heat and power (CHP) schemes, and established a network of Local Energy Advice Centres (Owen 1997). Although OFGAS established the E factor, the regulator made it pretty clear from the beginning that it did not see wider environmental goals within its remit and this ought to be dealt with by central government (House of Commons Environment Committee 1993b). This would become an issue of great controversy later on.

Summary

In the context of energy market liberalisation and quasi monopolies, policy makers and stakeholders considered new policy instruments that used utilities as a vehicle for promoting energy efficiency comparable to the LCP approach developed in the US. Once the idea for an obligation on suppliers was on the table, feedback mechanisms reinforced the implementation of the first schemes such as the E factor and EESoP 1. One feedback mechanism was that as a market-based instrument in a context of liberalisation, obligations on suppliers were characterised by a high degree of ideational fit. Market liberalisation was seen as essential to promote economic efficiency and energy efficiency was very much part of this idea as a means to ensure the efficient consumption of energy. It had been expected that utilities would offer energy efficiency services as part of their portfolio anyway once the market was fully liberalised. In the meantime, however, an obligation was supposed to incentivise the utilities to deliver energy efficiency services (Interview UK1, UK14). Therefore, obligations were fully in line with the dominant narrative at the time. The circumstance that the SO (and the E factor) was an instrument independent of public expenditure comprised another feedback mechanism. Such schemes were seen as having positive fiscal effects in the sense that they did not put additional strain on the budget. This positive policy feedback mechanism prevailed and is probably one of the main reasons why in times of deficit reduction programmes the SO remained unaffected.

4.2.2 Change of key personnel

Change of key personnel can trigger policy change in some instances and is a recognised mechanism in the literature on policy change (e.g. Sabatier 1988). A good example of the impact of changing key personnel affecting the dynamics of policy change can be found in Great Britain during EESoP 1 and 2.

In the 1990s, when the SO was still run entirely by the regulator (including the target-setting procedure), change of personnel at the top of the regulator OFGAS had a significant effect on the development of the SO. The following part shows how a single person, Claire Spottiswoode, who became director of OFGAS in 1993, successfully blocked any attempts at implementing a SO in the gas sector and downgraded the E factor significantly. In contrast, OFFER's director was much more sympathetic to running energy efficiency programmes and put in place the first SO in electricity in 1994. Only when a new OFGAS director was appointed, was the way finally cleared for having a SO in gas as well.

OFGAS' role: obstruction of energy efficiency programmes

In general, McKinnon was 'quite amenable to it [energy efficiency]' (Interview UK4) and it was likely that he might further advance the E factor over the coming years. However, the story took a very different turn when McKinnon left office in 1993 and Claire Spottiswoode took over. As a result of her appointment, in November 1993, there were serious concerns that not enough money could be raised for EST making it impossible for the Agency to deliver the CO_2 savings promised in the Climate Change Programme (DoE 1992). Claire Spottiswoode rejected raising money via the E factor for energy efficiency measures administered by EST (ENDS 1994b). While the 1986 Gas Act did provide some leverage for OFGAS to support energy efficiency measures, Spottiswoode did not feel comfortable raising prices (OFGAS 1994). Spottiswoode took the view that 'we should not be interfering in the purity of the market with cross-subsidies of this kind' (Interview UK10). Once the market was fully liberalised, she argued, energy efficiency measures would just be offered by the energy companies as part of a competitive market and consumers were best placed to decide whether they wanted energy efficiency measures or not. Spottiswoode expected that to happen in 1998 when the whole of the gas market had been opened to competition. Only in the meantime would there be some very limited role for energy efficiency measures as encouraged by the E factor (OFGAS 1994).

One of the interviewees described her as 'just a classic, right-wing economist' who believed that if all those cost-effective energy savings opportunities existed, people would do it anyway so why should one interfere with the free market (Interview UK4). Also, Claire Spottiswoode argued that such decisions were within the realm of elected politicians and could not be decided by the regulator (Interviews UK10, UK11). Furthermore, she claimed that the E factor 'was not introduced in order to deal with the Government's CO_2 remit' but that it was 'being hijacked into that' (House of Commons Trade and Industry Committee 1994, paragraph 93). She even accused her predecessor McKinnon of acting illegally in authorising expenditure under the E factor (House of Commons Environment Committee 1994), although she later withdrew those allegations following a legal review by Jeremy Lever QC and Simmons and Simmons who deemed the E factor legal (Owen 1997).

As a result, British Gas submitted a greatly scaled down package of EST projects to OFGAS, but most of their proposals were subsequently rejected by the regulator (ENDS 1995). In the end less than £2 million compared to the £50 million announced by McKinnon was spent by the time the E factor had ended in March 1997 (Owen 2006). Following the same logic of argument, Spottiswoode also declined to put an obligation similar to EESoP on gas suppliers. There was the feeling that without reforming the primary legislation, i.e. the 1986 Gas Act, further energy efficiency programmes that involved gas suppliers would be very unlikely (ENDS 1998).

OFFER's role: measured support of energy efficiency programmes

The electricity regulator, OFFER, took a rather different view. OFFER issued a consultation paper in 1991 on options of energy efficiency programmes including Standards of Performance (OFFER 1991). However, the consultation paper remained rather vague on specific instruments and also OFFER's response to the consultation did not contain any specific proposals (OFFER 1992). OFFER's Director General, Professor Stephen Littlechild, suggested in 1992 the introduction of an energy efficiency scheme for electricity similar to the E factor for gas (see above) (Eadie 1992). In November 1992, OFFER announced that it planned to take energy efficiency considerations fully into account during the 1994-1995 price control reviews (Woolf 1993). One interviewee said that 'there was the feeling that Steven Littlechild was playing catch-up' with what was happening in the gas sector at the time (Interview UK9). OFFER commissioned a study in 1992, which examined the potential for cost-effective utility-run energy efficiency programmes. The study estimated that at least 6% of existing electricity use could be realistically saved through efficiency improvements within ten years (LE Energy Ltd and SRC International 1992). In 1993, OFFER circulated an unpublished discussion paper on the potential design of Energy Efficiency Standards of Performance with more detailed proposals (OFFER 1993).

EST gave advice to OFFER on how EESoP should be designed. Part of this advice was a study tour in the United States to learn more about Least-cost-Planning and Demand Side Management in the US (Energy Saving Trust 1994). The level of EESoP proposed by EST was followed by OFFER and all companies were allocated a target in line with EST's recommendation (OFFER 1994).

Eventually, in 1994, OFFER put energy efficiency standards of performance (EESoP) on the Public Electricity Suppliers (PESs) (OFFER 1994). PESs were the 14 companies created when the electricity market in the United Kingdom was privatised in 1990. This was going to be the first SO and the scheme was administered by EST. EESoP 1 raised about £100 million for energy efficiency projects, equivalent to £1 per customer per year (Owen 1997). However, OFFER did not raise the amount of money expected by ministers and OFFER's Director General had concerns that higher obligations 'would raise issues more appropriately dealt with through general fiscal policy' (ENDS 1994a). OFFER made this very clear from the beginning long before the scheme commenced in April 1994 (House of Commons Environment Committee 1993b). Also the second EESoP scheme, which operated from 1998-2000, did not raise significantly more funds than EESoP 1.

While OFFER's director had taken a more proactive approach to energy efficiency programmes, Steven Littlechild made it very clear early on that he would only be willing to do this at a discretionary level of not more than £1 per customer (Interview 4). Any further increase in the costs of the SO to customers, he argued, would not be in line with OFFER's remit as an unelected (economic) regulator and therefore require government intervention in some shape or form. So it was very clear at the time that if government wanted a SO at a much larger scale delivering higher reductions in all energy use and carbon emissions, a rather substantial legislative change had to take place shifting the target setting powers to central government.

Change of personnel and merger of regulators

The appointment of a new OFGAS director would eventually break the deadlock. Finally, in September 1998, Claire Spottiswoode's term as Director General of OFGAS came to an end and Callum McCarthy was appointed to be her successor. From the beginning, McCarthy was much more sympathetic to having schemes such as the SO in gas (Interviews UK3, UK4) and subsequently extended the SO to the gas sector

Prior to the extension to the gas sector an important change with regard to the regulator took place: OFFER and OFGEM were merged into a single gas and electricity regulator (OFGAS). While OFGEM was formally created by the Utilities Act 2000, OFGEM already operated informally in 1999 with Callum McCarthy being joint director general of OFGAS and OFFER from January 1999. Shortly after winning the elections in 1997, the new Labour government announced its intention to merge the two regulators in March 1998 in a consultation document on utility regulation in general, arguing that it was necessary to have a single energy regulator ensuring greater consistency due to the converging gas and electricity markets with companies becoming dual fuel suppliers after market liberalisation (DTI 1998b). This was confirmed later in the response to the consultation in July 1998 (DTI 1998a) and proposals for legislation were finalised in 1999 (DTI 1999). It became law in 2000 as part of the Utility Act. In the meantime, Callum McCarthy was joint director general of both regulators.

Extension to gas

Callum McCarthy was much more cooperative with regard to energy efficiency schemes. In 1999, EST urged Government to extend EESoP 2 as it was coming to an end in 2000. In addition to getting an extension of the SO, EST hoped that gas suppliers would also be covered (ENDS 1999a). The House of Commons Environmental Audit Committee took EST's concerns forward and recommended the extension of EESoP plus a separate scheme for gas suppliers (House of Commons Environmental Audit Select Committee 1999). Within just four days of publication of the Committee's report, the newly created OFGEM issued proposals to extend the electricity EESoP scheme for two years from April 2000 and also proposed a new EESoP scheme for gas suppliers for the same period with a savings target even higher than the electricity SO (ENDS 1999b; OFGEM 2000b). This was a significant shift considering the gas regulator's past opposition to an EESoP type scheme for gas.

Summary

What this episode illustrates very clearly is that a single person's objection to a policy instrument, in this case the SO, can have a significant effect on whether this instrument is adopted or not, an effect that is generally recognised in the literature on the theories of policy change (Sabatier 1988; Sabatier and Jenkins-Smith 1993). The replacement of Claire Spottiswoode with Callum McCarthy was definitely the main reason why the SO was applied to the gas sector as well (Interview UK4). This process can also be understood by applying the concept of friction: Spottiswoode was supposed to establish domestic sector energy efficiency programmes in order to help with achieving the national carbon reduction targets set by government (see section 4.2.5). However, she acted as a bottleneck blocking most of the pressure put onto the regulator. As a result, policy inputs (such as demands to promote energy efficiency in order to reduce carbon emissions) were not translated into policy outputs (in the form of an effective E factor or a SO for the gas sector). Hence Spottiswoode's objection was a source of friction leading to the accumulation of pressure to reduce carbon emissions. EST frequently raised concerns that without the promised funding from the E factor or a SO in the gas sector it would be unable to generate the carbon emission reductions of the scale required. The fact that shortly after his appointment McCarthy implemented the SO in the gas sector indicates that at the time Spottiswoode was the primary source of friction rather than cognitive limits or constrained institutional capacities as theorised by PET (Baumgartner 2011; Jones and Baumgartner 2005, 2012). However, as the next section will show, there were also significant institutional constraints, which caused substantial friction.

4.2.3 Transfer of target-setting powers

As discussed in chapter 2, one of the levers of policy change identified in the literature is venue change. Venue change refers to situations when the institutional location of decision authority changes (Baumgartner and Jones 1993). Such a venue change occurred in the UK in 2000.

The debate outlined above shows that there were considerable conflicts about the responsibilities and duties of the regulators in the context of energy efficiency and, more generally, in environmental and social issues. Both regulators, OFGAS and OFFER, saw themselves primarily as economic regulators and were not willing to ramp up the SO significantly as they felt this was something government ought to be doing (Interview UK4, UK5, UK10, UK11). At that stage an 'impasse had been reached at which the previous government had expected the regulator to do something and then the regulator had not' (Interview UK10). Without change in primary legislation, it looked like further measures would be extremely difficult to implement and this is exactly what happened in the end when the new Labour government decided to shift the target-setting powers from the regulator to the Secretary of State by primary legislation.

Proposals for utilities regulation reform

The new Labour government made clear from the beginning that they were going to take action on utilities regulation and energy efficiency policy. Without a change in government it would have been difficult to overcome the deadlock that had been reached in the 1990s (Interview UK1, UK4).

In the 1998 review of the future of utility regulation, Government concluded that statutory guidance from the government to the regulator needed to be issued to encourage the regulator to take into account social and environmental considerations, and that the regulator should be placed under a new secondary duty to have regard to that guidance. However, government acknowledged that such guidance could not be used to implement social or environmental measures (including energy efficiency measures) which have 'significant financial implications for consumers or for the regulated companies' (DTI 1998a). This is also reflected in the consultation on the 1998 UK Climate Change Programme where it is argued that setting more ambitious targets for the SO 'would fall into the category of measures which should be implemented through new specific legal provision rather than relying on guidance to the regulator' (DETR 1998, para 66).

As a logical next step, in its proposals for legislation on utility regulation, government announced in 1999 that it would put in place new legal provisions for government to set the target of the SO (DTI 1999).

Utilities Bill

In 2000, the proposals were passed through parliament as part of the 2000 Utilities Bill. As expected, the Bill allowed the Secretary of State to issue guidance on social and environmental matters to regulators. The first guidance of such kind was issued by DTI in November 2002 but remained rather vague about home energy efficiency policy. Succeeding guidance issued by DTI, later BERR then followed by DECC, did not include stronger and more precise provisions and in 2010 the only reference to home energy efficiency was that 'the Authority should have regard to the fact that improved household energy efficiency can also reduce costs to consumers and help to reduce fuel poverty'(DECC 2010e, p. 10). In sum, the guidance did not have much impact on the SO or in general (Interview UK1).

Furthermore, the primary duty of the 1986 Gas Act and the 1989 Electricity Act was changed in the Utilities Act. While the primary duty previously was to promote competition, the Utilities Act changed it to protect the interests of consumers including future consumers, a change that some thought might be an important lever for more ambitious environmental and social initiatives by the regulator, but this did not happen (Interview UK1).

However, and more importantly for the development of the SO (Eyre and Staniaszek 2005), the Bill also gave the Secretary of State powers, by order, to impose energy savings targets on gas and electricity utilities. As part of this, provisions were made in the 1986 Gas Act and the 1989 Electricity Act to impose an energy efficiency target on each gas transporter and supplier, and each electricity distributor and supplier. This resolved some of the conflicts over EESoP 1 and the E factor, which struggled to get the regulator's support due to conflicting duties and unclear responsibilities. The Utilities Bill directed the responsibility for target setting to Government and obliged the regulator to implement the schemes that would be needed to reach the targets. OFGEM's role changed from being the decision maker on the SO to becoming a 'middleman' having to put the scheme according to government's specifications on the energy companies (Interview UK6). This enabled Government to significantly extend EESoP imposing much more ambitious targets on energy companies.

Also, the Utilities Act was intended to 'depersonalise' the regulators by creating the Gas and Electricity Markets Authority (GEMA), essentially a governing board that replaced the former Director General, in order to avoid some of the issues discussed in the previous section (Lawrence 2000).

First SO after Utilities Bill

Shortly after the Utilities Bill had been passed, the government set the first SO target in the Electricity and Gas (Energy Efficiency Obligations) Order 2001. Whereas the target of the old EESoP 3 scheme was only 11 TWh (4.9 TWh Electricity & 6.1 TWh Gas) for a period of two years (2000-2002), its successor, EEC 1, imposed a much higher target of 62 TWh on energy suppliers (OFGEM 2005) for a period of three years (2002-2005), which equates to a target four times as high as the EESoP 3 target.

The transfer of target-setting powers clearly was a key moment in the development of the SO and without this institutional change it would be hard to imagine an SO at the level where it is today. Asked whether the transfer of target-setting powers had been an important moment in the history of the SO one interviewee said:

> *Oh crucial, we'd still be a pound a customer or one pound twenty a customer whatever it was. We'd be stuck at maybe two pounds about now. And there was definitely a changing realisation that this wasn't just going away, this was a real problem. So yes. (Interview UK4)*

In a sense, although unintentional, the resistance of Claire Spottiswoode in the early 1990s led in the end to a much stronger SO. Asked about whether there had been much resistance from the different stakeholders to the shift of target setting powers, another interviewee said:

> *No, my impression is not. Because the suspects that would have are precisely the ones who got us into that position anyway, i.e. the rightwing let's not interfere in the market people had been the people saying we can't have the regulator doing that because that's politics, that's putting tax and politicians have got to do that. So when the government responded by saying politicians will do it end of argument really. (Interview UK1)*

However, representatives of the energy suppliers bemoaned that previously the 'regulator had a lot more freedom to tweak the rules and make sure they had the right outcome' whereas since the government sets the target it has become much more 'politicised' (Interview UK12) and 'high profile' (Interview UK13) with ministers interfering with the scheme more and more. While in the 1990s the SO was quite light touch and based on gentlemen's agreements, it appears to have come increasingly under the spotlight of ministers and technical experts as the scheme moved along.

Nevertheless, the new institutional setting gave clarity to all the stakeholders involved in this and put an end to the controversies around the remit of the regulator:

> *There were bits of the story that were about regulating an industry and there were other bits of the story that were about energy efficiency, helping the poor, and by separating the decisions they gave clarity. (Interview UK3)*

In retrospect, the hesitance of the regulators proved an important driver for the institutional change that took place, allocating the responsibilities in a manner that could easily be understood by all stakeholders.

Summary

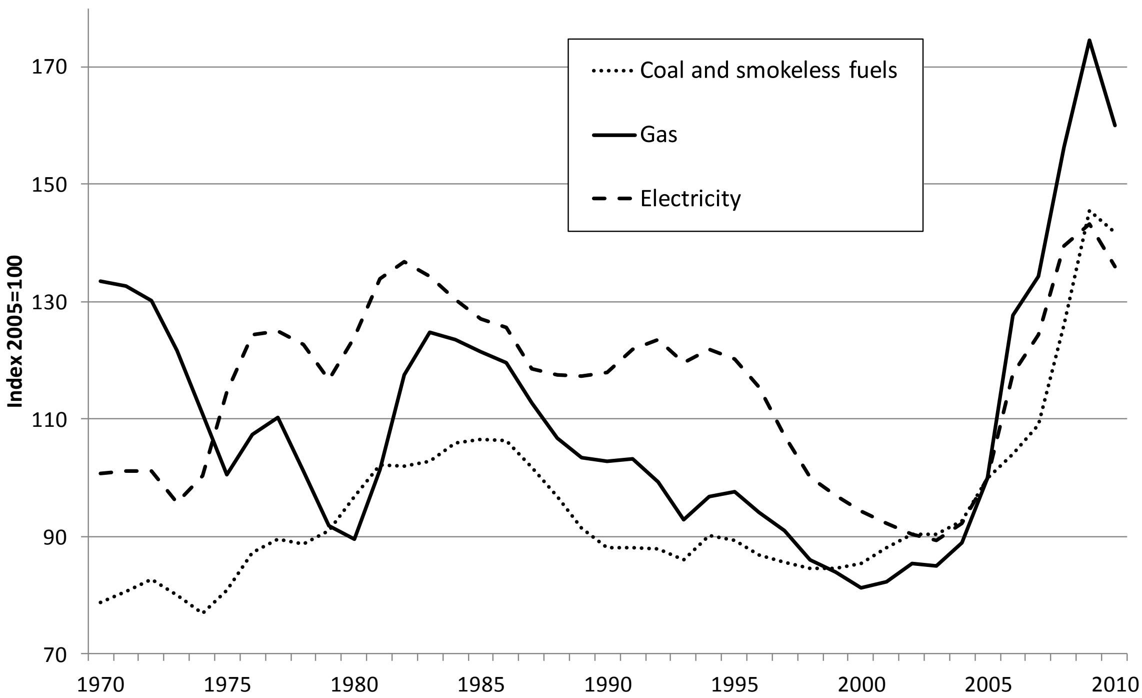
The venue change that occurred in Britain resulted from a lengthy political debate about the role of the energy regulators and their unwillingness to increase expenditure for energy efficiency measures. In order to realise substantial carbon emission reductions in the domestic sector modifying the institutional framework appeared to be the only option and the accumulation of pressure eventually led to reform. Hence the venue change was a deliberate means to achieve carbon reduction goals in the housing sector rather than an unrelated coincidence. With regard to the conceptual framework of this thesis, the following observations can be made. Due to the inability of existing institutions (in this case OFGAS and OFFER) to raise the energy savings target, the pressure to generate the carbon emission reductions elsewhere accumulated. Directing the target-setting powers to the central government instead of the regulator was seen as the only way of dealing with the pressure to achieve carbon emission reductions in the housing stock. Analysed through the lens of friction, the institutional constraints (unwillingness and inability of OFGAS and OFFER to increase efforts beyond a low level) limited the system's ability to translate policy inputs (pressure to cut domestic carbon emissions) into policy outputs (effective SO).

4.2.4 Energy prices

Energy price shocks are often cited as an example for a crisis that leads to a modification of existing policy instruments (Campbell 2004). The oil crisis in 1973 is a good example of policy change induced by crisis in the form of non-linear price signals. Whereas before energy efficiency was of very limited political concern, this changed almost overnight (Eyre 1997). As expected, energy prices played an important role for the development of the SO. Rising prices are clearly linked to fuel poverty, another policy driver assessed in section 4.2.6, but rising prices constituted a policy driver due to concerns about their effect on all consumers beyond low-income households (Interview UK14).

In the 1980s and 1990s, energy prices were low compared to the 2000s with the general trend of falling prices since the early 1980s (Figure 6). However, from 2004 onwards, domestic energy prices of all fuels increased dramatically. Gas prices in real terms almost doubled in just a decade;[3] prices for coal and smokeless fuels increased by 65% and electricity prices by 45%.

Figure 6: Fuel price index numbers relative to the GDP deflator (2005=100)



Source: based on DECC (2011f)

This trend generally pushed energy policy up the political agenda, as one interviewee pointed out:

[3] Used fuel price index relative to the GDP deflator.

> *We had relatively abundant domestic energy in the UK, relatively benign energy prices, and, I mean compared to today, completely different world and energy policy was just not seen as that important. (Interview UK2)*

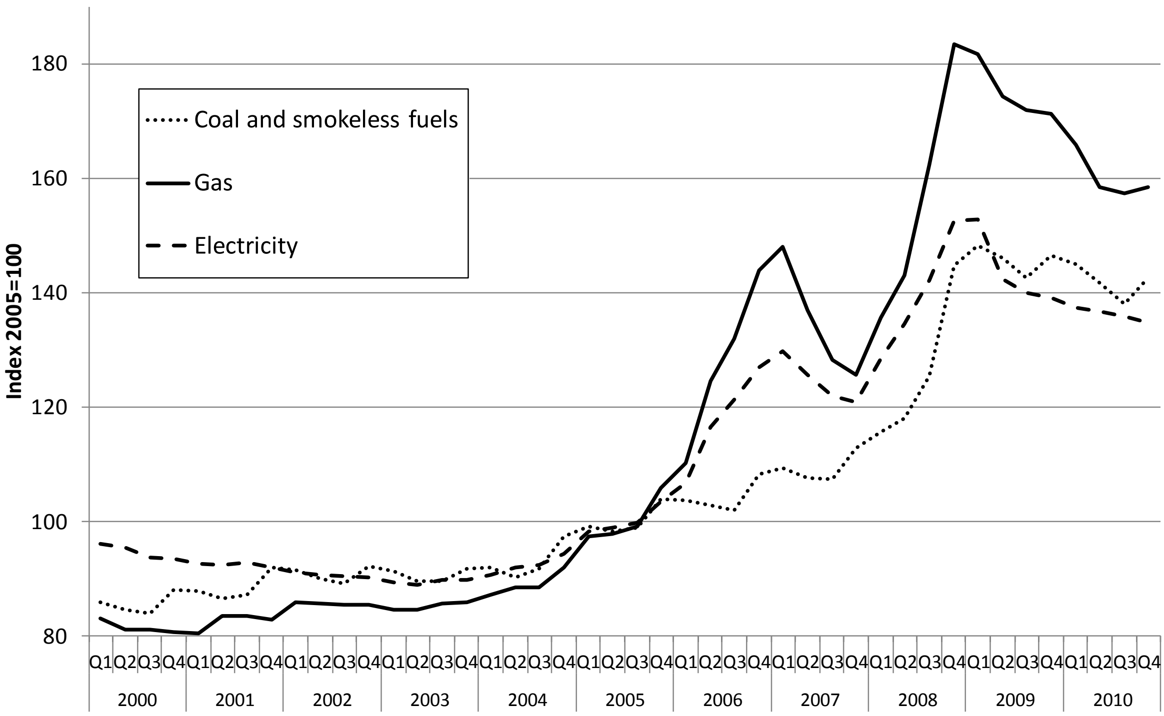
While energy prices are a direct driver of fuel poverty (see section 4.2.6), reducing the costs of energy services in general was a separate key objective of the SO from the beginning. References in the various consultation documents confirm that with earlier schemes referring to the efficient consumption of energy based on the duties of the regulator laid down in the 1986 Gas Act and the 1989 Electricity Act (OFFER 1994, 1998a). EEC 1's objectives included helping consumers to lower their fuel costs or increase their comfort as one of three main objectives alongside reducing fuel poverty and carbon emissions (DEFRA 2001). Similarly, the EEC 2 and CERT consultation documents name lowering the costs of all energy use in households as a key objective of the SO (2004a, 2007a), separately from fuel poverty. It therefore comes as no surprise that rising energy prices had an impact on the development of the SO.

Sharply rising energy prices in 2008

Prices increased rapidly during the winter of 2006/2007 and 2007/2008. The rising energy prices particularly affected the SO in 2008, when prices increased more quickly than any increase since the 1973 oil crisis. However, in 2006/2007 no changes took place even though there were some discussions about high energy prices (e.g. Hussain 2006) although with a significantly lower intensity than in 2008.

As shown in Figure 7, residential gas prices in 2008 increased almost by 50% in real terms in just four quarters. This was mainly a result of rising wholesale gas prices in continental Europe, where gas prices are contractually linked to oil prices. Similarly, electricity prices went up by almost 30%, also mainly due to rising wholesale gas prices.

Figure 7: Fuel price indices in the domestic sector in real terms Q1 2000 to Q1 2010



Source: based on DECC (2010d)

The developments in the energy markets triggered a controversial discussion about energy companies and their pricing as well as their profits, which in the end led to a change of the SO.

Discussions about a windfall tax in 2008

In the context of sharply increasing energy bills, there were calls in early 2008 for a windfall tax on energy suppliers. A heated discussion started after OFGEM reported to the Treasury and the Committee on Business and Enterprise that energy companies made £9 billion profit from EU ETS permits which were issued for free. In January 2008, OFGEM suggested that this windfall could be used to fund help for the fuel poor (OFGEM 2008b). Just a few weeks after the OFGEM proposal, Government held a meeting with the heads of major energy suppliers and told them that they might face a levy on their profits to help the poor (Oliver 2008). As expected, the proposals were not met with great enthusiasm by the energy suppliers. In February 2008, OFGEM announced a two-year investigation into the price rises and the competitiveness of the markets in electricity and gas for households and small businesses (OFGEM 2008a). In early March 2008, the Local Government Association, a cross-party organisation representing councils in England and Wales, proposed to require utilities to pay £500m annually for home energy efficiency measures (LGA 2008). There were expectations that the 2008 Budget might introduce a windfall tax but this turned out not to be the case (Grice and Russel 2008).

However, discussions about a windfall tax continued and in July 2008 the Committee on Business and Enterprise argued that ‘there is a compelling rationale for at least a modest, one-off top-slicing of these gains to help fund action to reduce the energy bills of vulnerable families in the long term’ (House of Commons Business and Enterprise Committee 2008, p. 47). Increasing profits made by energy suppliers such as Centrica after raising domestic fuel prices by 35% led to a renewal of calls for a windfall tax in August 2008. There was, however, no agreement in Government on the matter –Chancellor Alistair Darling and John Hutton, the Business Secretary, opposed a windfall tax on the basis that energy companies needed extra funds to expand low-carbon energy sources (Kennedy and Pagnamenta 2008; Webster and Elliott 2008). After EDF pulled out of a deal which included buying British Energy and probably constructing new nuclear power plants, there were signs that a windfall tax was off the agenda (Wighton 2008).

However, more than 70 Labour MPs signed a petition that called for a windfall tax and hoped to make the issue one of the dominating themes of the party’s annual conference in September. Among them was Geoffrey Robinson, a key ally to Gordon Brown who devised the windfall tax on energy companies in 1997 (Stratton 2008). Shaun Woodward, the Secretary of State for Northern Ireland, even threatened to resign if there was no windfall tax coming (Webster and Elliott 2008). A windfall tax was also supported by the unions. As expected, energy companies opposed any attempts to introduce a windfall tax and argued that they would need to raise prices even further in case of a tax due to the need to build new power plants (Jameson 2008). In early August 2008, Government examined different alternatives to a windfall tax. One of them was to oblige the energy companies to spend the bulk of the money under CERT in the first two years and also to increase the share spent on helping the fuel poor. Raising the proportion of auctioned EU ETS permits and a carbon levy was also considered (Wintour 2008). Government eventually designed a £1bn package of new funding and measures to tackle fuel poverty and threatened the energy companies with a windfall tax in case they did not sign up for the package (Webb 2008).

Substitution for windfall tax: CERT uplift

On 11 September 2008, Government finally revealed the package they negotiated with the energy companies – the Home Energy Saving Programme. The package included an increase in the existing CERT target by 20% with a new target of 185m lifetime tonnes of CO_2 for the period April 2008 - March 2011. That implied additional expenditure by the energy suppliers of an estimated £560m (HM Government 2008). Alongside this, Government introduced the new Community Energy Savings Programme (CESP), increased funding for the Warm Front programme, and a range of specific fuel poverty measures such as tripling the Cold Weather Payments[4] and increasing the Winter Fuel

[4] Cold Weather Payments are automatically paid to people on certain benefits when the temperature in the area they live has dropped or is forecast to drop to zero or below for 7 consecutive days.

Payments.[5] Government argued that increasing CERT and introducing CESP 'is the better, simpler way to meet our objectives than a windfall tax' and that 'by choosing this route the Government can more swiftly help families cut fuel bills now and in the medium term; help secure the long-term investment in new low-carbon energy infrastructure this country requires; and help keep prices down' (HM Government 2008, p. 2). The uplift of CERT was subsequently put into law in July 2009 in the Electricity and Gas (Carbon Emissions Reduction) (Amendment) Order 2009.

While a DECC official claimed that the decision against a windfall tax and the uplift of CERT were not directly related and that the CERT uplift was 'a very separate decision' (Interview UK6), it seems unlikely that this was the case as confirmed by various interviewees (Interview UK1, UK6, UK8, UK10, UK12). One interviewee made this very clear:

> *[..] definitely, the package of not having a windfall tax included increasing CERT, bringing CESP in, all these sort of things that were announced at the time that was dressed up as 'we're doing this instead of a windfall tax'. (Interview UK12)*

Favourable outcome for energy companies

Not surprisingly, the energy companies made it very clear to the government that they were opposed to a windfall tax in negotiations with government:

> *I think there were quite a lot of conversations behind closed doors, if you know what I mean. You had energy companies going to talk to officials, ministers being spoken to, quite strong lobbying. I think the mood music played from what actually happened was very much, along the*

[5] Winter Fuel Payment is an annual tax-free payment made to people older than 60 years to help towards their winter heating costs.

> *lines, the energy companies were very clear, they did not want a windfall tax on their profits. (Interview UK5)*

Apparently, the energy companies did well in conveying their arguments against a windfall tax:

> *Let's just say as an energy supplier I'd be really proud of my negotiation skills on that. To manage to go from a windfall tax to what was a bit of an extension of CERT was impressive negotiations. (Interview UK8)*

It seemed that the concerns raised by the energy companies regarding the risks of a windfall tax to long-term investment in the energy infrastructure convinced the Government.

Proponents of a windfall tax criticised the Government that the announced measures would not go far enough. However, there was also support for the measures, for example from the Association for the Conservation of Energy(ACE) (ENDS 2008), a lobbying group representing the interests of the energy efficiency industry. The Association of Electricity Producers announced that the costs of the package would be passed on to consumers by energy companies which the Prime Minister promised would not happen (Naughton 2008), although the architecture of CERT clearly contradicts that statement in that cost pass-through is not regulated and down to the discretion of the energy suppliers.

The outcome of the debate, the uplift of CERT and introduction of CESP compares quite favourably to a windfall tax: In case of the windfall tax the government would have taken away some of the profits of the energy companies whereas any rise of expenditure for CERT could be passed through to consumers. Also, because the energy companies did not have to pay for the CERT uplift but the package was sold as a burden on energy suppliers, they could claim that they helped households in fuel poverty in times of high energy prices and use this as part of their PR (Interview UK6).

Intervention of the Prime Minister

One point worth noting is that the decision to increase the CERT target was related to an intervention of the Prime Minister. Gordon Brown was directly involved in the negotiations with the energy companies and the involvement of No. 10 clearly had an impact on the modifications that CERT was undergoing.

One interviewee commented on the proposals of the Brown government as following:

> *I remember the frantic response of the Brown government in 2008 when the oil price hit $147 and energy efficiency was suddenly on top of the government's agenda. (Interview UK10)*

Apparently, DEFRA were rather slow to respond to the political pressure and, as a result of this, No. 10 took over the process (Interview UK10). Gordon Brown was under a lot of pressure with the Labour Party conference coming up at the end of September 2008 (Interview UK12). Government departments were asked about potential policies to address the peaking energy prices and in particular domestic fuel bills. DEFRA recommended using the existing CERT mechanism because 'it had clear legs, it was something that could be delivered quickly' (Interview UK6).

So there were at least two reasons, why the CERT uplift had been chosen as the main response to the mounting political pressure: First, the energy companies agreed to the CERT uplift as opposed to a windfall tax. Second, the SO had been in place for 14 years at the time and the government knew it could be expanded easily.

When Gordon Brown announced the Home Energy Saving Programme, he apparently made an error. In his statement he said that over the next three years six million homes would be insulated at a rate of two million a year. However, the PM's statement was based on a draft by DEFRA which said that the Home Energy Saving Programme would deliver energy savings *equivalent* to what would be produced by insulating 6 million homes, a very different target definition because it does not prescribe the number of homes to be insulated, but sets a carbon reduction target. Nevertheless, once the statement was made Gordon Brown insisted on the target he announced (Interview UK7, UK10, UK11, UK12). After the Prime Minister's statement, the government set up a special task group to make sure it was delivered. The task group comprised the insulation industry and the energy suppliers and was called 'Action on Insulation' (Interview UK7).

Summary

Attempts to introduce a windfall tax on energy companies' profits in 2008 were unsuccessful due to resistance from within government and the companies themselves. Alternatively, the government decided to raise the CERT target and to introduce CESP. Considering that CERT had just started in April 2008, the announcement of the 20% uplift in September 2008 was certainly unusual and unprecedented. Due to considerable friction the proposals for a windfall tax did not bear fruit, but at the same time the pressure to respond politically to rising energy prices and increasing profits of energy companies accumulated. Eventually a venue change occurred and Gordon Brown dealt with the issue directly. Without the Prime Minister's intervention the 20% uplift of CERT would have been rather unlikely, given that CERT was running for just about five months and a change to the target half way within a SO scheme had never happened before. The intervention of macropolitics in subsystem politics is one of the main causal mechanisms leading to policy change hypothesised by PET (Baumgartner and Jones 1993; True 2000; True et al. 2007a; Walgrave and Varone 2008). Macropolitics can overcome inertia inherent in policy subsystems as a result of friction because 'at the macropolitical level, old and new political interests can be rebalanced and major redirections of policy can be launched' (True 2000, p. 12). In this case the involvement of the Prime Minister himself led to significant and rapid changes in the subsystem of domestic energy efficiency policy.

4.2.5 Climate change

Climate change policy became the most important driver of the SO over time. However, the significance of it gradually increased over the years.

First references to climate change

As outlined above, the origins of the SO have a lot to do with discussions around economic efficiency/Least Cost Planning and less with climate policy. One interviewee made this very clear:

> *'When we thought of energy efficiency we were still very much in terms of improving the efficiency of energy use and reducing energy intensity as opposed to saving tons of carbon.' (Interview UK10)*

However, 'those sort of rather arcane regulatory economics issues became less important and it became much more about climate' (Interview UK1). Climate change climbed the political agenda in the UK over the last two decades and demarcated a distinct policy area after Margaret Thatcher mentioned climate change as a substantial challenge to mankind in her 1988 landmark speech to the Royal Society (Pearce 2006). Thatcher famously suggested that 'we have unwittingly begun a massive experiment with the system of this planet itself' (Thatcher 1988). Her speech was seen as a sharp turning point in her government's approach towards environmental policy (Interview UK3, UK10) and drew the public's attention to the issue of climate change (Anderson 1991). Government's changing focus on climate change was also restated in the 1990 White Paper 'This

Common Inheritance: Britain's Environmental Strategy' (HM Government 1990) which committed the UK to stabilise its carbon emissions at 1990 levels if other countries would join in.

The increasing importance of climate change was also reflected in the way the SO was perceived. For example, as part of the first report under Article 12 of the Framework Convention on Climate Change, which was ratified in 1993 (HM Government 1994), the Energy Efficiency Office had to calculate the amount of carbon emissions that would be saved by various policy instruments including the SO (Interview UK10). Together with the E factor, EESoP 1 was supposed to raise money for the EST that was established by Government, British Gas and public electricity supply companies in 1992 to reduce home all energy use and the associated carbon emissions. The EST played a key role in the Government's climate policy strategy for the domestic sector as outlined in the 1994 UK Climate Change Programme (HM Government 1994), and the government wanted EESoP 1 to play a leading role in reducing domestic sector carbon emissions (Royal Commission on Environmental Pollution 2000). This was driven by the recognition that energy efficiency offered a lot of 'low hanging fruits' in the form of low-cost carbon reduction options (Interview UK2).

While the issue of climate change was around in the early 1990s, it was not a major driver of the SO (Interview UK1, UK3, UK7, UK11, UK12, UK13, UK14). As one interviewee put it: 'all of that stuff that now dominates government thinking we were just beginning to introduce' (Interview UK10). Climate change 'was still very much a subsidiary business, the main business was about a competitive free market in energy, and cheap energy and […] let the market sort it out' (Interview UK3). The comparatively low significance of climate change in the 1990s was also reflected in the energy companies' marketing of their energy efficiency programmes:

> *'All the marketing at the time was all about making customers more comfortable and saving money. I think we downplayed the environmental benefits because quite a lot of research showed that customers weren't interested at that time.' (Interview UK13)*

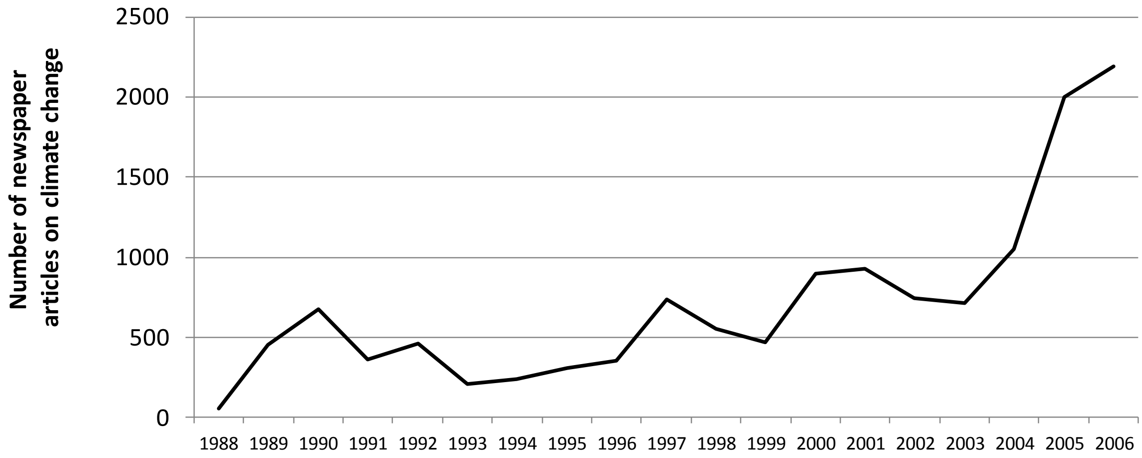
The low importance of climate change is also reflected in the consultation paper by OFFER on energy efficiency (OFFER 1991) and the document setting out the first EESoP scheme (OFFER 1994): There is not a single reference to climate change or carbon emissions. Four years later, only very few references to carbon emissions can be found in the EESoP 2 consultation document, mainly in the context of cost and lifetime savings (OFFER 1998b). The final EESoP 2 document does not make a single reference to carbon emissions or climate change (OFFER 1998a).

Climate change climbing up the agenda

However, climate change stayed on the government's and the public's agenda. One indicator that can be used to track back the role that a particular issue played in discussions at the time is media coverage. Media coverage is often used to analyse political pressures as they 'influence policymaking through the highlighting of issues - designating some important and others less important' (Jones and Baumgartner 2005, p. 211).

An analysis of the number of newspaper articles in The Guardian and The Observer, The Times and The Sunday Times, and The Independent and The Sunday Independent clearly shows that climate change was reported on increasingly over the 1990s, with peaks after Thatcher's 1988 speech and the 1992 Rio Summit as well as the 1997 Kyoto Protocol (Figure 8).

Figure 8: Newspaper coverage of climate change in the UK



Source: based on Boykoff and Rajan (2007)

This trend continued until 2006 when it started to slow down and media coverage declined again, although there was another peak in 2009 due to the Copenhagen climate summit and the Climatic Research Unit email controversy (also known as 'Climategate') (Boykoff 2011; Painter 2011).

While there was increasing media coverage, important policy changes took place as well. Particularly the Kyoto Protocol on climate change and the agreement of the newly elected Labour government to a 12.5% reduction in greenhouse gas emissions by 2008-2012 based on 1990 levels put climate change firmly on the government's agenda. This was followed by a new Climate Change Programme in 2000 committing the UK to a 20% reduction of carbon emissions by 2010 based on 1990 levels, a target that had featured previously in the Labour Party's 1997 election manifesto (Labour Party 1997). The draft of the 2000 Climate Change Programme explicitly mentions the SO as one of the six key UK policy measures to save carbon (DETR 2000). However, at the time the targets were comparatively humble and nothing of the scale seen later in the 2000s. The idea of having more long-term targets was not around at that time (Interview UK1) and it took some time until climate change targets became much more ambitious.

Nevertheless, for the first time since the commencement of the SO, the EESoP 3 consultation paper explicitly mentioned climate change and referred to the Kyoto target and the 20% reduction target set out in the Labour election manifesto (OFGEM 1999).

First ambitious emission reduction targets

The starting point to this is probably a report published by the Royal Commission on Environmental Pollution in 2000 on energy and climate change which recommended a 60% reduction in carbon emissions by 2050 based on 1990 levels (Royal Commission on Environmental Pollution 2000). The figures of the report were based on a June 1996 decision of the EU Council of Ministers as outlined in the EU Community Strategy on Climate Change to limit emissions to such an extent that atmospheric CO_2 concentrations of 550 ppm would not be exceeded. This figure, in turn, goes back to the 1995 IPCC Second Assessment Report (IPCC 1995) which argued that atmospheric CO_2 concentrations needed to be kept below 550 ppm in order to limit the global average temperature rise to around 2 degree Celsius above the preindustrial level.

As one of the first areas with significant potential to help to achieve such a reduction the report highlighted the potential to lower the level of all energy consumption via efficiency measures. The report argued that the 'scope for improvements in buildings of all kinds, but especially housing, is particularly large' (Royal Commission on Environmental Pollution 2000, p. 4). While the report acknowledged that the SO could play a critical role in reducing households' all energy use, it also pointed out that existing policies were falling short of achieving a significant enough reduction of all energy use and that further measures were needed.

The growing importance of climate change as a political driver was also reflected in a modification of the metric: Under EESoP 1-3 the target was simply defined in kWh savings to be achieved (although it was an indicative target, the actual target was set in £ per customer per year). EEC 1 introduced a target with fuel weighted kWh, i.e. it depended on the carbon intensity of the fuel saved how much it would count towards the target. So effectively, EEC 1 introduced a carbon target (Interview UK1, UK13).

When DEFRA presented its proposals for EEC 1, climate change was mentioned as one of the main reasons why EEC 1 would be implemented. According to the consultation document, one of EEC 1's three objectives was to make a significant contribution to the UK's carbon targets (both Kyoto and the 20% target) alongside saving households money and helping with the alleviation of fuel poverty (DEFRA 2001).

Energy efficiency and its potential contribution to reduce carbon emissions in the UK also played a major part in an energy review carried out by the Cabinet Office's Performance and Innovation Unit (PIU). In the chapter on reducing carbon emissions the report argued that the SO (at the time EEC 1) was 'expected to deliver the largest carbon savings in the domestic sector' (PIU 2002, p. 113). Therefore, the review argued, DEFRA and DTI should make an early commitment to extending EEC from 2005-2010 keeping it at least at the level of EEC 1.

The above mentioned report by the Royal Commission on Environmental Pollution suggested a reduction of carbon emissions of 60% by 2050 based on 1990 levels, a figure that featured as an indicative target in the 2003 Energy White Paper. The White Paper placed energy efficiency firmly on the political agenda - it was presented as the most important measure in the short and medium term in order to achieve all four of the objectives of the Paper (tackling climate change, security of supply, economic competitiveness and social equity) (Eyre and Staniaszek 2005). Because of its emphasis on climate change and energy efficiency, the White Paper had been a turning point in UK energy policy (Eyre 2008).

In line with the PIU review, the White Paper stressed that in order to achieve that sort of scale of reduction the SO 'will have a major role to play in homes' (DTI 2003, p. 34). The White Paper also announced that that the government would consult on an extension of the SO from 2005 to at least 2008 with a target twice its level of activity under EEC 1. While there are some references in the White Paper to fuel poverty when the SO is mentioned, it clearly is framed as a policy instrument that has the primary objective of reducing carbon emissions.

Effect of first carbon targets on SO

There is evidence that the climate targets directly impacted on the design of the SO. Prior to the commencement of EEC 1, the government department responsible for setting up the SO was assigned the task of linking the expected carbon savings from the SO to the overall carbon reduction targets:

> *'We were doing a lot of top-down analysis linking to the bigger picture White Paper and Climate Programme targets where we were sort of saying 'how many millions of tons of savings do we need to deliver from this sector by 2010?', initially to meet the Kyoto target and the UK pledge to do a 20% CO_2 reduction by 2010, and we portioned that out between the different sectors. Then you have to say what contribution does the cumulative savings of all these schemes have to make by 2010.' (Interview UK2)*

From EEC 1 onwards, climate change appears to be the strongest driver and the government targets put pressure on the departments to deliver a substantial contribution to the carbon targets via the SO (Interview UK2, UK4, UK5).

While the EEC 1 consultation document referred to climate change as one of three objectives, the EEC 2 consultation document stresses that 'the primary aim of EEC 2 is to make a significant contribution to the UK's legally binding target under the Kyoto protocol […] and its domestic goal to cut emissions of carbon dioxide by 20% below 1990 levels by 2010' (DEFRA 2004a, p. 5).

Another milestone was the Stern Review on the Economics of Climate Change commissioned by the Treasury in 2005 and published in 2006. The report received a lot of attention both nationally and internationally. Although it is primarily about the economics of climate change, there are some references to energy efficiency. The review supported the view of the International Energy Agency (IEA) that 'by 2050, energy efficiency has the potential to be the biggest single source of emissions savings in the energy sector' (Stern 2007, p. 13).

The SO remained a key element in the government's climate change strategy and featured among the top three additional measures to save carbon across all sectors in the 2006 Climate Change Programme (HM Government 2006). This was confirmed in the 2007 Energy White Paper. Government expected that in 2020 the SO would deliver up to 17% of all carbon reduction measures planned at the time, making it the second most significant measure after the EU emissions trading scheme. The White Paper highlights the government's commitment to continue delivering carbon savings in the household sector via the SO until at least 2020 (DTI 2007).

Changing metric of the SO

In order to align the SO with the wider climate policy landscape, the metric of the SO changed from TWh to carbon emissions when CERT commenced in 2008 (Interview UK6). The Climate Change and Sustainable Energy Act 2006 changed the provisions previously made through the 2000 Utilities Act in the 1986 Gas Act and the 1989 Electricity Act, which enabled the Secretary of State in the past to set an energy efficiency obligation on each gas transporter and supplier, and each electricity distributor and supplier. The altered sections gave powers to the government to set the obligations in the form of a carbon emissions reduction target.

Another reason for the new metric was that government wanted to include additional measures such as micro-generation and behavioural measures in the SO, although very limited activity on CHP and solar thermal had already been carried out under previous SO schemes (see section on mix of measures above). The official reasoning behind the decision to open the SO to additional measures was as follows:

> *The Government wishes to encourage a holistic approach to carbon abatement in the household sector, encouraging customers to take advantage of the full benefits of combining both energy efficiency and microgeneration to reduce their carbon emissions. We also want to raise awareness among household consumers of the impacts of their energy use and encourage them to change their behaviour and attitudes to energy in the home. As part of this approach we wish to provide suppliers with even more flexibility in the measures they can adopt to meet their targets. (DEFRA 2006a, p. 11)*

Although CERT focused explicitly on carbon emissions whereas EEC 1 and 2 defined the savings target in terms of TWh, the change was mainly semantic. EEC used fuel-weighted savings targets based on the carbon content of the various fuels, i.e. it was essentially a carbon emissions saving target (Interview UK1).

DEFRA consulted on the additional measures and the change of metric shortly after the Climate Change and Sustainable Energy Bill passed the last stage in the House of Commons (DEFRA 2006a; ENDS 2006a, 2006c). Later, DEFRA published a draft list of the additional measures that suppliers could use to reach their target (ENDS 2006b).

In the consultation document on CERT, DEFRA made it very clear that the SO's main purpose was to contribute to the UK's climate change policy:

> *'[T]he primary aim of the CERT is to make a significant contribution to the UK's legally binding target under the Kyoto protocol to cut greenhouse gas emissions by 12.5% below 1990 levels by 2008–2012 and its domestic goal to cut emissions of carbon dioxide by 20% below 1990 levels by 2010.' (DEFRA 2007a, p. 12)*

Climate Change Act

In 2006, the UK became the first country in the world to commit itself to a legally binding carbon reduction target of 60% in the Climate Change Bill. This followed a period of pressure from a number of NGOs including the Big Ask Campaign of Friends of the Earth which resulted in more than 200,000 people asking their MP to sign up to a binding target of 80%. Also the WWF's Get on Board campaign supported an 80% reduction target. The Bill was drafted by Friends of the Earth and brought before Parliament on 7 April 2005 by three MPs from the three major parties, namely Michael Meacher (Labour), John Gummer (Conservatives), and Norman Baker (Liberal Democrats). Because parliament was dissolved prior to the 2005 election, the bill was unable to make progress. However, shortly after the election an Early Day Motion was signed by more than 400 MPs demanding a climate change bill. The Prime Minister announced a climate change bill in the 2006 Queen's Speech.

While the initial target was only a 60% reduction, the target was raised following a recommendation by the Climate Change Committee, which was set up as part of the bill to advise government on its climate change policy. After several debates on the bill, it finally became law in November 2008.

Part of the bill was the extension of the primary legislation via amendments in the 1986 Gas Act and 1989 Electricity Act allowing the Secretary of State to put carbon emissions reduction targets also on energy generators. Such changes were required to establish the Community Energy Savings Programme (CESP), an area based scheme targeting energy generators as well as suppliers. The Climate Change Act did not make provisions that affected the SO until 2010, but it gives government more flexibility to modify the SO in the future.

Summary

Climate change clearly has been one of the main drivers for the development of the SO. Its importance gradually increased over a long period of time. While the earlier SO schemes made very little (if any) references to climate change, later schemes explicitly mention the contribution of the SO to reducing carbon emissions as one of the key objectives of the scheme. From EEC 2 onwards, the principal aim of the SO according to government documents was to reduce carbon emissions in the household sector. Behind the growing importance of climate change objectives for the SO lay a number of factors, including the steadily increasing media coverage of climate change and the development of legally binding carbon reduction targets resulting in the Climate Change Act in 2008. The increasing pressure on the SO did not materialise until the target setting powers were transferred from the regulator to the central government due to resistance from the regulator to upscale the SO (see sections 4.2.2 and 4.2.3). Hence there was substantial friction as hypothesised by PET, in particular in the 1990s. Following the 1997 Kyoto target, high profile reports, such as the landmark publication by the Royal Commission on Environmental Pollution in 2000, pointed out that current policies did not deliver significant enough carbon savings, an indicator that the policy inputs (pressure to act on climate change) were not translated into policy outputs (policy instruments focusing on carbon emission reduction). While the targets increased in each period after EESoP 3, the government did not feel comfortable raising the targets more quickly and to the extent required in order to reach the national climate targets. The hesitation was due to a lack of experience with the SO and restricted administrative capability at the time (see section 4.2.8), another source of friction. Still, the 80% carbon reduction target adopted put pressure on policy makers to expand the SO and eventually the SO became the second most important climate policy after the EU ETS.

4.2.6 Fuel poverty

One of the drivers of the SO was fuel poverty. While this chapter cannot provide a comprehensive account of the history of fuel poverty policy in the UK, its impact on the SO is analysed and where appropriate the wider historical background is provided. For a detailed analysis of fuel poverty policy in the UK please refer to Boardman (1991a, 2010).

In Britain fuel poverty is an important driver of energy policy and became a distinct issue of public concern following the oil crisis in 1973-1974. The recognition of regressive impacts of rising energy prices led to a distinction between fuel poverty and general poverty (Bradshaw 1983). Boardman argued that 'fuel poverty is different' (Boardman 1991b, p. 30) from income poverty because of 'the crucial role of housing stocks - the house, heating system and other energy-using equipment' (Boardman 1991a, p. 221).

Fuel poverty in the UK is defined as the need to spend more than 10% of household income on all energy use in order to maintain a satisfactory heating regime and other energy services (DECC 2011a). The original definition of fuel poverty goes back to Boardman (1991a). According to DECC (2011a), the level of fuel poverty depends on the interaction of three factors: income, fuel prices paid, and fuel requirement (which is affected specifically by the fuels used, the dwelling and energy efficiency). Hence fuel poverty goes up if energy prices rise, although some of this can be offset by rising incomes and increased energy efficiency. Note that at the time of writing the official definition of fuel poverty used has been under review by John Hills (2011, 2012) and is likely to change in the future.

Fuel poverty in the early days of the SO

The Conservative government did not recognise fuel poverty as a problem and avoided using the phrase in official documents (Boardman 2010). Its focus was very much on privatisation of the energy industry assuming that the benefits of this process would eventually reach all customers in the form of cheaper energy prices (Sharratt et al. 2007).

This is also reflected in the regulator's publications on energy policy at the time. Not surprisingly, the consultation document on energy efficiency published by OFFER in 1991 does not refer in any way to fuel poverty (OFFER 1991). There is also no reference to fuel poverty either in the consultation or the proposals on EESoP 1 (1993, 1994). However, part of the criteria that the energy suppliers were required to consider when selecting projects under EESoP 1 were related to fuel poverty. Suppliers were obliged to take into account 'the interests of Consumers and in particular the interests of those Consumers who are elderly or disabled, who are in rural areas or who may have difficulty in meeting their obligation to pay for electricity' (OFFER 1994, p. 20). Those criteria are based on the duties of the regulator laid out in the 1986 Gas Act and 1989 Electricity Act (see section 5.1.2). EESoP 1 was put in place with the expectation that around 35% of energy savings would accrue to low income customers, although in practice about 60% of the suppliers' expenditure had been spent on this group (OFFER 1998a).

Nevertheless, in the early 1990s the SO was not oriented towards fuel poverty very much and there was a presumption that, if at all, then government should fund fuel poverty programmes such as the Home Energy Efficiency Scheme, which later became Warm Front (Interview UK11). Fuel poverty was seen as an unacceptable concept according to a former DETR official:

> *[…] at the time we weren't really allowed to talk about fuel poverty, that wasn't an acceptable issue to talk about. (Interview UK3)*

However, while fuel poverty clearly did not play a significant role in the 1990s (both for energy policy in general and the SO), in the 2000s a lot of debates took place around fuel poverty and its eradication.

Change of government and more emphasis on fuel poverty

While the Conservative government more or less ignored fuel poverty, it became an issue of high political significance immediately after the Labour Party won the 1997 election. The responsible minister at DETR announced that the government would introduce new policies to tackle fuel poverty, one of which was to reduce VAT on domestic fuel to 5%, the minimum rate permitted by EU rules (Boardman 2010).

EESoP 2 reflected the new emphasis on fuel poverty, at least partly. Using the same criteria as EESoP 1, for EESoP 2 OFFER expected that about 67% of the total expenditure for the scheme would be spent in the low-income group (OFFER 1998a). Again, there was no reference to fuel poverty, but the phrase 'low-income customers' was used for the first time in SO related documents.

In the 1999 consultation paper on energy efficiency OFGEM explicitly mentions fuel poverty as one of the key objectives of energy efficiency schemes (OFGEM 1999). This was also reflected in OFGEM's Social Action Plan (OFGEM 2000c), a document that the new Labour Government asked the regulators to prepare as a result of a fundamental review of utility regulation (DTI 1998b). Putting social objectives on utility regulators was a general trend after the election of Labour in 1997 (Sharratt et al. 2007) and similar initiatives took place in the water and telecommunications sector (Jones 2001). This approach was also incorporated legally in the 2000 Utilities Act which states that the regulator and the Secretary of State must have regard to the interests of (a) individuals who are disabled or chronically sick, (b) individuals of pensionable age, (c) individuals with low incomes, and (d) individuals residing in rural areas. As a result, it came as no surprise that when presenting the framework for EESoP 3, OFGEM stressed that the SO 'can help to tackle fuel poverty' (OFGEM 2000b, p. 3).

In addition to the Utilities Act, tackling fuel poverty became enshrined in legislation in 2000 when the Warm Homes and Energy Conservation Act passed through parliament. The Act required government to develop 'a strategy setting out the authority's policies for ensuring, by means including the taking of measures to ensure the efficient use of energy, that as far as reasonably practicable persons do not live in fuel poverty'. The Warm Homes and Energy Conservation Act demanded that a target date must be specified not more than 15 years from the date on which the strategy is published. In 2001, the government published the UK Fuel Poverty Strategy and committed to eradicate fuel poverty in vulnerable households in England by 2010 (DTI 2001). This was an interim target with the long-term target being to eradicate fuel poverty as far as is reasonably practicable by 2016 given the publication date of the strategy in 2001. Because the document did not set an explicit target for 2016, i.e. the eradication of an unknown number, it was criticised (Hills 2011). The SO is mentioned several times in the document as one of the measures that would help to bring down fuel poverty.

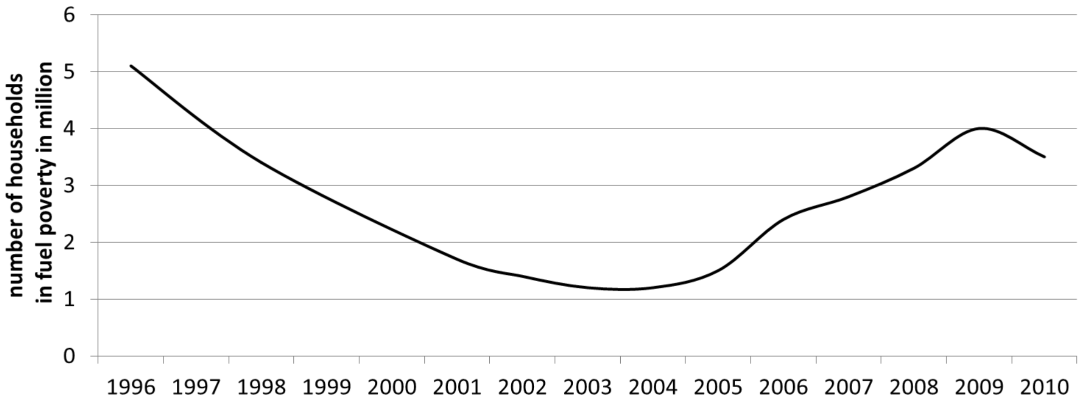
Around the same time when the UK Fuel Poverty Strategy had been published, the government set up a Fuel Poverty Advisory Group (FPAG) for England consisting of representatives from the energy suppliers, fuel poverty NGOs, consumer and housing groups, ACE, and independent experts.[6] In its first annual report FPAG named the SO as one of the three key policies to reduce fuel poverty in the UK (FPAG 2003). FPAG also voiced concerns about the effectiveness of the SO to reduce fuel poverty (for example because of the likely promotion of light bulbs in fuel-poor households rather than insulation measures) and demanded a modification of the SO for the purpose of reducing fuel poverty.

Rising fuel poverty despite government strategy

Ironically, shortly after the adoption of the UK Fuel Poverty Strategy fuel poverty increased rapidly. The problem with the UK Fuel Poverty Strategy was that it relied on falling or at least not rising fuel prices (Boardman 2010). However, energy prices increased significantly over the last decade as pointed out in an earlier section. As a result, the number of households living in fuel poverty actually went up, not down following the adoption of the UK Fuel Poverty Strategy.

[6] Similar advisory groups were set up in Scotland, Wales, and Northern Ireland.

Figure 9: Number of households in fuel poverty in England (1996-2009)



Source: based on DECC (2012b) figures for 1997, 1998, and 2000 interpolated

Similar developments can be found in Scotland, Wales, and Northern Ireland (Boardman 2010). This trend was flying in the face of the fact that access to affordable warmth was one of the four main goals in the 2003 Energy White Paper (DTI 2003) and remained a goal in the 2007 Energy White Paper (DTI 2007).

In every report produced on fuel poverty in England, FPAG criticised government for not delivering on fuel poverty and demanded more resources to be put into its eradication (FPAG 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011). The anticipated failure of eradicating fuel poverty in vulnerable households led to a judicial review requested by Friends of the Earth and Help the Aged. However, the judicial review resulted in a ruling that government had done its job by publishing the Fuel Poverty Strategy and setting a target date as required by the Warm Homes and Energy Conservation Act. This was despite the fact 'that the strategy might be inadequate, provisional and out of date' (Boardman 2010, p. 14). In the end, the interim target date passed after 'a devastating period for the fuel poor' (FPAG 2010).

Tension of objectives of SO

Due to the rising number of households in fuel poverty there was constant pressure on the SO to address the issue at least to some extent. This caused a lot of tension due to the different objectives of the SO (reducing carbon emissions on the one hand and fuel poverty on the other), a process that is not unusual when putting social and environmental obligations on private utilities in a liberalised market (Jones 2001).

There is an incentive for suppliers to work mainly with well-off customers because they are able to make a higher contribution to the measures delivered (Interview UK4, UK5, UK6, UK7) and suppliers may get business out of engaging with them whereas low-income customers are perceived as being less attractive financially (Interview UK3, UK7). By putting in place a PG target, suppliers are forced to allocate a large share of their activities to those assumed to be vulnerable.

According to the consultation document on EEC 1, alleviating fuel poverty was one of the three main objectives of the scheme (after reducing carbon emissions and lowering the costs of energy). This is also mirrored in the introduction of the obligatory PG target of 50%; previously there was only an indicative target (DEFRA 2001). The introduction of a firm PG target is clearly related to the Labour Government and its election in 1997 (Interview UK1). The logic of the PG is that all households contribute to the SO with their energy bills and therefore all households, and particularly the fuel poor, should benefit from the SO. Ideally, this would make the benefit allocation progressive (Eyre 2008).

But there are some trade-offs:

- *Regressiveness*: As described above, the costs of the SO to suppliers are passed on to customers in the form of increased energy bills. By definition, the revenue *raising* part of the SO is therefore regressive as is any other policy paid for via energy bills (Boardman 1993, 1995; Dresner and Ekins 2006; Ekins and Lockwood 2011). Due to confidentiality issues, no public data on the exact costs is available. Suppliers pass on the cost at their own discretion (Boardman 2004) and are likely to spread the cost unevenly across customers putting the burden on 'non-switchers' and those not on direct debit (Preston et al. 2010), a group that is overrepresented amongst fuel poor households (Boardman 2010). With increasing size, projected contributions from customers to the SO went up from just £1 per customer per annum in 1994-98 (OFFER 1994) to about £54 in 2012 (including both CERT and CESP) (OFGEM 2012b), although ex-post estimates for EEC 1 and 2 show that suppliers delivered the obligation for 20% and 23% less than expected, respectively. Even though the cost effectiveness of the obligations increased substantially over time (Lees 2006, 2008), rising energy prices are regressive in that they hit families in the lower income bracket proportionally harder than those with higher incomes. Hence, if insufficient numbers of households in fuel poverty are beneficiaries, increasing reduction effort via the SO has regressive impacts.

- *Cost effectiveness*: The higher the fuel poverty component is, the higher are also the costs of delivery, first because PG households usually receive the measures for free, i.e. with a 100% subsidy compared to for example, a 50% subsidy in the non-PG, and second because it is more difficult to identify people who are willing to receive energy efficiency measures when they have to be within a defined group. This effect shows in evaluations of past SO schemes. An example is the Energy Efficiency Commitment 2005-2008, which estimates that suppliers spent more than 60% on delivering the PG obligation even though it was only 50% of the overall target (Lees 2008). As this does not include the indirect cost, the figure is likely to be even higher. The introduction of the SPG led to higher supplier search costs resulting from sourcing the same share of carbon savings in a smaller pool of household opportunities (Interview UK2, UK7).

- *Rebound effect*: Low-income households take more of the energy savings in the form of increased comfort (rebound effect) because they tend to underheat their homes compared to the able-to-pay (Milne and Boardman 2000; Sanders and Phillipson 2006). Obviously, providing people with the means to adequately heat their homes has many well-documented benefits including improved health and well-being (Boardman 2010) and justifies policy intervention before even considering the impact on carbon abatement. However, due to the increased comfort taking of low-income households, it is also clear that in order to achieve the same carbon reduction, a greater energy efficiency improvement associated with higher costs is required compared to the able-to-pay. One interviewee representing Consumer Focus, a consumer organisation, claimed that for this reason early versions of the SO tended to focus on the able-to-pay (Interview UK14).

These trade-offs were subject to controversial debates over the last ten years and remain largely unresolved. FPAG was supportive of using the SO as a mechanism to address fuel poverty, even though they would have preferred a grant scheme such as Warm Front to take a more important role:

> *Ideally, any additional resources needed to meet the fuel poverty targets should, in the Group's view, be provided through fuel poverty programmes like Warm Front. EEC could then be focused more on carbon savings. However, assuming a limitation on public resources, EEC would need to play a significant role in meeting fuel poverty targets as well as helping low-income customers more broadly on equity grounds. (FPAG 2004, p. 10)*

Subsequently, the SO was seen as a programme that could do both, reducing carbon emissions and contributing to the eradication of fuel poverty. However, at the latest from EEC 2 onwards it became clear that there was some confusion over the goals of the SO and also some evolving conflicts. While eradicating fuel poverty is mentioned in all the consultation documents following EESoP 3 as one of the objectives of the SO, the primary aim of the SO remained the reduction of carbon emissions. This becomes very clear in the EEC 2 consultation document. The document stresses that EEC 1 'was not intended to specifically target the fuel poor' (DEFRA 2004a, p. 7) and that the 'primary aim is to make a significant contribution to the UK's legally binding target under the Kyoto protocol' (ibid., p. 5). This is restated more strongly in the CERT consultation where it is stressed that the SO 'does not have a specific fuel poverty objective', that the PG target was put in place 'for reasons of equity' (DEFRA 2006a, p. 7) and that the SO will 'only ever be able to be a make a limited contribution to meeting our fuel poverty targets' (ibid., p. 29). The change in focus has been described as 'a discursive shift away from fuel poverty, toward a more 'pure' carbon reduction market' (Powells 2009, p. 2352) and one interviewee argued that 'the move to push for fuel poverty from these energy efficiency programmes [SO] has been slightly undermined over the time' (Interview UK5).

In contrast to DEFRA's consultation documents, FPAG sees the SO as a 'fuel poverty programme' (FPAG 2005), a view opposed by a former director of a UK energy agency:

> *[…] it is not a fuel poverty target, had never been a fuel poverty target. This is an environmental programme. And the Priority Group is because it is a social equity issue. […] Don't try and steal money from an environmental programme, make your programme work. (Interview UK4)*

Consumer groups recognise the fact that initially the provisions for low-income households were related to social equity rather than fuel poverty (Interview UK14).

However, FPAG demanded the PG component of the SO be ‘radically reformed’ in order to sharpen the SO’s fuel poverty focus (FPAG 2006, p. 3) and also that the PG savings target should be at least 50% because otherwise it would be highly regressive (FPAG 2007). FPAG subsequently criticised the reduction of the PG target from 50% (EEC 2) to 40% (CERT) as well as the enlargement of the PG to all households on benefits and all those over 70 (FPAG 2008). Because the total size of the SO increased by 100% from EEC 1 to CERT it meant that the number of households benefiting in the PG increased (but also the contribution from fuel-poor households to the SO), even though the share of the total target got lowered. FPAG acknowledged that but would have liked the PG target to have remained at 50% nevertheless.

Effective lobbying by organisations such as Consumer Focus, National Energy Action (NEA), Age Concern and Help the Aged (now Age UK) put further pressure on DEFRA to make provisions for fuel poverty (Interview UK3, UK14). NEA wanted the SO to include ‘targets which focus on the achievement of affordable fuel costs’ (NEA 2000, p. 1), although NEA argued that the ‘unsatisfactory attempt to shoehorn a social dimension into an energy saving scheme suggests that in the longer term it may be more effective to separate these objectives’ (NEA 2001, p. 3). Given that this was unlikely to happen, NEA demanded a PG target of at least 75% for EEC 1 (NEA 2001), 62.5% for EEC 2 (NEA 2004) and at least 50% for CERT (with 65% of resources spent in PG) (NEA 2006). However, NEA maintained that the ‘different objectives tend to produce sub-optimal outcomes for both’ (NEA 2007, p. 3) and that a programme funded by taxation would be a progressive option of financing both carbon reduction and fuel poverty alleviation activities. When CERT was extended, DECC introduced the SPG in order to focus more activity on those affected by fuel poverty. NEA supported this move and lobbied for the SPG target to be higher than the proposed 10% share (NEA 2010). It ended up being set at

15% of the total target and one interviewee commented that ‘SPG was a ‘concession to the fuel poverty lobby’ (Interview UK7).

The suppliers, on the other side, generally opposed high PG targets and one interviewee suggested that they ‘would have been happiest with no PG at all’ (Interview UK1). Both the enlargement of the PG and the drop from 50% to 40% was a result of DEFRA listening to the concerns of the energy suppliers (Interview UK6). ERA urged government to reduce the PG target even further to 25% and, in conjunction with NIA, provided evidence on why a higher target would not be feasible to achieve 40% (ERA 2007). ERA also pointed out that it did not believe that the SO was an effective instrument for tackling fuel poverty and that ‘refining a carbon policy instrument to tackle fuel poverty is not the right approach’ (ERA 2007, p. 2). Instead, ERA argued that a ‘Private Sector Single Scheme’ should be introduced funded by the utilities but run by organisations with expertise in social welfare provision (ERA 2006). Similar views were put forward by the energy efficiency industry. ACE stresses that the SO ‘can only coincidentally help people living in fuel poverty’ and that other mechanisms need to be developed in order to eradicate fuel poverty (ACE 2006, p. 7).

With energy prices unlikely to fall significantly over the next years and fuel poverty still being at very high levels, the conflicts sketched above will probably not go away:

> *So there was a lot of toing and frowning about that and kind of what is and isn’t about the programme. Is it primarily carbon, is it fuel poverty, or is it both. And I don’t think that issue is anywhere near resolved. (Interview UK8)*

Summary

Fuel poverty policy did have a significant effect on the SO, particularly after the Labour Government came into power in 1997. While it was not the main driver for the increase in the targets,[7] the introduction of the PG is clearly related to debates around fuel poverty. With a scheme being funded by energy bills and incentives for suppliers to engage with the well-off customers, there is a strong rationale to make provisions on the grounds of social equity. However, the extent to which this was deemed acceptable varied and the different stakeholders took diverging views on the matter. The constant tension over the SO's objectives, including the resistance of the energy companies to high PG targets and the preference of the fuel poverty lobby for a separate scheme funded by general taxation, clearly falls into the category of the negative policy feedback (Weaver 2010). However, even though such negative policy feedback processes occurred, the SO continued to make provisions for low-income households because of the lack of other ambitious fuel poverty policies and accumulating pressure in the form of increasing fuel poverty mainly resulting from rising energy prices.

4.2.7 Energy efficiency industry

Another driving force that has been identified is the growth of the energy efficiency industry as a result of the SO. While the cost of the scheme is born by the energy suppliers and their customers, the beneficiaries of the policy instrument clearly are the companies providing the energy efficiency measures incentivised by the SO. With expenditures of currently more than £1 billion per year the SO creates a significant market for the energy efficiency industry. As one interviewee put it:

[7] Some stakeholders voiced concerns about increasing the targets due to the regressive nature of the SO's funding basis. For example, NEA (2004) stressed that without sufficient provisions for the fuel poor, EEC 2 may aggravate fuel poverty rather than reduce it.

> *[Y]ou have in effect an entire industry that built up around it. An industry and a market that doesn't really exist in its own right. It is a highly subsidised market, therefore it is probably not really a genuine market. (Interview UK8)*

Another interviewee even mentioned the term 'subsidy junkies' when asked about the role of the energy efficiency industry (Interview UK14).

Interest groups which benefit from public policies are a classic example of positive policy feedback (Béland 2010; Pierson 1993a). It is therefore not surprising that a policy such as the SO with substantial monetary benefits for a particular industry displays this effect.

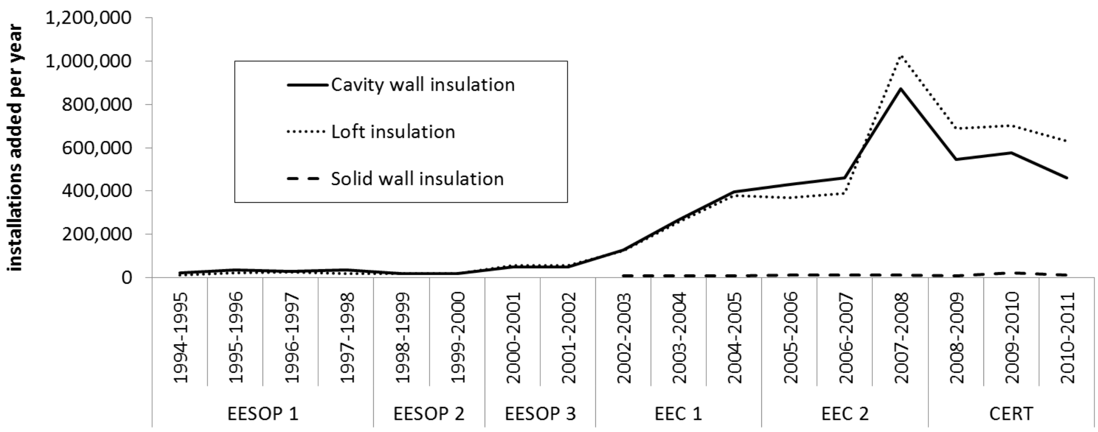
Unfortunately, no reliable data of the past growth of the insulation industry in terms of turnover, number of companies or number of jobs could be identified and the few assessments that exist are dated (e.g. Element Energy Ltd 2008; Purple Market Research 2007, 2009). Still, the importance of the SO for the energy efficiency industry can also be illustrated by looking at the uptake of the various measures that were supported by it. A good example is insulation measures, which are the most important measures in terms of their contribution to the overall targets.

Growth of insulation industry

While at a very low level initially, primarily because of the low targets in the beginning and also because EESoP 1 and EESoP 2 focused solely on homes heated by electricity, the number of insulation measures supported by the SO increased rapidly particularly after EEC 1 started. The following graph shows data on the installation rates of cavity wall, loft, and solid wall insulation from 1994-2010.

Note that the data refers to installations per year based on published OFGEM reports and they exclude any carry-over activity from previous schemes in order to represent actual installation rates. For EEC 1 and EEC 2 no annual figures for solid wall insulation were available and the total for the whole period of the scheme was allocated on a pro-rata basis to generate annual figures.

Figure 10: Uptake of insulation measures under the SO (1994-2010)



Source: based on various sources (OFGEM 2005, 2006, 2007, 2008c, 2009c, 2010b, 2011b; OFGEM and Energy Saving Trust 2003)

Obviously there had been some activity in the insulation market already prior to the SO, but installation rates were much lower compared to what was undertaken during the last SO schemes. Before EESoP 1 started in 1994, only around 100,000 cavity wall insulation installations were carried out per year (Lees 2006). During EEC 2 and the first three years of CERT more than 550,000 cavity wall insulation installations were carried out on average every year. Even if one assumes that the activity that had been there prior to the SO already is included to 100% in that figure, it still means that the market for cavity wall insulation effectively grew by a factor of about five within just ten years as a result of the SO. Figures on the business as usual installation rates are also provided by the Impact Assessment of the Green Deal and the Energy Company Obligation which indicate that less than 50,000 cavity walls would be insulated without policy support (DECC 2011d). Those figures imply that EEC 2 and CERT increased the installation rate by a factor of ten.

Energy efficiency lobby

According to Toke (2000), the interest groups around energy efficiency did not have much influence in the 1980s and early 1990s, but at the end of the 1990s they were in a powerful position in the decision making process.

Particularly over the last 10 years the energy efficiency industry has been getting stronger and continuously put pressure on government to increase the savings targets (Interview UK3, UK8, UK12). One interviewee mentioned the 68% insulation target introduced as part of the CERT extension in 2010 as proof of the influence the insulation industry now exerts:

> *I think over the years as they become bigger they become more organised, they become more professional, they've got the trade associations the NIA [National Insulation Association] and ACE which both are quite well connected politically. And you can see that in the CERT extension you've got a 68% insulation target. I mean that has come directly from the insulation industry saying you need to keep increasing the target, there is more in our supply chain to do this at least. (Interview UK12)*

ACE has been lobbying governments since 1981 (Pickvance 2009), and while the organisation was formed with an initial membership of only three companies (Dawkins 1987), it now represents twenty companies with a substantial interest in the UK energy efficiency market. Members include insulation manufacturers such as Knauf Insulation (UK) Ltd.; glass manufacturers such as Pilkington plc; controls manufacturers, e.g. Honeywell Control Systems Ltd.; installers of energy efficient equipment such as Mark Group; but also two major energy suppliers: E.ON UK and ScottishPower. In the early days of its existence ACE had limited impact on government policy, although it quickly developed a visible public and press profile (Owen 1995) and reached ‘insider status’ (Dawkins 1987, p. 255).

Andrew Warren, director of ACE, was a Special Advisor to the House of Commons Select Committee on the Environment and has given evidence to many House of Commons and House of Lords Select Committees. ACE also frequently responds to government consultations (more than 120 from 2001-2011) and asks for a long-term policy framework and energy efficiency targets (e.g. ACE 2002). In its responses ACE argued for higher energy savings targets; for example, ACE demanded that CERT should be at least twice the size of EEC 2 if not bigger in order to ‘encourage business to maintain current capacity’ (ACE 2006, p. 7). The association highlighted that 70% of the overall EEC 2 target had been achieved after only 15 months, leaving 21 months for the remaining 30%. In order to keep the order books of the energy efficiency industry full, ACE argued, a much higher target for CERT was needed. The same argument was used in a response to a consultation on the 20% CERT uplift in 2009: ACE stressed that after just nine months almost half of the CERT target had already been reached and that the uplift could be increased further (ACE 2009). Concerns raised in the DECC consultation document (DECC 2009a) about the capability of the insulation industry to deliver at a higher rate were disregarded by ACE in a response to the consultation on the extension of CERT to December 2012 (ACE 2010).

The stop-start issues around the SO clearly were a major driver and had an impact on government thinking:

> *But as time went on and they got more experience of doing it and each time the targets were delivered before the end of the period so government then would have to think about the insulation industry or the lighting industry, you’ve got to have to signal what’s going to happen*

> *in the next period, you've got to make it bigger and to carry over so it doesn't stop. That kind of really paved the way how each time it got extended, become widened and become bigger really. (Interview UK12)*

While not as visible as ACE, NIA is another important energy efficiency industry lobby organisation. NIA (called National Cavity Insulation Association until 2002) has operated since 1982. It represents more than 170 manufacturers and installers of cavity wall insulation, loft insulation, draught proofing, external wall insulation and other energy efficiency products in the UK. Among its members is also one major energy supplier, E.ON UK. Like ACE, NIA frequently provides evidence to Select Committees and responds to relevant consultations expressing its support of the SO, asking for higher targets and highlighting the capability of the insulation industry to deliver more. NIA also refer to the stop-start pattern of the SO delivery pointing out that this is a real concern for the insulation industry (e.g. 2006, 2007; NIA 2009).

There are many other lobby groups representing the interests of the energy efficiency industry including the Energy Services and Technology Association, the Mineral Wool Insulation Manufacturers Association, the Thermal Insulation Contractors Association, the External Wall Insulation Association, the Heating and Hot Water Industry Council, the British Electrotechnical and Allied Manufacturers Association, the Heat Pump Association, the Combined Heat & Power Association, the British Glass Manufacturers' Confederation, the Glass and Glazing Federation, and the Draught Proofing Advisory Association. This list is by no means comprehensive, but gives an indication of the number of lobby groups acting on behalf of the energy efficiency industry.

An umbrella body, the British Energy Efficiency Federation (BEEF), acts on behalf of 19 trade associations involved with the energy efficiency market. Its chairman is Andrew

Warren. BEEF was founded by an initiative of the British government in 1996 to 'provide a forum for consultation between the relevant trade associations within the energy efficiency industry and Government' (BEEF 2002, p. 1). The Federation meets quarterly with government officials to discuss relevant matters. According to Toke (2000), BEEF helped the energy efficiency industry to gain increased access to civil servants and ministers by, for example, being involved already at the pre-consultation stage rather than after proposals are finalised.

Energy Efficiency Partnership for Homes

BEEF also played a major role for setting up the Energy Efficiency Partnership for Homes (EEPH), which is an important forum for the concerns of the energy efficiency industry. It was launched by Michael Meacher, the then Minister of State for the Environment, in 2000 and is a network of currently over 600 organisations from the public, private and voluntary sectors involved in the delivery of energy efficiency measures in the domestic sector including the big six energy suppliers. According to EEPH, the idea of founding such a network came out of discussions between DETR, EST, and BEEF after the UK signed the Kyoto agreement. It has been facilitated by EST.

According to EEPH, the forum 'enable[s] supply chain stakeholder collaboration which enhances the evidence base that underpins government' and its work 'results in the identification of opportunities which improve the ability of the industries to deliver on government goals and targets' (EEPH 2010, p. 6). Its membership base grew from about 200 organisations in 2000 to more than 600 in 2011 and EEPH can probably be considered as the most important forum in the area of home energy efficiency policy in the UK (Interview UK4).

EEPH is now widely used by government to consult with stakeholders on home energy efficiency policy. The impact of EEPH on the development of the SO was also highlighted by a senior civil servant at DECC:

> *[…] [W]e used the Energy Efficiency Partnership for Homes which is one of their [EST's] biggest stakeholder groups to in a sense to sort of stress test the different assumptions underpinning the illustrative mix. (Interview UK2)*

Following Toke's observation that BEEF provided the energy efficiency industry lobby with opportunities to influence the policy process pre-consultation stage, EEPH took this one step further. Interestingly, Andrew Warren, the chairman of BEEF and director of ACE is also one of the two deputy directors of EEPH. It seems that ACE is extremely well connected which was confirmed by one interviewee who, when asked which were the main actors in the policy process prior to EEC 1, answered: 'ACE obviously' (Interview UK4). Although ACE only employs 11 staff it is one of the key players in home energy efficiency policy in the UK, a fact that had also been noticed by Owen (1995) at a time when ACE employed just 5 staff.

Summary

The energy efficiency industry undoubtedly benefited significantly from the SO and markets such as the cavity wall insulation market grew substantially over the last decade as a result of EEC 1 and 2 as well as CERT. Hand in hand with a growing industry also goes a strengthening of its lobbying power. While it is not possible to identify the particular features that were modified in the SO as a result of pressure by organisations such as ACE, NIA, and BEEF, there is evidence that those groups managed to get involved more directly in the decision making processes, for example by being consulted prior to the official consultation stage and being part of important stakeholder forums such as EEPH. The expansion of energy efficiency lobby groups clearly falls into the category of positive policy feedback, contributing not only to the maintenance of the SO, but also to its expansion.

4.2.8 Perceived success of policy instrument

Growing experience with policy instruments usually results in the expansion of the administrative capabilities of the state and its agencies making it more likely that similar policies are implemented in the future (Pierson 1993a; Skocpol 1992). The same is true for the regulated entities which equally reorganise according to a particular policy regime. Once established, these effects contribute to a positive perception of a policy, which has also been a driving factor of the SO. Note this does not refer to the 'real' effectiveness of the policy instrument (e.g. how many tonnes of carbon emissions were saved), but to how it is perceived by policymakers and other stakeholders. While initially there were concerns about how such a policy instrument might work and what the costs and benefits would be, government became much more confident in the SO and considered it as a very successful instrument (Interview UK1, UK2, UK3, UK4, UK5, UK8, UK12). This also comes out of the government reports in which the SO was labelled as 'highly successful in delivering cost-effective energy efficiency improvements' (DEFRA 2007b, p. 28), the 'flagship energy efficiency scheme' (DECC 2009b, p. 5), and 'one of the most cost-effective policies to reduce carbon emissions' (DEFRA 2007a, p. 4).

Initial concerns

It did take a while until the SO was so highly regarded. At first, people did not want to over-commit to something they were not familiar with and there were concerns about the costs and the benefits, and whether it would work (Interview UK2, UK3, UK9). However, those concerns diminished with time and 'people felt more confident, it seemed to be pretty successful, it seemed to be popular, and then they were prepared to push on a bit further' (Interview UK3). Part of addressing those concerns was the publication of an assessment by the National Audit Office in 1998 which concluded that EESoP 1 was a successful and cost-effective scheme that should be extended and widened in the future (National Audit Office 1998). Also according to the results of the Climate Change Programme Review, the Energy Efficiency Commitment was one of the most cost-effective policies to reduce carbon emissions (DEFRA 2006b). In its CERT consultation DEFRA announced that it had therefore been 'decided to maximise carbon emission reductions via this policy mechanism' (DEFRA 2007a, p. 4).

Role of suppliers

In an early paper about the politics of energy efficiency and the role of ACE, Dawkins (1987, p. 263) predicts that in case of the implementation of a policy such as the SO in Great Britain 'we would probably see the massed ranks of the energy supply lobbies coming into the fray'. Resistance from vested interests constitutes a well-recognised phenomenon (Baumgartner 2009). However, when the SO was first discussed in the early 1990s, resistance was not as fierce as predicted. British Gas openly opposed a policy similar to the SO but the electric utilities reacted in a more measured way with some utilities such as East Midland Electricity and Manweb even supporting a new policy framework carrying out pilot projects in that area. Other electricity utilities, such as South Western Electricity and Eastern Electricity, were more concerned and reluctant to embrace the concept of utility energy efficiency programmes (House of Commons Environment Committee 1993a). After implementation and throughout the various schemes, energy suppliers frequently raised concerns over the deliverability of the SO (Interview UK5, UK11) and at some stages even, for example prior to EEC 1, that those could never be met

(Interview UK4). There is also evidence on this from the consultation responses of the Energy Retail Association (ERA, now Energy UK), which represents the collective views of the big six energy suppliers. During the EEC 2 consultation ERA raised concerns about the lack of capacity in the insulation industry to deliver measures and a lack of demand. It therefore urged DEFRA to 'come forward with more reasonable target savings' (ERA 2004a, p. 7). ERA suggested a target about 25% smaller than the proposed EEC 2 target and argued that just over half of the assumed number of cavity wall insulation installations 'might be achievable' (ERA 2004b, p. 14). Similar concerns were put forward during the CERT consultation in 2007 and ERA pointed out that according to ERA's own analysis DEFRA had overestimated the volume of CERT targets that could be achieved (ERA 2007). Similar arguments were made by individual energy suppliers in their response to various consultations. For example, SSE plc (formerly Scottish and Southern Energy plc) stressed in its response to the CERT consultation that the proposed CERT target would 'represent an immense challenge for all energy suppliers' (SSE 2007) and Scottish Power were concerned that the CERT target would be 'a significant challenge to deliver and will put strain on the insulation industry' (ScottishPower 2007).

However, in the end suppliers delivered and discharged their obligations long before the end of all schemes (Interview UK2, UK5, UK6, UK11, UK12); they 'jumped as high as the government wanted them to jump' (Interview UK5). Because suppliers met their targets so easily, government became more confident that the targets could be increased (Interview UK2). This is also highlighted in the CERT consultation document (DEFRA 2006a). While energy suppliers kept raising concerns about the size of the targets they lost credibility given that in spite of pointing out how difficult those targets were they always delivered what was expected. One interviewee suggested that the companies cried wolf too often resulting in government becoming more doubtful about their claims (Interview

UK5). Clearly, the energy suppliers were aware of this and as a senior manager of one of the big six energy suppliers put it: 'We have just been victims of our own success.' (Interview UK12).

When asked whether by consistently over-delivering the energy suppliers did not shoot themselves in the foot signalling that they can achieve the targets that they deemed not achievable in the beginning, a representative of an energy supplier mentioned the reputational risk involved in not discharging their obligation, the potential penalty of up to 10% of global turnover,[8] and potential risks of under-delivery if doing it too late in the scheme (Interview UK12). Suppliers also always delivered their obligation much earlier than needed because there is a risk that the supply chain struggles with delivering the measures required if demand is slowing down and increasing shortly before the scheme concludes (Interview UK2). Furthermore, consumer demand may not be there when it is needed if companies leave it to the very end (Interview UK6).

Both over-delivery and consistently meeting the targets were a major factor for extending the SO. In addition, the opposition to the SO from suppliers remained confined to the scale of the targets and the particular design, such as PG rules. Outright opposition against the policy instrument was rare, one reason being that the alternatives, such as a levy on energy and a fund independent of the suppliers, was a less attractive option from an energy supplier's perspective:

> *'It kind of suits energy suppliers as far as it goes. It is there, they are not fans of regulation […]. But from their perspective they've got that business established now and it is easy to keep that ticking along. And they have got to a point now where they see some competitive advantage*

[8] Note that it is unlikely that the fine would be 10% of global turnover; this is just the upper limit as one interviewee suggested (interview UK1).

> *for them in it in that it gets them in the door, it gets them a profile with the customer, it might mean that they then can do something to get them onto their tariff at some point. So there is that side of things, so for them, that suits them. […] And then also going to a potentially more onerous form of regulation, something that is more administratively burdensome for them is also not in their advantage. I think there is an element of better the devil you know.' (Interview UK8)*

Also, the SO does not put suppliers at a competitive disadvantage because all of them are subject to the same policy. All of the above are reasons for only modest resistance to specific elements and support of the SO from suppliers.

Summary

While there were initial concerns about the SO and its implications, the policy instrument is now considered very successful. The main reason for its perceived success is simply that it worked in the sense that energy suppliers delivered their obligations. Even though energy suppliers stressed the difficulties of achieving the increasing targets, government became more and more confident that they would meet future targets based on past experience. Therefore they felt self-assured to enlarge the targets every time a new SO scheme was designed. There are a number of processes at work that can be put in more theoretical terms: First, there was some negative policy feedback when the interest group of energy suppliers claimed that the SO was very difficult to achieve. However, this kind of policy feedback proved fairly weak and positive policy feedback in the shape of the targets being achieved more than outweighed negative policy feedback. Additionally, the administrative capability and with it the confidence of government to run the SO increased over time. Again, this falls into the category of positive policy feedback.

4.2.9 Policy drivers not found relevant

EU policy was not mentioned as a driver by any of the interviewees, rather UK policy makers uploaded the SO as a suitable instrument onto the EU energy efficiency agenda (see draft of Energy Efficiency Directive which explicitly demands all member states to implement energy savings obligations although other measures are permitted if amounting to the same level of energy savings).

Conclusions

This chapter sketched the development of the principal home energy efficiency policy instrument in the UK from its inception identifying some, but not all, driving forces that impacted on policy change. The SO shows remarkable and frequent changes in its development, and arguably few people would have expected the scheme to reach the scale it arrived at in recent years. The analysis of the drivers shows that it was mainly gradual processes that caused the changes. This is contrary to the perception that significant policy change is mainly triggered by crisis events.

The SO was initially driven by attempts to incentivise the efficient consumption of energy at a time of market liberalisation and constrained public funding. Using utilities as a vehicle to promote energy efficiency had a high ideational fit with the dominant regulatory framework at the time. Later on, other issues such as climate change, rising energy prices, and fuel poverty became more and more important. In addition, changes in institutional structures and key personnel had a significant impact on the SO. Both were a source of friction and acted as a bottleneck. The growth of the energy efficiency industry and the perceived successfulness of the SO put further pressure on the government to stick with the instrument and increase the targets. Both drivers fall into the category of positive policy feedback.

The question remains whether the trend of ever increasing targets will continue in the future given that rising targets also mean a higher contribution by households on their bills particularly because the potential for low cost measures will at some point be depleted. According to a recent government consultation, the successor of the current SO will set a target equivalent to expenditure levels slightly higher than those generated at the moment. However, the carbon target is supposed to be much lower due to a redirection of the SO from low-cost measures to more high-cost measures and the introduction of new policy instruments to incentivise low-cost measures (Rosenow and Eyre 2012). This could have a significant effect on the SO once again. Therefore, future developments promise to be an interesting area for more research.

5 Case II: CO_2 Buildings Rehabilitation Programme in Germany

Politics is a slow drilling of hard boards with both passion and measure.

Max Weber, 1919 (quoted in Ringer 2004, p. 249)

While the history of the KfW CO_2 Buildings Rehabilitation Programme (CBRP) is seven years shorter than that of the SO, it is no less colourful and interesting. Some issues were similar, for example the impact of climate change policy on energy efficiency policy. Others were distinct, such as the fiscal dynamics. Logically, the structure is similar to the previous chapter: First, in a descriptive section background information on the CBRP and the main policy changes that occurred is provided. This is followed by an in-depth analysis of the CBRP.

5.1 Background and main changes of CBRP

The CBRP is run by the Kreditanstalt für Wiederaufbau (KfW), meaning Reconstruction Credit Institute. KfW was formed in 1948 after World War II as part of the Marshall Plan. Since its creation the KfW has run several loan and grant programmes related to housing refurbishment. The first programmes started in 1990, although their primary focus was not energy efficiency but modernising the housing stock in the east of Germany after reunification. Only with the CO_2-Minimisation Programme did the KfW introduce a programme with the specific aim to reduce carbon emissions from the housing stock (Schroeder et al. 2011).

A summary table of those programmes is provided below.

Table 6: KfW housing refurbishment programmes

Name of programme	Period
Housing Modernisation Programme East I	1990-2000
Housing Modernisation Programme East II	2000-2002
Housing Modernisation Programme 2003	2003-2004
Housing Modernisation Programme 2005	2005-2011
CO_2-Minimisation Programme	1996-2004
CO_2-Building Rehabilitation Programme	2001-today

Source: created by author based on BMVBS (2011)

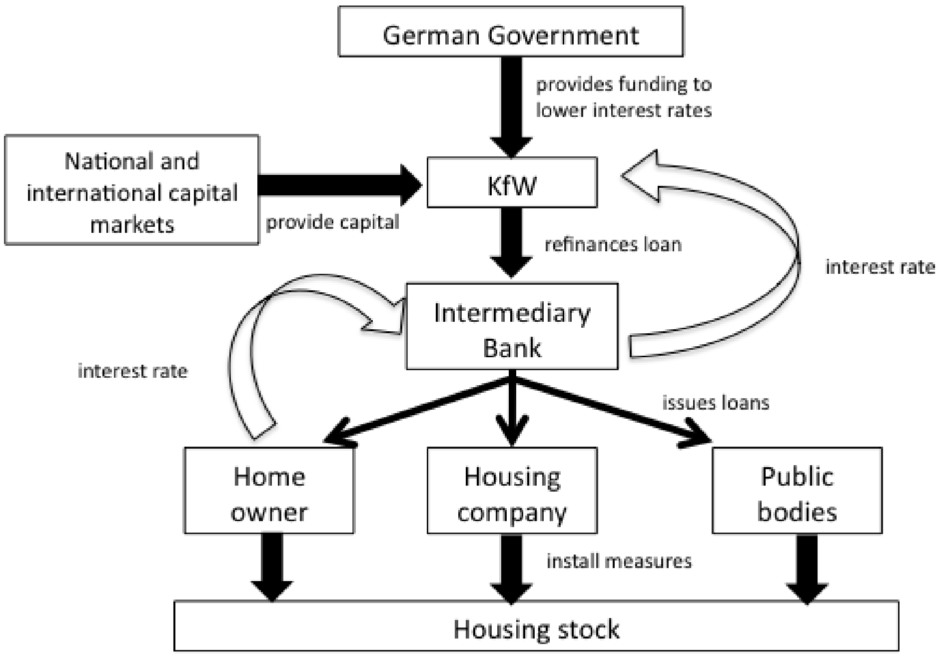
By far the most significant loan and grant programme in terms of energy savings was the CBRP which is still running today. While this thesis focuses on the CBRP only, a short overview of the other programmes is provided as part of the analysis.

Note that there were other programmes until 2010 focusing on non-domestic communal buildings such as schools, child care facilities, and facilities of organisations with a communal and social focus. These programmes include the Municipality Loans (2007-2009), Energy Efficient Refurbishment – Municipalities (2009-present), and Social Investment – Energy Efficient Refurbishment (2009-present) (Clausnitzer et al. 2011). However, the focus of the following analysis lies on the CBRP only.

5.1.1 Basic architecture of the CBRP

The CBRP provides low-interest loans and grants to households for specified energy efficiency measures. In the beginning the CBRP focused only on existing homes but later on loans and grants were also provided as part of the programme for energy efficient new buildings. The Federal Government funds the scheme and enables the KfW to issue loans with an interest rate lower than market rates. In addition, some of the funding provided is used to issue grants. Making use of both federal funding and national as well as international capital markets, KfW offers financial products to finance housing refurbishment. Homeowners, housing companies, and public bodies can apply for loans and grants at an intermediary bank which assesses the individual financial circumstances of the applicant. The intermediary bank then forwards the application to the KfW that then approves the loan or grant. Figure 11 outlines the model described above.

Figure 11: KfW schemes and financial arrangement



Source: created by author

The CBRP started in 2001 and is still running. It has become the most important instrument in Germany to tackle carbon emissions from existing homes. While the Programme changed over time, the core idea of providing low-interest loans (and later grants) remained the same. The following section sketches the development of the CBRP from 2001 to 2010 focusing on the key policy changes that took place. This is followed by an in-depth analysis of the modifications made over time.

5.1.2 Main changes of the CBRP from 2001 to 2010

The history of the CBRP is characterised by a lot of modifications. As before, this section only describes those changes without analysing the political dynamics behind them – a detailed investigation of the policy processes behind the modifications that occurred follows in a later section.

The most important changes occurred in the following areas:

Table 7: Main elements of policy change in case of the CBRP

Main elements of policy change
an increasing though varying budget for the CBRP
the type of measures allowed
the introduction of grants alongside loans
programme restructuring

Those changes will be explained in detail below.

Funding and loans/ grants issued

As already indicated above, the annual funding by the federal Government to support the CBRP changed significantly over time. There is, however, some confusion over the way the funding is accounted for. The KfW, the evaluations of the CBRP and the supply chain use the term CBRP for the loans and grants for domestic energy efficiency retrofits provided by KfW through the programme called CBRP. The responsible government department, BMVBS, uses the term CBRP as an umbrella term capturing a wide range of programmes including loans and grants for municipalities, new buildings etc. In the budget the term CBRP is used in the same way and funding for the CBRP covers a wide range of different programmes (KfW, personal communication 15/05/2013). The two definitions of the CBRP are therefore:

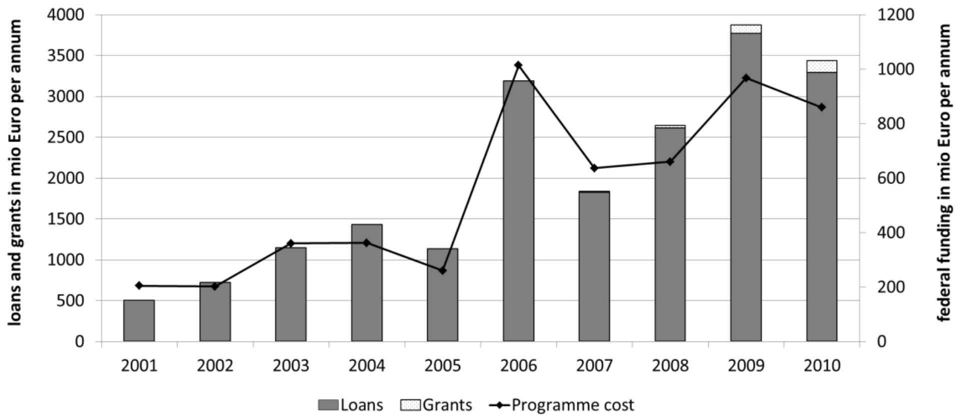
- BMVBS definition: CBRP encapsulates loans and grants for energy efficiency retrofits, loans and grants for energy efficient construction and municipality loans.

- KfW definition: CBRP encompasses only loans and grants for energy efficient refurbishment of domestic buildings.

This thesis uses the KfW definition. However, neither KfW nor BMVBS provide federal funding figures for the CBRP as defined by KfW i.e. the loan and grant programme for domestic energy efficiency retrofits. However, as Figure 12 shows, from 2001-2004 only loans for retrofit were funded under the umbrella term CBRP as used by BMVBS. We may assume therefore that the figures for federal funding from 2001 to 2004 for the CBRP refer to the CBRP as understood by KfW and this thesis. For the years 2005-2007 an independent evaluation (Kuckshinrichs et al. 2009) provides what the authors call 'programme costs' of the CBRP (KfW definition). By using the average ratio of loans and grants to programme costs the programme costs for the years 2008-2010 can be calculated.

On this basis, Figure 12 shows the federal funding for the CBRP (KfW definition) and the loans and grants issued from 2001 to 2010.

Figure 12: Federal funding of the CBRP KfW definition & loans and grants issued



Source: based on BMVBS (2011), (Kuckshinrichs et al. 2009) and own calculations

The loans issued by the KfW more or less follow the federal funding and on average the ratio federal funding (minus funding for grants) to loans issued is around 1:4. The reason for this relatively low ratio is that the interest rate reduction is not only paid in the first year of the loan but over the whole credit period. Hence the funding paid to KfW covers the interest rate reduction over the whole credit period for all loans issued in a given year rather than just the interest rate reduction for all loans that have been issued since the start of the programme. For example, for a loan of €50,000 paid back over 20 years (KfW loans have credit periods of up to 30 years) with an interest rate reduction of just 1% the total cost of reducing the interest rate that accrues over time adds up to about €10,000. For 2% this is about €20,000.

Grants were only issued from 2007 onwards (see below) and remain at a comparably low level when looking at the scale of loans provided by KfW. However, since the introduction of grants in 2007 their amount increased more than tenfold by 2010.

Mix of measures

Over time, the mix of eligible measures and the possible combinations of measures changed. From August 2001 to March 2009 loans provided by the CBRP only funded packages of measures, single measures were explicitly not supported (Clausnitzer et al. 2010).

At its inception the CBRP only supported the following packages of measures:

- Package of measures 1:
    - renewal of heating system
    - loft insulation
    - external solid wall insulation
- Package of measures 2:
    - renewal of heating system

    - loft insulation
    - basement insulation
    - renewal of windows

- Package of measures 3:
    - renewal of heating system
    - heating fuel switching
    - renewal of windows

Extra measures from Packages 1-3 could be added to the chosen package, Packages 1-3 are just minimum requirements.

Further combinations of measures outside of the scope of packages 1-3 were eligible if the measures were accredited by an approved architect or energy adviser to save at least 40 kg CO_2/m^2. The measures eligible for this feature of the scheme are summarised as Package of measures 4:

- Possible measures for Package of measures 4:
    - renewal of heating system
    - heating fuel switching
    - loft insulation
    - external solid wall insulation
    - basement insulation
    - renewal of windows
    - ventilation
    - ground source heat pumps
    - transparent insulation
    - photovoltaic

- CHP
- micro-renewables

The four Packages eligible for support by the CBRP did not change in the first two years of the scheme but in January 2003 another package of measures was added to the list (Diefenbach et al. 2005):

- Package of measures 0:
  - external solid wall insulation
  - loft insulation
  - basement insulation
  - renewal of windows

Also, two amendments were made to Package 4 in 2003. Financial support was granted if carbon emissions of more than 35 kg CO_2/m^2/year or 30 kg CO_2/m^2/year were saved (Diefenbach et al. 2005). However, after 2004 measures resulting in a reduction less than 40 kg CO_2/m^2/year were not supported by the CBRP any longer and were passed on to the Housing Modernisation Programme in 2005.

In May 2003, two further packages were added with Package of Measures 6 enabling new buildings to benefit from the CBRP as well (IER and PROGNOS 2004; KfW 2003):

- Possible measures for Package 5:
  - replacement of stand-alone heating devices using coal, oil, or gas, night storage heaters, and coal central heating systems with Energy Saving Ordinance 2002 compliant heating installations
  - replacement of oil or gas boilers installed before June 1982 with oil or gas condensing boilers in combination with solar thermal or other micro-renewables

- Possible measures for Package 6:
  - construction or purchase of new buildings compliant with the standard of the KfW Energiesparhaus 40 (<40 kWh/m^2)
  - construction or purchase of new buildings compliant with the Passivhaus standard

However, the two new packages did not feature for long in the CBRP: Package of Measures 6 was transferred to the new KfW programme 'Ecological Construction' from January 2005 (BAULINKS 2004). At the same time, Package 5 was taken out of the CBRP and became part of the newly created Housing Modernisation Programme of the KfW (KfW 2006b).

The following summary table presents the main changes related to the measures supported by loans from 08/2001 to 03/2009:

Table 8: CBRP loan requirements for packages of measures and refurbishment according to new built standard or better from 08/2011-03/2009

	08/2001	01/2003	05/2003	01/2005	02/2006	01/2007	10/2008	03/2009
Age of buildings eligible	built before 1978	no changes	no changes	no changes	built before 1984	built before 1995	no changes	
Package of measures 0	-	external solid wall insulation loft insulation basement insulation renewal of windows	no changes	no changes	no changes	no changes	no changes	terminated
Package of measures 1	renewal of heating system loft insulation external solid wall insulation	no changes	no changes	no changes	no changes	no changes	no changes	terminated
Package of measures 2	renewal of heating system loft insulation basement insulation renewal of windows	no changes	no changes	no changes	no changes	no changes	no changes	terminated
Package of measures 3	renewal of heating system heating fuel switching renewal of windows	no changes	no changes	no changes	no changes	renewal of heating system renewal of windows external solid wall insulation	no changes	terminated
Package of measures 4	requirement to meet <40 kg CO_2/m^2) with various measures including insulation and micro-renewables	as in 2001, but need to reach <35 kg CO_2/m^2	as in 2001, but need to reach <30 kg CO_2/m^2	no changes	no changes	at least 3 from an energy expert recommended measures from: external solid wall insulation various other insulation measures loft insulation renewal of windows ventilation	no changes	terminated
Package of measures 5	-	-	replacement of stand-alone heating devices and boilers installed before 1982 with Energy Saving Ordinance 2002 compliant heating technologies	no changes	transfer to Housing Modernisation Programme 2005	-	-	terminated
Package of measures 6	-	-	construction or purchase of new buildings compliant with the standard of the KfW Energiesparhaus 40 (<40 $kWh/m^2/year$) construction or purchase of new buildings compliant with the Passivhaus standard	terminated	-	-	-	terminated

Source: based on various sources (Clausnitzer et al. 2010; 2005; Diefenbach et al. 2011; 2006d, 2007)

When the programme structure changed in 2009 (see section below), the requirement to install a package of measures was lifted entirely and the basic principle became the so-called 'KfW-Efficiency House', which defined the energy performance of a refurbished building compared to a new building according to the Energy Savings Ordinance (Clausnitzer et al. 2010). The idea to set the standard according to the Energy Savings Ordinance or a defined benchmark already featured in the CBRP from the beginning (package of measures 4), but played a less important role. The major change in 2009 was that this became the main principle of the programme.

Introduction of grants

In addition to the existing low-interest loans, grants were added to the scheme in January 2007. Grants could be used for the same packages of measures and for achieving the energy performance of a new building or better according to the Energy Savings Ordinance. Single measures were also supported by grants after 01/2009; the eligible measures had to be part of the package of measures 4 and the minimum requirements of the Energy Savings Ordinance needed to be fulfilled. Homeowners could also get a grant worth 10% of total investment (maximum €5,000 per property) for refurbishment of existing buildings if they achieved the energy efficiency levels of new buildings. For refurbishment resulting in a 30% more energy efficient building than new buildings at the time, 17.5% of the total costs (maximum €8,750 per building) were provided as a grant. For carrying out packages of measures in existing buildings 5% of costs (maximum €2,500 per property) were paid by a grant (KfW 2006c). However, compared to the loans issued by KfW, the grants paid were fairly insignificant (in 2009: €99 million compared to €3,772 million (BMVBS 2010). As part of the program changes, the threshold for eligible buildings was raised from 1979 to 1995 (BMU 2007).

Programme structure

In the 2007 Integrated Energy and Climate Programme agreed by the Cabinet in Meseberg (see section below), a substantial restructuring of all KfW programmes related to housing was announced for spring 2008. In March 2009, the promised restructuring was made public. The CBRP and the so-called ÖKO-PLUS energy efficiency refurbishment measures of the Housing Modernisation Program 2005 were merged under the new umbrella ‘Energy Efficient Refurbishment’. Alongside Energy Efficient Refurbishment the new programme ‘Energy Efficient Construction’ was created which substituted the former Ecological Construction programme (BAULINKS 2009). The new structure was supposed to be more transparent and attractive to households.

The changes also included the start of a funding stream for special measures such as advice by energy efficiency experts on refurbishment, replacement of storage heaters, and optimisation of heating systems (KfW 2009).

Other changes

In addition to the changes outlined above there were a number of technical changes in terms of the minimum requirements of the measures installed. The technical details of the requirements are, however, outside of the scope of the thesis because they were not subject to political pressures but rather a result of technology development. An overview of the changing technical requirements over time can be found in Clausnitzer et al. (2010). Similarly, the changing financial conditions of the CBRP in terms of the interest rates are not analysed as part of this thesis. The interest rates are mainly a result of the level of federal funding and the developments on the financial markets.

5.2 Analysis of policy drivers

Following the descriptive section above, this part seeks explanations of the changes that happened over time. As already done in the UK case study, this chapter uses an approach that clusters different episodes according to themes rather than reconstructing the history chronologically.

The following drivers of change have been identified:

Table 9: Main policy drivers of the CBRP

Main drivers of policy change
climate change
struggling construction industry
recession
budgetary considerations
change of key personnel

Of course, these mechanisms are not distinct but interrelated – for example the change of key personnel (in this case a new Federal Minister who gave a lower priority to building refurbishment) intersected with debates around the public deficit, arguments that were used by the minister when amending the budget for the CBRP. Similarly, support for the struggling construction industry and attempts to alleviate the recession are clearly linked. However, separate analysis helps to approach this task in a more structured manner than a chronologic reconstruction would allow.

Similar to the UK case, some of the drivers are more institutional (such as the change of key personnel) whereas others are more topical (such as climate change policy). Still, no clear distinction between the two categories can be made because all drivers involve both topical as well as institutional aspects. Note that the drivers covered are by no means comprehensive and there are other drivers that have not been looked at in detail. At the end of this section possible additional drivers are discussed. Nevertheless, based on the empirical evidence reviewed, the above list covers the most important drivers.

Note that the figures for federal funding of the CBRP used in the analysis of policy changes below refer to the BMVBS definition, as this is the one used in public budgets and debates. Programme costs for the CBRP KfW definition are somewhat lower and can be derived from Figure 12.

5.2.1 Climate change

Climate change policy was one of the main drivers for the development of the CBRP (Interviews G1-G12). At the time of the inception of the CBRP climate change was already a defined policy area, but this took many years and it is useful to understand where the debate around climate change was coming from and what role energy efficiency played in it, particularly with regard to all energy use in buildings.

Beginnings of climate policy in Germany

Until the late 1980s issues around climate change were confined to the scientific community and political involvement was restricted to funding conferences and research. Funding for climate research was increased in the 1980s but political interest was limited. A landmark report was produced eventually in 1985 by the German Physical Society (DPG) titled ‘Warning of a threatening climate catastrophe’ which received a large amount of media attention (DPG 1985).

German climate change policy really started with the work of the Enquete Commission ‘Protection of the Earth's Atmosphere’ in 1987. While previously the debate about climate change was largely within the realm of science it appeared for the first time on the political agenda. The Enquete Commission had the task to review the scientific evidence on climate change and make policy proposals to Government. In its first report the Commission concluded that climate change was a serious threat and that political action had to be taken immediately (Enquete Kommission 1988). This was followed with a recommendation to reduce CO_2 emissions by 30% by 2005 based on 1990 levels (Enquete Kommission 1990). The Enquete Commission highlighted the importance of energy efficiency for reducing carbon emissions stating that the 'Enquete Commission expects the largest realisable emission cuts over the next two decades to come from the rationale use of energy [my translation]' (Enquete Kommission 1990, p. 468) with the biggest potential in the area of heating in buildings where a 70-90% reduction would be possible. Therefore, the Commission stressed that policy measures should give priority to those instruments which lead to an increase in energy efficiency. The recommended measures included a review of building regulations, funded energy advice programmes, training of architects and builders, tax breaks for energy efficiency investments, and programmes to provide low-interest rate loans. This is restated in the final report of the Enquete Commission in which the Commission proposes a ten year national funding programme for energy efficiency refurbishments of existing buildings (Enquete Kommission 1994).

Responding to the Enquete Commission's work, government gave first priority to energy efficiency, energy conservation, and behaviour change stressing that those could deliver a 20% reduction of CO_2-emissions by 2005. In addition to building regulations, government promised to develop new incentive schemes for energy efficient refurbishments but remained rather vague about what a scheme like that could look like (Deutscher Bundestag 1993b).

First carbon reduction targets

Also in 1990 the German Government promised in its CO_2 Reduction Programme to reduce its CO_2 emissions by 25% by 2005 based on 1987 levels, a target that was revised in the same year with the additional commitment of a significantly higher reduction in new states. In the following year, this target was revised once again to a 25-30% reduction by 2005 based on 1987 levels but for the whole area of Germany. Because CO_2-emissions were much higher in East Germany at the time, the decision to base the target on the whole of Germany without sub-targets meant a reduction in ambition and caused political turmoil (Fleischer 1997).

The work of the Enquete Commission was accompanied by the creation of an interdepartmental working group on climate change in 1990 composed of representatives from nine federal ministries plus the Chancellery and the Foreign Office headed by the Federal Environment Ministry (Krück et al. 1999). This working group still operates and is tasked with developing and delivering climate change policies. In its second report to the Bundestag the working group stressed that current funding schemes for energy efficiency in the building stock would not suffice for generating the investment needed if the CO_2-targets were to be met. Responding to the report, the coalition government named funding schemes for retrofitting buildings as one of the key measures to reach its CO_2-targets and it announced that the potential for funding energy efficiency measures in existing buildings would be assessed in conjunction with other policy instruments (Deutscher Bundestag 1993b). However, two years later the government still promised an assessment of additional programmes and lauded the initiatives by the Länder asking the regional governments to consider increasing those schemes (Deutscher Bundestag 1994). While there had been revisions of building regulations and the various energy performance related ordinances, no tangible policy instrument to fund energy efficiency building refurbishment in West Germany was put forward. The rational was that East Germany offered a lot of low hanging fruits and therefore programmes should target this area first (Deutscher Bundestag 1993a).

First KfW programme focuses on East Germany

As a result of unification, various policies were introduced in order to rebuild the infrastructure in East Germany. Part of this was the first KfW programme for refurbishment of the housing stock, the Housing Modernisation Programme East 1. While the Housing Modernisation Programme East is not the focus of this thesis, a brief review of its history is provided as background given that the CBRP started in the context of already existing housing refurbishment schemes.

At the time of the inception of the Housing Modernisation Programme East 1, the condition of the housing stock in East Germany was very poor and many properties required repair. Housing Modernisation Programme East 1 ran from 1990-2000 and resulted in the refurbishment of 3.6 million dwellings (Bundesregierung 2003). Low-interest loans worth more than €40 billion were spent as part of the Housing Modernisation Programme East 1, most of this was used for repairs and fuel switching from coal to gas and heating oil (BMU 2006). The Housing Modernisation Programme East 1 was followed by the Housing Modernisation Programme East 2 which ran from 2000-2002 and concentrated on the more expensive refurbishment measures. Similarly to Housing Modernisation Programme East 1, only dwellings situated in East Germany were eligible for funding. During the two years of the programme low-interest loans were made available by KfW resulting in more than 159,000 dwellings being refurbished

(Bundesregierung 2003). Note that energy efficiency measures were just a small part of the scheme and only 15% of all loans issued were used to finance energy efficiency measures (IER and PROGNOS 2004). HMP 2 was succeeded by the two year Housing Modernisation Programme 2003. In contrast to earlier programmes, the Housing Modernisation Programme 2003 covered all of Germany. Low-interest loans worth €5.5 billion were provided as part of the scheme. A number of measures were supported by the Housing Modernisation Programme 2003 and only some of them related to energy efficiency improvements (Eichhammer et al. 2006). From 2005-2010 a fourth programme ran, called Housing Modernisation, providing almost €15 billion worth of loans (BMVBS 2011).

In summary, the first funding programmes were part of the efforts to upgrade the infrastructure in the East of Germany post-reunification, climate change only played a minor role and the positive impact on reducing carbon emissions was more a side effect rather than the primary aim of the programme (Schroeder et al. 2011).

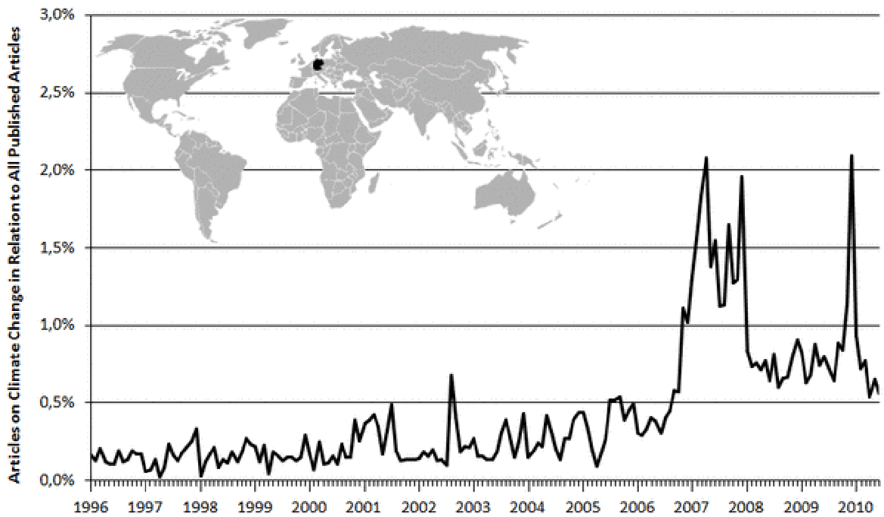
The predecessor of the CBRP kicks off

The first KfW programme aimed specifically at reducing carbon emissions of the housing stock, the CO_2-Reduction Programme (CRP), only started in 1996, many years after the government's promise to establish an additional funding scheme of some kind. The scheme was running during 1996-2004 and was a measures-based programme. Eligible measures included insulation (loft, solid wall, window glazing), increased boiler efficiency, solar thermal, photovoltaic, heat pumps, heat recovery measures, district heating, and CHP. KfW provided low-interest loans to home owners, housing companies, councils, the Kreise (regional government bodies), and other public bodies. At first the scheme applied only to existing buildings but it was opened for the construction of new low-energy buildings in 1998 (Kleemann et al. 2003). While in the beginning CRP covered only the old Länder in West Germany, in 1998 the scope was widened and new build low-energy homes in East Germany were eligible for support. From March 2000, all funding streams of the CRP were available to the whole of Germany (Deutscher Bundestag 2007). Loans worth 1 billion DM (about €0.5 billion) in the first years of the scheme were funded by the Federal Government but in later years the loans were provided by KfW without any further federal funding (Deutscher Bundestag 1997a, 2004).

Climate change climbing up the agenda

After 2000 climate change issues received increasing media coverage. Using the Süddeutsche Zeitung as a proxy for media coverage of climate change, Schäfer et al. (2011) show that the proportion of articles dealing with climate change rose significantly after 2000 and particularly after 2006:

Figure 13: Newspaper coverage of climate change in Germany



Source: Schäfer et al. (2011)

Increasing media coverage was accompanied by political commitments to reduce GHG emissions: in 1995, the carbon emissions target was changed to a 25% reduction by 2005, but based on 1990 levels as common practice in the international arena (Fleischer 1997). Under the 1997 Kyoto Protocol Germany committed itself to a 21% reduction in GHG emissions in the period 2008 to 2012 compared with 1990 levels (BMU 2010), a target which was less ambitious than Germany's domestic target. The domestic target was renewed in the 2000 National Climate Change Programme and remained at a 25% reduction by 2005 based on 1990 levels (BMU 2000). The 2000 National Climate Protection Programme was also the start of the CBRP.

Inception of the CBRP

Being part of the newly established National Climate Protection Programme the CBRP's main purpose was also mirrored in its name: CO_2 Building Rehabilitation Programme. The Federal Government provided 400 million DM for three consecutive years, i.e. a total of 1.2 billion DM, enabling the CBRP to run until 2003. The funding for the CBRP was based on the revenues from auctioning the Universal Mobile Telecommunications System (UMTS) licenses which generated more than €50 billion. All of the revenues were used to reduce the national debt which in turn led to lower interest rate payments (about €2.6 billion per year). Part of this reduction of interest rate payments provided the financial resources for the CBRP in the beginning of the programme (Deutscher Bundestag 2002).

It was also announced that a decision about an extension of the scheme lasting at least two years would be made in 2003 when putting together the 2004 budget. The projected CO_2-reduction was expected to be around 5-7 million t by 2005 compared to 1990 levels making the CBRP the most important feature of the package of measures addressing emissions of households (Bundesregierung 2000).

First extension of the CBRP

In May 2003, Government announced the promised extension of the CBRP to 2005. The extension also provided an additional €160 million annually taken out of the tax revenue of the ecological tax.[9] This was a significant increase in funding and equated to about 80% more annual funding for the programme. The additional funds and the extension of the CBRP were presented as carbon reduction measures in the context of national climate policy (BMU 2003). Other aspects such as job creation were clearly secondary in the press announcement released by BMU, BMVBS, and KfW but were referred to as additional effects of the CBRP (see more in section on construction industry).

Second extension of the CBRP

In his policy statement in March 2005 Chancellor Schröder announced a further extension keeping funding levels constant. This extension of the CBRP also featured in the 2005 National Climate Protection Programme where it was presented once more as a programme to save carbon emissions. Because the energy-intensive sector was covered by the EU Emissions Trading System, the 2005 National Climate Protection Programme focused on the domestic sector and the transport sector (BMU 2005).

[9] The ecological tax reform was introduced in 1999, modified in 2000, and modified again in 2003. The reform included an incremental increase of taxes on petrol and a tax on gas, oil, and electricity. The revenue is used to lower the rates paid by employees to the public pension scheme so that the reform is for the most part revenue-neutral.

The 2005 National Climate Protection Programme only stated the Kyoto target and did not refer to the domestic target as defined in the 2000 National Climate Change Programme (BMU 2005). However, for the medium- and long-term, the Government promised to cut GHG emissions by 40% by 2020 based on 1990 levels under the condition that the EU commits to a 30% reduction over the same period. This ambition was later restated in the Integrated Energy and Climate Programme (BMU 2007) and in the 2009 coalition contract of the Christian Democratic Union/Christian Social Union (CDU/CSU) and Free Democratic Party (FDP) (CDU et al. 2009).

New coalition government increases funding

In September 2005, a new coalition government was elected. The coalition consisting of the Social Democratic Party (SPD) and the Green Party was succeeded by a coalition led by the CDU with the SPD as the junior partner. The change in government did not, however, lead to a significant shift with regard to the CBRP and its priority (Interview G1). Early in 2006, the new government modified the CBRP once again and an uplift of the financial resources provided was announced after a Cabinet meeting in Genshagen on a programme for economic growth and employment. For the period 2006-2009, Government promised to allocate €4 billion, a significant increase of the programme's ambition. The additional funds more than quadrupled the existing budget for the CBRP. Climate change did not, however, play a major role at that point – issues around the recession and job losses in the construction industry dominated the debates. The changes made were clearly framed as measures to support growth and particularly small and medium-sized companies (also see sections below) whereas climate change is only mentioned sporadically in the press release (Bundesregierung 2006) and was not the top priority at the time (Interview G4, G6). One interviewee, a representative of the CDU, stresses that the increase in funding also had to do with the discussions around the renewable heat law, a policy that requires new buildings to use a defined proportion of heat from renewable sources that was part of the coalition agreement (CDU et al. 2005). According to the interviewee, the controversy around the most sensible order of measures, i.e. efficiency measures in order to reduce heat consumption prior to renewable heat, led to an increase in the CBRP (Interview G11).

Meseberg proposals on CBRP

An important framework of German energy and climate policy was the result of a cabinet meeting in Meseberg in 2007. The cabinet put together the so called Integrated Energy and Climate Programme, which sets a national target to reduce carbon emissions by 40% by 2020 based on 1990 levels (BMWi and BMU 2007). The Programme contains a list of 29 policy proposals and amendments some of which relate to energy efficiency in buildings.

However, there were controversial discussions around what policy measures should feature in the Programme. In the run up to the meeting at Meseberg, the Environment Minister, Sigmar Gabriel of the SPD, proposed to increase funding for the CBRP from about €1.4 billion to €2.5 billion annually. Those plans were opposed by the Federal Ministry of Finance. Furthermore, Sigmar Gabriel proposed a number of regulations that would have imposed a number of energy efficiency requirements on home owners such as a ban of night storage heating systems (Frankfurter Allgemeine Zeitung 2007). One of the proposals was a requirement to install energy efficient windows in those properties with non-insulated windows. Also, Gabriel proposed that tenants of energy inefficient properties should be allowed to pay a lower rent until the landlord upgrades the property to an acceptable level of energy efficiency (Deutschlandradio Kultur 2007). However, none of those proposals featured in the Integrated Energy and Climate Programme agreed by the Cabinet in Meseberg. No commitments were made to additional funding for the CBRP, it was only agreed that the programme would be stabilised at current levels until 2011 and restructured to make it more effective (BMU 2007; BMWi and BMU 2007). However, Gabriel's proposal to ban night storage systems resulted in grants being offered as part of the CBRP for the replacement of inefficient heating systems (Interview G3). One policy measure which was part of the Integrated Energy and Climate Programme was to raise the requirements for energy efficiency of new buildings in the Energy Savings Ordinance. This had an indirect effect on the CBRP in the sense that the CBRP increasingly defined the expected energy efficiency performance in relation to the Energy Savings Ordinance.

The discussions around the CBRP at Meseberg were primarily driven by climate change considerations (Interview G8), given the focus of the Integrated Energy and Climate Programme on climate change. In the years following Meseberg, due to budgetary considerations, the government modified the overall budget of the CBRP. This was not related to climate change policy; it had more to do with debates around the public deficit and a change of the Federal Minister of the BMVBS. Both issues are covered in detail below.

The 2010 Energy Concept

After a new coalition consisting of the CDU and FDP was elected in 2009, the government published the 2010 Energy Concept, a framework for the future of German energy policy (comparable to the UK Energy White Papers). The overall objective stated in the Energy Concept is to transform the German economy to one of the most energy efficient and environmentally friendly economies in the world, provided that energy prices remain competitive and the level of prosperity stays at a high level. While reducing carbon emissions was not the only objective of the Energy Concept, it played a major role and there are many references to climate policy throughout the document. Refurbishing the building stock is pointed out as one of the key areas with a high potential for reducing energy demand and carbon emissions and the government commits itself to reaching an almost carbon neutral building stock by 2050, promising a refurbishment roadmap to begin in 2020 (BMWi and BMU 2010). However, no modifications of the CBRP were announced in the Energy Concept and it remained rather vague about the policies that would be implemented in order to reach the stated policy objectives in the area of home energy efficiency.

Although not the focus of this thesis, a remarkable policy proposal featured in the original proposals with regard to obligatory energy efficiency standards for existing buildings (Interview G2). However, those proposals were watered down after a controversial public debate and did not feature in the final version of the Energy Concept (BMWi and BMU 2010). Government said in the Energy Concept that it wanted to offer incentives and not impose forced energy efficient refurbishment on homeowners. Economic considerations were at the heart of Government thinking, and energy efficiency measures should only be carried out if they were cost effective. Instead of obligatory refurbishment, the Energy Concept promised that demolishing and replacing old inefficient buildings would be covered by the CBRP in the future. In sum, the draft proposals were weakened considerably, with no precise commitments with regard to the CBRP.

Additional funding from the Energy and Climate Fund

Shortly after the Energy Concept had been published, government announced an important change with regard to the CBRP. After the CBRP's budget had been cut significantly (see section on budgetary considerations below), an additional €500 million per year were allocated to the CBRP. This money was supposed to come out of the Energy and Climate Fund, special assets outside of the budget (Deutscher Bundestag 2010a). The fund was created to help finance measures to reach the objectives laid out in the Energy Concept and has a strong climate component as also reflected in the name. Initially, a tax on windfall profits of the energy companies due to the prolonged phase-out of nuclear energy was supposed to provide a substantial proportion of funding for the fund, but after the nuclear accident at Fukushima, Japan, the German government reversed the plans to prolong the nuclear phase-out. However, this is beyond the scope of this thesis as those events occurred after 2010. In addition to the new tax on windfall profits, the revenues of auctioning the EU ETS permits should generate financial resources for the fund. This was based on the assumption of a high price per tonne CO_2, but prices dropped significantly in 2011 (Bloomberg 2012). Again, this matter is beyond the scope of this thesis and will not be explored further. The important change that took place is that for the first time part of the funding for the CBRP was not coming out of the budget but linked to an independent fund, the implications are discussed in the section on budgetary considerations.

Summary

Climate change policy clearly was the most important driver of the CBRP overall, although at certain times other issues such as using the Programme as an economic stimulus played a more important role. However, as one interviewee put it:

> *'I believe today we have a clear focus on energy efficiency and climate protection. […] The issues of creating jobs and economic growth are surely a side effect of the programme, I would not see this as the central motive.' (Interview G4)*

As shown above, this is also reflected in the official government documents and statements where climate change frequently features as the top priority of the CBRP.

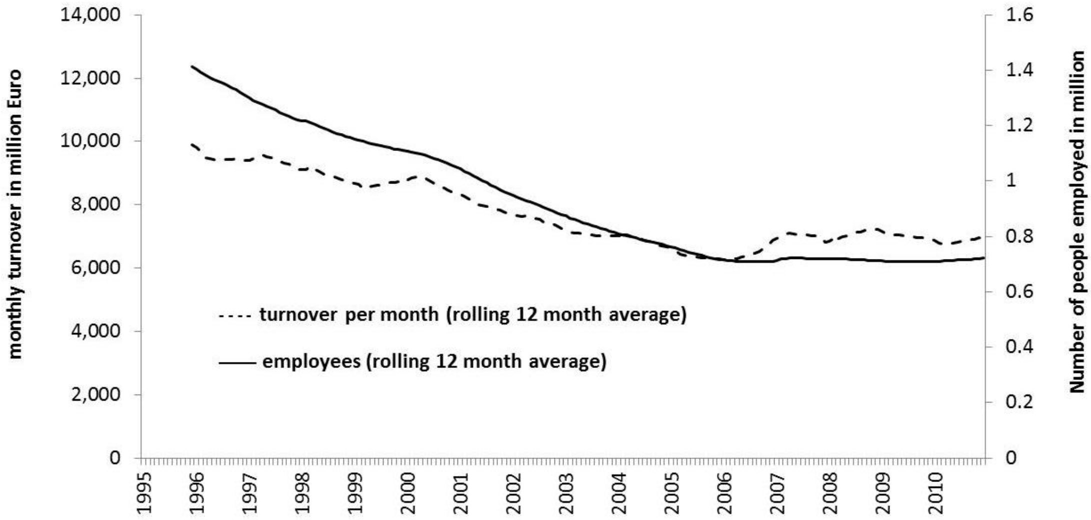
5.2.2 Supporting the construction industry

Although the primary objective of the CBRP was to reduce carbon emissions, the CBRP always had strong links to policies supporting the struggling construction industry. References to job creation and stimulating higher turnover in the construction industry can be found throughout the CBRP's development and it certainly was a major driver. At certain times considerations about the construction industry overshadowed climate policy objectives and there are several examples where the CBRP was changed primarily because of its effect on employment and growth in the construction sector. This section provides an analysis of how this policy driver impacted on the CBRP.

Declining turnover and employment in the construction industry

Between 1995 and 2010 the number of jobs in the German construction industry almost halved with turnover declining by more than 30% in the same period (Statistisches Bundesamt 2012c). While the trend appears to have changed after 2006, the industry is still stagnating (Figure 14).

Figure 14: Turnover and employment in the German construction industry 1995-2010



Source: based on Statistisches Bundesamt (2012c)

Reasons for the decline of the construction industry are manifold: demographic effects i.e. a stagnating population, tailing off of the infrastructure upgrade in East Germany, competition from abroad, lower demand for new buildings, and decreasing public investment in infrastructure (Ottnad and Hefele 2006).

In light of this trend, the CBRP was justified from the beginning not just with its contribution to climate policy objectives, but with the positive effects on the construction sector (Deutscher Bundestag 2000). These arguments were also used when putting in place the earlier KfW programmes focusing on building refurbishment (Deutscher Bundestag 1997a, 1997b). However, the primary objective at the time was clearly climate protection (see section on climate change).

Increasing emphasis of positive impacts on construction industry

As described above, Government extended the CBRP in 2003 to 2005 providing an additional €160 million annually. Alongside the objective to reduce carbon emissions, the contribution of the CBRP to job creation and preservation in the construction industry was stressed by both the Federal Construction Minister, Manfred Stolpe, who stated that the increased budget for the CBRP would secure 18,000 jobs in the construction industry (Reimer 2003) and Environment Minister, Jürgen Trittin, who claimed that the program had become a 'job machine' (BMU 2003). Not surprisingly, the extension and the increase in funding was applauded by the construction industry (Bundesvereinigung Bauwirtschaft 2003).

Also when extending the CBRP in March 2005, Chancellor Gerhard Schröder referred to the need to support jobs in the construction industry particularly in small and medium enterprises (Bundesregierung 2005b). This was confirmed in the Twenty Point Programme for Economic Growth, in which Government promised to provide €720 million for the scheme's extension, again with a reference to the construction industry alongside with climate policy (Bundesregierung 2005a).

The government increasingly used arguments with regard to the construction industry and this became the main reason for extending the programme in 2006 when the new government modified the CBRP once again. An uplift of the financial resources provided was announced after a Cabinet meeting in Genshagen as part of a programme for economic growth and employment. For 2006-2009, Government promised to allocate €4 billion, a significant increase of the programme's ambition (Bundesregierung 2006). This was part of the initiative, 'Housing, Environment, Growth', which featured in the investment programme announced after the Cabinet meeting. The first of the three reasons for the uplift named by Construction Minister Wolfgang Tiefensee was job creation and keeping jobs in the construction industry. In a press release KfW and government argued that the increase in funding would have immediate positive effects on employment (KfW 2006a). Similar references can be found in later policy documents. Also the emphasis in the paper summarizing the results of the Genshagen cabinet meeting, of which the extension and top-up of the scheme was part, lies clearly on economic growth and stimulating additional investments (Bundesregierung 2006). Interviewees also supported the view that around 2006 job creation in the construction industry played a major role (Interview G4). Again, the Genshagen proposals were met with support by the construction industry (Bundesvereinigung Bauwirtschaft 2006).

Asked why the CBRP was picked as the instrument to address the decline of the construction industry and unemployment in general one interviewee suggested that the CBRP supports economic activities with a high labour intensity (more than 50%) whereas other areas have a much lower labour intensity (Interview G1). However, the rhetoric around job creation and supporting the construction industry appears to be somewhat instrumental (also interview G12):

> *'The CBRP was not created primarily to secure and create jobs, but to contribute to climate protection, energy security and reduce the cost of energy consumption via demand reduction. But employment effects are a welcome side effect.' (Interview G1)*

Most interviewees agreed that while the CBRP did have positive effects on the struggling construction industry and employment the overall aim was related to climate policy goals (e.g. interview G1, G2, G4, G5, G12).

Summary

Positive effects on the construction industry were always stressed in discussions around the CBRP. Arguably, other drivers such as climate change dominated in most years. There were, however, times when arguments with regard to job creation in the construction industry played a major role. This was most notable during 2005/2006 when both the old

SPD-Green government and the CDU/CSU-SPD government justified the increased funding for the CBRP with its important role for protecting and creating jobs in construction.

5.2.3 Recession

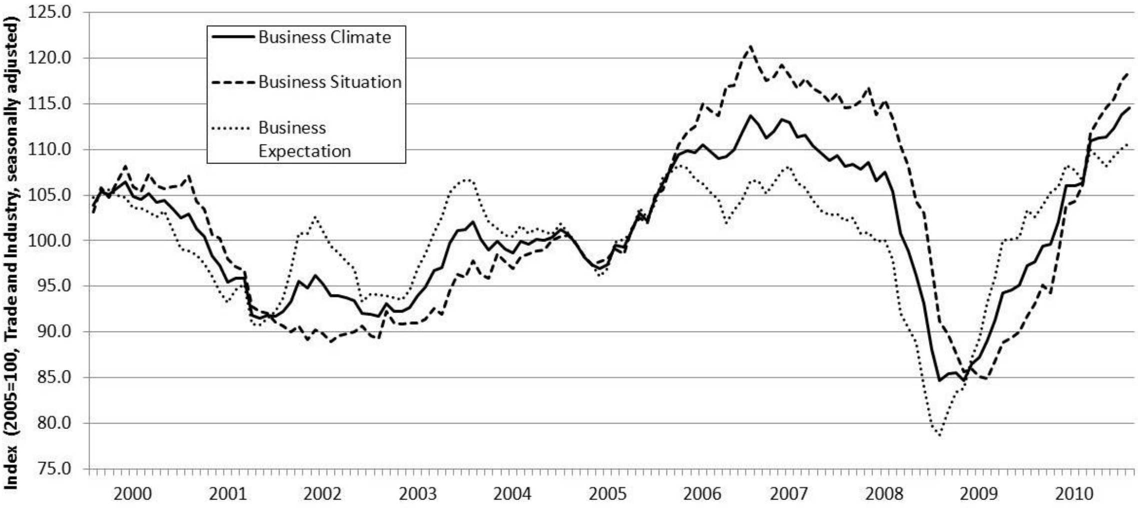
Another driver that had an impact on the CBRP more recently was the recession triggered by the global financial crisis in 2008. Aware of the positive effects on economic activity and employment, the German government used the CBRP as an instrument to stimulate the economy.

Contracting economy and unprecedented low business confidence

Following the financial crisis, the economic situation in Germany worsened considerably and the economy contracted by 1.9% in the last quarter of 2008 compared to the previous year, 6.5% in the first quarter, 7.4% in the second quarter and 5% in the third quarter of 2009 (Statistisches Bundesamt 2012a). Never before since World War II had the German economy experienced a recession of such scale (Butterwegge 2012).

Business confidence approached the lowest level in decades and the outlook was very bleak. An influential German index measuring economic activity and the expectations of businesses is the Ifo Institute’s Business Climate Index. The Index is based on surveys in manufacturing, construction, wholesale and retail. The survey asks the companies about their current business situation and their expectations for the next six months. Based on the survey responses Ifo Institute compiles the Business Climate Index which is published monthly. The index shows a remarkable dip around 2008 indicating the decline in economic activity that followed (Figure 15).

Figure 15: Ifo Business Climate Index in Germany



Source: based on Ifo Institute (2012)

It was in this context that the government considered potential measures to help stimulate the economy when the CBRP was modified.

CBRP as a means to stimulate economic activity

There was a debate, at times controversial, about what kind of initiatives the government should undertake to stimulate economic growth.

The SPD drafted a programme aimed at generating investment worth €60 billion, part of which was the €3 billion increase in funding of the CBRP that was later incorporated in the Economic Stimulus Package I (Süddeutsche Zeitung 2008), even though the Finance Minister at the time, Peer Steinbrück (SPD), positioned himself against such an investment programme (Frankfurter Allgemeine Zeitung 2008a). In contrast, the CDU/CSU proposed tax breaks for high income earners and new cars (Focus 2008). However, Chancellor Angela Merkel was in favour of a non-traditional economic recovery package targeted at specific sectors of the economy triggering further private investment (Frankfurter Allgemeine Zeitung 2008b). The CBRP fit into this category and is widely regarded as a programme that generates significant private investment (Kuckshinrichs et al. 2010). For example in 2009, the ratio of public investments to private investments as a result of the CBRP was estimated to be 1:9 (BMVBS 2010). Therefore, according to the then parliamentary group leader of the SPD, Peter Struck, the increase in funding for the CBRP was one of the measures which was not contested when the coalition government discussed potential measures (Zylka 2008).

As a result of those discussions, in November 2008 the Government published a first investment programme as a response to the recession. It was argued that following the financial crisis the government saw its task in securing growth and employment. Part of the fifteen point programme ‘Securing Jobs by Strengthening Growth’ (also known as the Economic Stimulus Package I) was a promise to top up the CBRP and other KfW programmes for 2009-2011 by €3 billion (BMWI and BMF 2008). Shortly after the programme was published, KfW announced an increase of grants for packages of measures from the previous 5% to 7.5% of total costs (KfW 2008).

While the government always used climate policy related arguments when justifying previous extensions and funding increases, the document presenting the Economic Stimulus Package I did not contain a single reference to climate change or environmental issues. This indicates that at the time the driver for the modifications made was merely the recession and the perceived need to stimulate economic growth. Such a view is also confirmed by interviews (Interview G4).

There was a second stimulus package in 2009, but no additional provisions were made for the CBRP.

Summary

Following the financial crisis the CBRP was used as part of the government's attempts to stimulate economic growth. While the CBRP's contribution to economic prosperity was stressed also prior to 2008, it was only then that the Programme was amended explicitly aimed at triggering investment to help overcoming the recession.

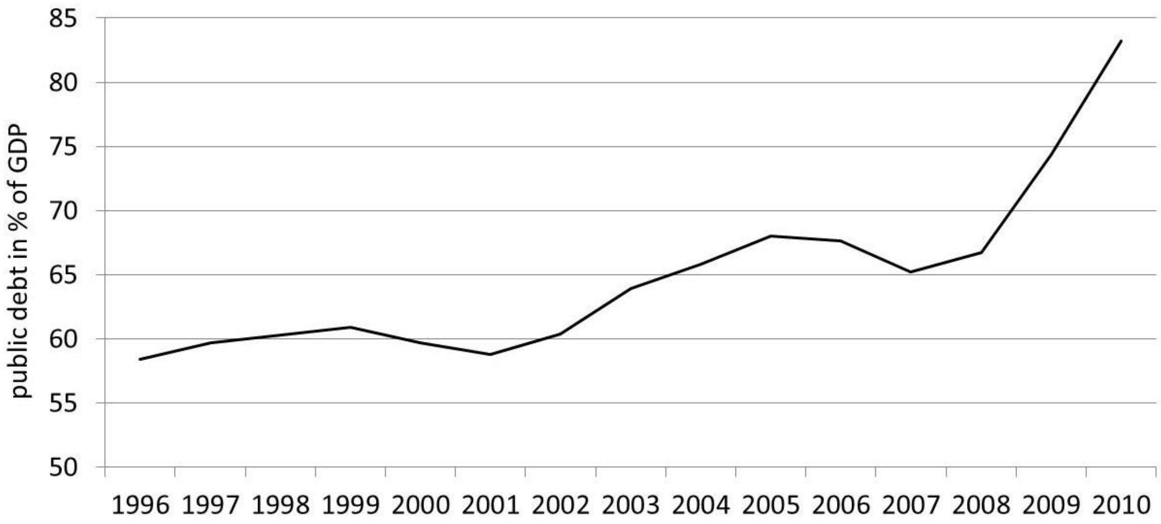
5.2.4 Budgetary considerations

Another important driver of the CBRP was the debate around public debt and the implications for public spending. First, this section provides background information on public debt in Germany and the new constitutional amendment to limit additional public debt (debt brake). Second, the implications of fiscal policy and budgetary considerations for the CBRP are analysed in detail. All interviewees agreed that budgetary issues played an important role for the development of the CBRP (Interview G1-G12).

Growing public debt

While public debt had been rising continuously over the last decades, and the reasons are manifold following the financial crisis and during the recession it increased at a much faster pace than in the years before (Figure 16). The last time public debt increased so quickly in Germany was after reunification in the early 1990s (Streeck 2010).

Figure 16: Public debt in Germany as a proportion of GDP



Source: based on Statistisches Bundesamt (2008, 2011)

The main reasons for the rapid increase in public debt as a proportion of GDP around 2008 /2009 are the two economic stimulus packages which required a large amount of public funding (see section 5.2.3) and the bailout of the banks during the financial crisis (Statistisches Bundesamt 2010) going hand in hand with lower, and at times even negative, economic growth leading to a lower tax revenue. Hence the gap between government revenues and government spending suddenly expanded reaching its peak in 2010 when it was about seven times bigger than in 2008 (Grasl and König 2010).

Debt brake

Article 115 of the German constitution sets a limit to how much additional net debt the government can take on every year. From 2002-2006 and again since 2010 the budget did not comply with Article 115. In order to address the growing public debt, already the red-green coalition attempted to change the financial constitution as part of the reform of federalism. However, the Federalism Commission failed to find an agreement due to controversies around education policy and the different roles of the Länder and the federal government. Following the 2005 election, the CDU and SPD restarted the reform process and set up a second Federalism Commission in 2006. More than two years later the Commission concluded and put forward a number of proposals including fiscal policy reform. For a more detailed discussion of the political processes around the federalism reform see Lorenz (2010).

Based on the Commission's proposals the government coalition successfully passed an amendment of the constitution through the Bundestag and Bundesrat (Federal Council representing the Länder) (Grasl and König 2010). This amendment limited the amount of additional debt that the government could take on in the future to just 0.35% of GDP per year and was called 'debt brake'. Essentially, the debt brake requires both the Federal Government and the Länder to balance the budget without additional debt. This rule will be introduced gradually from 2011 to 2016 and only in emergency situation can the rule be violated (Renzsch 2010).

There is a connection between the debt brake and the two stimulus economic packages discussed before: the large amount of public spending and the required additional debt could only be justified with a commitment to limit the budget deficit in the future (Dietrich 2009).

Budgetary cycle and controversies about variability of funding

Before the debt brake had an impact on the CBRP in 2010, there were discussions about the amount of funding available. Demand for loans and grants in 2009 was higher than expected and the funding allocated to the CBRP in the budget was not sufficient to provide for all applicants. In August 2009 federal funding for 2009 was raised by an extra €750 million taken from the budgets for 2010 and 2011. Hence total federal funding for 2009 was more than €2 billion (BMVBS 2011). Bringing forward funding from later budgets is not an unusual process, but this step led to a controversial debate later on.

As a result of the increased spending in 2009, only €1.1 billion were left in the budget of the scheme for 2010. The construction industry association Bundesvereinigung Bauwirtschaft asked the Government to top up funding for 2011 in order to make sure that the €1.5 billion per annum announced in the investment package in 2008 would be provided (Bundesvereinigung Bauwirtschaft 2010). The reduced funding in 2010 which resulted from the shifting of funding from 2010 to 2009 was heavily criticised by various associations and NGOs. In a campaign the reduced funding was framed as cuts to the funding of the CBRP (CAMPACT 2010), a claim that is technically not correct given that the budget was simply spent earlier meaning that for the whole commitment period 2009-2011 the overall funding did not decrease (Interview G2, G3, G4, G6, G11).

Adding to the controversies, the financial contributions to the KfW programmes were put on hold in January 2010 and KfW stopped approving applications for loans and grants. The reason was that the budget for the year 2010 was not yet in place and that demand for loans and grants was higher in 2009 than expected (EnBauSa 2010c). However, shortly after the CBRP was put on hold and following objections voiced by various industry associations and NGOs, the Bundestag approved preliminary spending with regard to the KfW programmes (EnBauSa 2010b).

There have been calls for more reliable funding over time. However, the budget for such programmes can only ever be guaranteed for one year as part of the overall federal budget and the respective laws. A longer commitment over a time span of 5-10 years for example is not possible within the federal budget and permitted by the Bundesrechnungshof, a supreme federal authority that examines federal financial management (Interview G6).

Debt brake impacts on CBRP

However, in June 2010, a leaked letter to the coalition MPs from the Minister of the BMVBS, Peter Ramsauer, unveiled that cuts of around 50% of the CBRP were planned for 2011 in addition to the already reduced budget (due to bringing forward funds to 2009) leaving the scheme with only €436 million for 2011 (Ramsauer 2010). This was later confirmed in a meeting of the MP committee on transport, construction, and urban development (EnBauSa 2010d). Reasons given for the cuts were mainly that the debt brake would not allow for the programme to continue at current levels. Also, it was argued by the Coalition Government, low-interest rates would enable investors to find loans elsewhere. Both the SPD (Deutscher Bundestag 2010c) and the Green Party (Deutscher Bundestag 2010d) put forward a motion to not authorise the cuts. The Green Party asked for federal funding of the CBRP of at least €2 billion per year and the SPD demanded stabilisation at a high funding level. Opposition to the announced changes also came from all the major associations with an interest in housing (construction industry, housing corporations, homeowners, tenants) (BAULINKS 2010) and various environmental NGOs (e.g. Forum Ökologisch-Soziale Marktwirtschaft 2010). Also the German Energy Agency, DENA, criticised the proposed cuts and demanded to increase the funding to €5 billion per year i.e. more than ten times the proposed level (ENBAUSa 2010a).

Note that while the shifting of budget from a later year to an earlier year described above does not qualify as a spending cut when looking at the whole period, the cuts announced by Ramsauer were actual cuts reducing the budgetary commitment made for the period.

More funding for CBRP

Responding to a parliamentary question by the Green Party (Deutscher Bundestag 2010e), the Government announced that the CPRB would receive an extra €500 million for the year 2011 increasing the funds available from €436 million to €936 million (Deutscher Bundestag 2010b). The money was supposed to come out of the Energy and Climate Fund, a Government owned fund to finance low-carbon technologies such as energy efficiency and renewable energy. The fund should be financed by the large energy suppliers which were obliged to pay a windfall tax on profits due to delaying the phase-out of nuclear power plants and windfalls gained from EU Emissions Trading Scheme permits.

The introduction of the Energy and Climate Fund meant that for the first time in the history of the KfW loan and grant programmes part of the funding was not based on the budget alone but also on a separate fund. Precisely for that reason the government argued that the fund offers more long-term certainty as it is independent of budgetary considerations that take place year on year and adds more flexibility (Deutscher Bundestag 2011a). Minister Peter Ramsauer stated:

> *I always stressed that we need continuous and stable funding; because a lot of businesses specialised in the area of CO_2-Building Rehabilitation. One cannot ramp up their activities in one year and slow them down in the next year. [my translation] (Ramsauer 2011)*

This is an interesting statement given the fact that the Minister himself proposed to cut the CBRP's budget just a year before.

The announcement of the new finance mechanism was heavily criticised in a common press statement by a wide range of organisations, including construction industry associations, tenant organisations, consumer associations, and environmental NGOs. Their main objections related to the overall level of funding, which they deemed too low, and the uncertainty of the payments through the Energy and Climate Fund (Mieterbund 2010). Interviewees representing the Green Party shared those concerns (Interview G7, G12) and a Member of Parliament of the SPD stressed that it is important to keep the funding for the CBRP under control of the parliament rather than implementing funding streams independent of the federal budget (Interview G9).

Those concerns should soon be confirmed. As already said, the Fund was supposed to be financed to a significant extent via a tax on windfall profits from extending the phase-out of nuclear energy. However, after the nuclear accident at Fukushima the German government decided to revert from the extension of the phase-out and speed up the phase-out process. Therefore, the windfall tax was made obsolete and could no longer fund the Energy and Climate Fund (Deutscher Bundestag 2011b). In addition to the funding issues around the windfall tax on profits from extending the phase-out of nuclear power there were also problems with the second funding stream, the revenues from auctioning EU ETS permits. Permit prices fell below €10 per tonne of CO_2, way below the anticipated €17 when designing the Energy and Climate Funds (Bloomberg 2012). Ironically, the aim of providing finance for the CBRP independent of the federal budget in order to reduce the unstable funding and dependence on budgetary cycles led to even more uncertainty about the future funding of the programme. This caused controversial political debates with the opposition demanding to put the CBRP back into the overall budget (Deutscher Bundestag 2012). Paradoxically, even Minister Ramsauer, who previously announced the 50% spending cut for the CBRP in 2010, urged the Coalition to revoke the cuts and top up the CBRP in 2012 to make up for the reduced funding coming from the Energy and Climate Fund (Neuerer 2011). However, Members of Parliament of the CDU and FDP suggested that even if there were shortfalls in the Energy and Climate Fund, the CBRP would not be affected significantly by any funding cuts (Interview G10, G11). For 2012 this prognosis proved correct, but only because of a special loan arrangement made to shift funds from the regular budget to the Energy and Climate Fund.

Summary

Budgetary issues affected the CBRP in a number of ways. First, the shifting of funding from one year to another resulted in more funds than originally planned in 2009 leaving a shortage of funds for 2010. While the overall amount of finance was not reduced, it caused some controversy with some groups labelling the lower funding levels in 2010 as cuts. Second, the growing public debt eventually led to the introduction of the debt brake which prohibits the government to take on new net debt. The debt brake was used as an argument to cut funding for the CBRP by 50% for 2011. Ironically, the expansion of the CBRP's funding in 2008 (see section 5.2.3) contributed to public debt and in that sense had negative feedback effects. Third, the introduction of a budget-independent Energy and Climate Fund was supposed to provide more long-term certainty and stability of the finance stream. However, it looks like the introduction of the Fund may have caused the opposite being based on rather unreliable finance sources itself. Again, even though unintended, the modified finance structure started to generate negative policy feedback effects in the form of unreliable funding for the programme.

To conclude, the debate remains unresolved and there is no certainty about the future funding for CBRP. Many interviewees stressed that the unpredictability of funding had negative effects on the market in the past (e.g. interview G7, G9, G10, G12), although one interviewee disagreed and stated that the private housing market would not be affected to a large extent (Interview G1).

5.2.5 Change of personnel

Tied in with other drivers such as budgetary constraints, the change of personnel at the ministerial level in late 2009 had an impact on the CBRP. Peter Ramsauer (CSU) succeeded Wolfgang Tiefensee (SPD) as minister of the BMVBS. Of course one would expect some change in priorities related to the change in government and a new coalition plus a change of the minister, but Ramsauer's appointment had an impact beyond party politics.

Many interviewees described Ramsauer as a 'transport minister' rather than a 'construction minister' who had prioritised investment into the transport infrastructure and neglected policies focusing on building construction and refurbishment such as the CBRP (Interview G1, G2, G5, G7, G9, G10, G12). A good example to illustrate this was the announcement of cuts to the CBRP budget in 2010.

CBRP budget cuts

As already mentioned above, Ramsauer announced in June 2010 that the CBRP's budget would be cut by 50% in 2011 (Ramsauer 2010). Ramsauer's announcement was followed by unusually harsh criticism from industry associations, tenant organisations, and NGOs. The Bundesvereinigung Spitzenverbände der Immobilienwirtschaft (BSI), a federation of the large real-estate associations, claimed that the cuts were 'nonsense' and 'economically and fiscally wrong' (BSI 2010). On a similar note the Bundesverband deutscher Wohnungs- und Immobilienunternehmen (GDW), a real-estate association, labelled Ramsauer‘s decision a ‘crass political misjudgement‘ (GdW 2010). The

Baugewerbeverband Schleswig-Holstein, a regional construction industry association, even went so far to call the cuts 'dishonourable' (BAULINKS 2010). Also the German Energy Agency (DENA) criticised Ramsauer's proposals and suggested that rather than cutting the CBRP's budget it should be raised to €5 billion per year (BAULINKS 2010).

Also of interest, Ramsauer faced opposition by his own ministry: the parliamentary state secretary of the BMVBS, who belonged to the FDP, demanded publically the CBRP funding be increased to a level of €3 billion per year. This was just one day before Ramsauer defended the cuts in parliamentary debates (Schäfer 2010). Furthermore, just a few weeks earlier the Environment Minister Norbert Röttgen, also belonging to the CDU/CSU, criticised the cuts in a leaked confidential paper. In the paper he said:

> *These cuts will lower the refurbishment rate massively and will have drastic impacts on the economy and the job market. [my translation] (Rheinische Post 2010)*

Also the responsible rapporteur of the CDU/CSU in the parliamentary budget committee and the spokesperson for construction and transport expressed their regret about the cuts (Spiegel 2010).

The opposition from within his own ministry and party shows that Ramsauer did not simply represent an official party or ministry position, but rather followed his own agenda on the matter. As one interviewee put it:

> *This is actually unusual, everyone fights for his budget. And if it is about adjustments within a given budget one could of course take the position 'okay, he needs to trade the maintenance of motor ways against the CBRP. Of course we would have wished for a clear position pro CBRP, but this was not even the main issue. Apparently he did not make the case with Schäuble [the then-finance minister] for keeping or increasing the budget for the CBRP. Instead, the Programme's budget was cut. [my translation] (Interview G2)*

One should, however, also take into account the on-going debates at the time around budget constraints and the debt brake (see section 5.2.4). Ramsauer linked his arguments to this debate and embedded the cuts in a wider discussion about public spending.

Summary

Shortly after being appointed, Peter Ramsauer announced cuts in the CBRP's budget. It seems that while impossible to prove, a different minister with more balanced priorities giving more consideration to the overall coalition parties' positions would have reacted differently and tried to prevent the cuts to the CBRP's budget. Ramsauer resisted pressure not to cut the funding for some time and his resistance was a source of friction. However, as sections 5.2.1 and 5.2.4 have shown, following the 2010 Energy Concept and with the formation of the Energy and Climate Fund, financial resources equivalent to the cuts initiated by Ramsauer were made available to fund the CBRP.

Conclusion

While the CBRP is a fairly technical and sophisticated policy, its history is marked by frequent, and often unpredictable, changes as a result of politics. Politics transformed the CBRP in various ways, at times supporting its expansion but at others constraining the programme's effectiveness. Throughout the CBRP, climate change policy has been a major driver but with varying degrees of importance. Other drivers, for example support for the construction industry and job creation, sometimes reinforced the pressure from climate change policy, but there were also incidents where pressures, such as budgetary constraints or the change of minister, had regressive impacts on the programme. In these cases, it seems like 'politics determined policy'.

However, there is also evidence for the opposite dynamic whereby ‘policy determined politics’. For example, during the recession the government used the CBRP as a tool to stimulate economic activity. But this initiative had important negative policy feedback effects. The enlargement of the CBRP led to higher public debt, which in itself was used by the responsible minister as an argument to cut the CBRP’s budget. Hence the initial expansion of the programme ironically contributed to factors that constrained, and even reverted, the CBRP’s development. Another of these feedback effects, but in this case a positive policy feedback effect, is that with growing budgetary size, the CBRP also attracted strong lobby groups across different sectors including industry associations, unions, homeowners, tenants, and environmental NGOs making it more and more difficult for the Government to reduce the funding for the programme.

There are a number of observations that can be made. First, the funding mechanism and dependence on annual budgets has put significant strain on the programme in recent years and poses a risk to the long-term stability of the CBRP. Second, in the past short-term political decisions were accompanied by unintended consequences unfolding over the medium- and long-term. A good example is the creation of the Energy and Climate Fund, which was supposed to provide more funding stability and fill the finance gap created by budget cuts. In fact, the funding base for the CBRP is now even more fragile than it was before.

If the carbon reductions required for reaching the ambitious climate targets are going to be achieved with the CBRP, a long-term strategy is needed to provide the resources for the programme. Otherwise it is likely that, like in the past, political opportunism and short-termism will prevail.

6 Evaluation

I really reject that kind of comparison that says, Oh, he is the best. This is the second best. There is no such thing.

Mikhail Baryshnikov (unknown)

This section provides an evaluation of the two policy instruments in terms of their effectiveness, i.e. the carbon emissions and energy saved compared to the financial resources spent. Both programmes are applauded by various stakeholders, nationally and internationally. Due to the CBRP, Germany is often labelled a ‘front runner’ (Murphy et al. 2012) in energy efficient building refurbishment. Lowe (2009) highlights that Germany is one of the few countries in the world that has a large-scale funding programme for energy efficient refurbishment, and Boonekamp and Eichhammer (2007, p. 273) call the CBRP a successful example of ‘long-term financial efforts’ with ‘considerable impacts in terms of energy savings and CO_2 emissions reductions’.

Similarly, the Britain’s SO is frequently hailed as a successful policy instrument. The International Energy Agency (IEA) has ‘strongly commend[ed] the UK government for the creative approach to energy efficiency taken with the [SO 2002-2008] Commitment’ (IEA 2007) and considers the ‘Energy Efficiency Commitment an impressive success’ (IEA 2006). Similar praise can be found elsewhere (Bertoldi and Rezessy 2008; Forfori 2006; Lees 2007b)

These commendations are largely based on evaluations carried out for the government responsible for the funding and regulatory framework.

Based on official statistics, this chapter investigates and compares the SO and CBRP by exploring: (a) the total quantity of energy and CO_2 that appears to have been saved through the public costs (public costs are defined here as the total contribution made by the public to fund the policy instrument – in case of the SO this is through energy bills and in case of the CBRP via taxes); (b) the economic efficiency of energy saved through the public costs, in Euros per kilowatt-hour (€/kWh); and (c) the economic efficiency of CO_2 saved, in Euros per tonne (€/t). It is beyond the scope of this thesis to carry out a fully fleshed out evaluation of the two programmes – this would be a herculean task. Instead, it relies on official figures provided by evaluations commissioned by the respective governments and their agencies.

However, a substantial body of literature covering several decades of energy research suggests estimated savings in evaluations are often higher than actual, measured savings (Clinton et al. 1986; Fels and Keating 1993; Frondel and Schmidt 2005; Gillingham et al. 2006; Hewett et al. 1986; Hirst 1990; Hirst and Hannon 1979; Hirst et al. 1983; Joskow 1993; Nadel and Keating 1991; Newcomb 1984; Vine 1994; Vine and Sathaye 2000).

To make robust judgments of an energy saving programme's economic effectiveness, we need to know how much energy and CO_2 is actually being saved through the financial support they provide. But most evaluations of home energy efficiency programmes depend on calculated, rather than measured, levels of heating energy consumption. This fails to take into account the discrepancies that have been observed in practice, between calculated and actual heating energy consumption both before and after refurbishment (Schröder et al. 2011). Factors contributing to such discrepancies include rebound effects, prebound effects, free rider effects, and technical shortcomings. Those factors will be addressed in detail in the following and the evaluations of each policy instrument will be critically analysed regarding their completeness with regard to these reduction factors.

The remainder of this chapter proceeds as follows: Section 2 compares the official results. Section 3 introduces and offers estimates of the rebound and prebound effects in energy-efficiency refurbishment in Germany and the UK, it also discusses free rider effects and their potential impact. Sections 4 and 5 review existing evaluations of Germany's CBRP and the Britain's SO programmes respectively, offering a critical analysis before the chapter concludes.

6.1 Comparison of official results

The accounting methodology for energy and carbon savings differs in the UK and Germany, hence the following comparison carries inherent limitations.

The German evaluations performed for the CBRP calculate annual reduction of carbon emissions rather than the induced lifetime CO_2 emissions reductions. However, the annual reductions can be converted into lifetime emissions saved by assuming an average lifetime of measures of 30 years, as shown by an additional analysis complementing the evaluation of Clausnitzer et al. (2007) by Gabriel and Balmert (2007).

The figures used in Great Britain for the SO (EEC 2 and CERT) do not include the energy and carbon savings carried over from previous obligation periods; only those savings actually achieved under the respective scheme are considered. Savings under EEC 2 are only reported in TWh, and conversion factors from the Department for Environment, Food and Rural Affairs (DEFRA) have been used to convert energy savings into carbon savings taking into account the proportion of different fuels saved as reported by OFGEM. In order to get annual figures for saved carbon emissions the total carbon savings of EEC 2 were allocated on a pro-rata basis according to annual energy savings. For CERT saved carbon emissions have been reported on an annual basis by OFGEM but no figures for energy savings are available. Using the same energy/carbon ratio as EEC 2, annual energy savings were calculated for CERT.

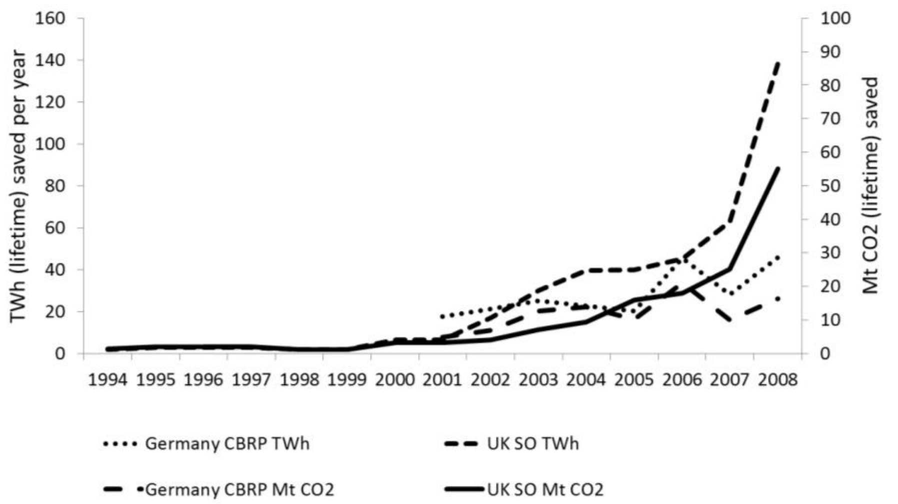
The figures are not readily comparable for several reasons: first, the evaluation methodology applied changed over time (for example, energy savings were discounted under early versions of the SO, but this is not any longer done). Second, the figures calculated for this paper are based on the assumptions outlined above and need to be revised for a like-for-like comparison.

This paper's detailed comparison of savings and expenditure covers the period 2002-2007 only, as the CBRP started in 2001, detailed evaluations of the SO began in 2002, and the last evaluation of the SO was published in 2008. SO figures refer to financial years whereas the CBRP data is based on calendar years.

Carbon and energy savings

From 2002-2007 the CBRP generated savings of about 74 Mt CO_2 (lifetime) compared to savings by the SO of 79 Mt CO_2 (lifetime). In more recent years, the SO delivered higher savings than the CBRP. Figure 1 displays these savings over time.

Figure 17: CO_2-emissions in Mt (lifetime) and TWh (lifetime) saved per year [10]



Source: own calculations based on various sources (Clausnitzer et al. 2011; Clausnitzer et al. 2010; Clausnitzer et al. 2007, 2008, 2009; Doll et al. 2008; Gabriel and Balmert 2007; IER and PROGNOS 2004; Kleemann and Hansen 2005; Kleemann et al. 2003; Kuckshinrichs et al. 2010; OFGEM 2005, 2006, 2008c, 2009c, 2010b, 2011b; OFGEM and Energy Saving Trust 2003; Rosenow 2011); data for energy savings of CBRP based on CO_2 savings in 2004 using same carbon/energy ratio as other years

Concerning energy savings, the picture looks slightly different: the CBRP saved about 173 TWh (lifetime) whereas the SO resulted in 235 TWh (lifetime) from 2002 to 2007, i.e. 35% more than the CBRP. The difference is most likely due to the fact that households in the UK use a higher proportion of gas for heating (DECC 2011c) which has a lower carbon factor than heating oils that are used in Germany (EEFA 2010). Also the carbon factor for electricity is higher in Germany than in the UK (DECC 2012a; UBA 2012). These circumstances are likely to result in higher energy savings per unit of carbon saved for the SO. Lifetime energy savings are not discounted.

Financial resources spent

The financial resources for the two instruments are provided via two very different routes: in case of the SO the energy customers paid for the scheme with their bills, while the

[10] SO data is for financial years whereas CBRP data is for calendar years.

CBRP funding was based on taxpayers' money. In both cases households receiving financial resources for energy efficiency measures make an additional contribution to the overall cost. In some cases third parties such as social housing providers and local authorities may also add funding. However, in order to be able to compare the two instruments it is reasonable to exclude these contributions and compare only the cost that the public bears either through tax or a premium on the energy bill.

From 2002 to 2007 about €1.5 billion were spent by energy suppliers to comply with the SO including both direct costs and indirect cost (Lees 2006, 2008). In the same period federal funding for the CBRP amounted to as much as €2.8 billion (BMVBS 2011). Table 10 relates the cost figures to the energy and carbon savings. It should be noted that these costs include public costs only, not the portion of refurbishment costs paid by the homeowners.

Table 10: Total expenditure, carbon and energy savings 2002-2007*

	Carbon emissions saved in million t CO_2 (lifetime)	Energy saved in TWh (lifetime)	Public costs billion €	Public costs in € per t CO_2	Public costs in € cent per kWh
SO	79	235	1.5	19	0.6
CBRP	74	173	2.8	38	1.4

Source: own calculations based on various sources (BMVBS 2011; Clausnitzer et al. 2011; Clausnitzer et al. 2010; Clausnitzer et al. 2007, 2008, 2009; DECC 2010b; Doll et al. 2008; Gabriel and Balmert 2007; IER and PROGNOS 2004; Kleemann and Hansen 2005; Kleemann et al. 2003; Kuckshinrichs et al. 2010; Lees 2006, 2008; OFGEM 2005, 2006, 2008c, 2009c, 2010b, 2011b; OFGEM and Energy Saving Trust 2003; Rosenow 2011)

* figures for SO from April 2002 to March 2008, figures for CBRP from January 2002 to December 2007; used factor of 1.16 (01/07/2013) to convert £ in €

The table shows that, based on the official results, the CBRP requires 2 times the financial resources per t CO_2 (lifetime) or TWh (lifetime) as the SO. One reason could be that German dwellings are more energy efficient than the UK's (BPIE 2011), which can therefore benefit proportionately more from cheaper upgrade measures at lower levels. Further, CBRP subsidies are only given for top-end retrofits, where the marginal return per

Euro invested is low (Galvin 2010). Note that the cost figures do not include the benefits in terms of saved energy costs. For a comparison to other carbon reduction programmes those would need to be included. But even without considering the energy savings, the costs per t CO_2 are still below other well-known alternatives such as on-shore wind power (~60€/tCO_2) or solar power (>500€/tCO_2) (McKinsey, 2007) .

The domestic price for electricity in both countries is well above 15 Cent/kWh, for gas and heating oil this is more than 6 Cent/kWh, which means that the public cost for the two programmes is more than recovered by the energy savings.

6.2 Evaluating energy efficiency programmes

The figures presented above rely on the evaluations commissioned by the respective governments and agencies. I now discuss which factors should be taken into account in evaluations of energy efficiency programmes followed by a critical analysis of the methodologies used in the evaluations of the CBRP and the SO.

6.2.1 Rebound effects

Jevons (1865) argued that 'it is a confusion of ideas to suppose that the economical use of fuel is equivalent to diminished consumption. The very contrary is the truth.' It is argued that increasing energy efficiency makes it cheaper to produce goods and services, leading to greater wealth, which drives energy consumption higher than before the efficiency improvements. This hypothesis has also been labelled back-fire (Brookes 1990).

In reality, the evidence available shows that only a proportion of the energy savings is taken back in the form of increased usage of energy services. This phenomenon is known under the term rebound effect and occurs on the micro level, both directly and indirectly (Greening et al. 2000; Sorrell 2007), and also on the economy-wide, macro level (Barker et al. 2007; Sorrell 2007). The present study is concerned only with direct micro rebound effects, namely the percentage of the energy saved through refurbishment that is taken back, to provide increased thermal comfort or convenience after refurbishing.[11]

There are various assessments of the magnitude of the rebound effect for domestic heating. Greening et al. (2000) reviewed 75 studies and found rebound effects of 10-30% for space heating. A review of over 500 studies for the UK Energy Research Centre found rebound effects for home heating averaging less than 30% (Sorrell 2007). Haas and Biermayr (2000) estimate a figure of 30% for home heating in Austria, a country with similar climate, building standards and indoor culture to those of Germany.

Localised studies in Germany show similar trends. Erhon (2007) found actual consumption increasing steadily above calculated values as thermal standards became higher, i.e. as calculated consumption, given here in kilowatt hours per square metre of floor area per year (kWh/m^2) became lower. This started at 0% for detached houses of 150 kWh/m^2, and multi-dwelling buildings of 100 kWh/m^2, and reached 50% for the most energy-efficient dwellings of both types. Loga et al. (2011) found similar effects in homes with calculated consumption ratings lower than 50 kWh/m^2, while Kaßner et al. (2010) found actual consumption of 65% above calculated for dwellings with calculated ratings of 75 kWh/m^2. Thomsen et al. (2005) reported 100% over-consumption (i.e. above the expected after refurbishment) in a study of ‘advanced solar low-energy buildings’. A recent study suggests that the rebound for space heating ranges between 12% for owners to 49% for low-income tenants (Madlener and Hauertmann 2011). Greller et al.’s (2010) study of 100,000 dwellings, referred to above, revealed progressive magnitudes of over-

[11] Short of a detailed thermodynamic examination of the building envelope and heating system it is impossible to know what portion of this difference is genuine ‘take-back’ and what is due to technical shortcomings in the refurbishments.

consumption increases in parallel with the progressive tightening of legal standards over the past decade. These figures are not strictly the 'rebound effect' because their baseline is current calculated consumption, rather than calculated savings in consumption. But they are useful measures as they show the same phenomenon: over-consumption compared to the calculated rating, in low-energy dwellings.

The picture in the UK is similar. A study by Milne and Boardman (2000) suggested that rebound effects for insulation measures are likely to be around 30% in the UK. For electrically heated dwellings Henderson et al. (2003) reported rebound effects of 18%. Without quantifying the contribution of the rebound effect, the total measured shortfall from expected savings in gas heated homes is 55% (Energy Saving Trust 2004). This figure includes technical shortcomings and other reduction effects which are not rebound effects. The rebound effects for fuel-poor households in the UK may be as high as 65-100% (Hong et al. 2006). However, Martin and Watson (2006) showed that although low-income customers displayed slightly higher rebound effects, there was little difference in rebound effects between average and low-income customers. More recent analysis of seven popular energy efficiency measures arrived at much lower figures of 5-15% for direct and indirect rebound effects (Chitnis et al. 2012).

6.2.2 Prebound effects

Sunikka-Blank and Galvin (2012) reviewed eight studies which analysed measured and calculated consumption figures for a total of 3400 German dwellings, plus measured ratings only for an additional 1 million. They found a clear trend was evident in the studies: on average, the higher the calculated energy rating (i.e. the less energy-efficient the building), the larger the percentage difference between measured and calculated consumption. The authors labeled this the 'prebound effect', as it is the opposite of the rebound effect. It refers to the percentage by which the measured consumption of a dwelling is *lower* than the calculated consumption. Note that this is not the result of an intervention (as it is in case of the rebound effect), but the result of the way actual measured consumption differs from the modeled consumption. It is an inaccuracy in the models used rather than a result of energy efficiency refurbishments.

For example, a dwelling with a calculated rating of 200 kWh/m^2 that is consuming 160 kWh/m^2 is showing a prebound effect of 20%. Though there were slight differences in the results of the studies reviewed, generally the prebound effect was, on average, 0% for dwellings of calculated rating 100 kWh/m^2, rising through 30% for ratings of 220 kWh/m^2, up to 55% for ratings of 500 kWh/m^2. While these were average values, the measured consumption of individual dwellings varied widely (Greller et al. 2010), Bild 1, for a graphical representation of the range of differences). However, average figures are useful for the present study, because, in the absence of evidence to the contrary, I may presume that the discrepancies between calculated and measured heating energy consumption in buildings that are about to be refurbished belong to the same statistical distribution as those in the total residential building stock.

Sunikka-Blank and Galvin (2012) compared these findings to those of comparable studies in France (Cayre et al. 2011), the Netherlands (Tighelaar and Menkveld 2011), Belgium (Hens et al. 2010) and the UK (Kelly 2011) and found similar trends.

6.2.3 Free rider effects

A point of controversy in the energy efficiency literature has been the issue of free riders and their impact on the effectiveness of programmes (Blumstein 2010; Eto et al. 1995; Gillingham et al. 2006; Joskow 1993; Kreitler 1991; Levine et al. 1995; Malm 1996; Train 1994; Vine et al. 2012; Vine 1994; Vine and Sathaye 2000; Wirl 2000). Free riders ‘are programme participants who would have purchased and installed an energy efficiency measure even in the absence of the programme' (Geller and Attali 2005, p. 18). This phenomenon is also referred to as 'deadweight' (Lees 2007b).

Kreitler (1991) estimates that free rider effects can reduce estimated savings by up to 80%, and Loughran and Kulick (2004) estimate this at 50-90%. Malm (1996) estimates free rider effects on high efficiency heating system purchases at almost 90%. A cross-evaluation survey on US demand side management programmes resulted in estimates of 0-50% with an average of 12.2% (Eto et al. 1995).

A recent study in Germany (Grösche and Vance 2009) calculates that up to 50% of estimated savings may be lost due to free riders. The impact of free riders depends very much on the type of measure and the specific context in which the measure is provided.

Responding to the critics, some stress that while free rider effects exist, they are offset by so-called 'free driver' or spillover effects, which result from measures being installed as a result of but not through the programme. This is the case when people install additional measures over and above the programme's incentives or if non-participants take up measures as a result of the programme (Eto et al. 1995). Recent evaluations of energy efficiency programmes show that spillover effects can be substantial and counterbalance a significant proportion of the free rider effects (NYSERDA 2012).

6.3 Evaluations of the Supplier Obligation

DECC commissioned independent evaluations of EEC 1 and EEC 2 conducted by Eoin Lees Energy (Lees 2006, 2008). In addition, OFGEM provided annual reports on the results of the SO since 2002 (OFGEM 2003, 2004b, 2005, 2006, 2007, 2008c, 2009c, 2010b, 2011b) and, with support of the Energy Saving Trust, a summary review of EESoP 1-3 covering 1994-2002 (OFGEM and Energy Saving Trust 2003). Those reports result from the regulator's duty to report to the Secretary of State on the programme. Until the end of EEC 2, OFGEM reported the accounted lifetime savings in terms of TWh broken down by energy supplier and measure. Since 2008 the target metric changed to t CO_2 (lifetime) and energy savings are no longer reported.

This paper focuses on the independent evaluations carried out by Lees (2006, 2008) because the OFGEM reports are more an accounting procedure based on an ex-ante agreed scoring system than a comprehensive evaluation. Lees critically discusses assumptions made in the accounting process and contrasts those with 'real' data. The evaluations include detailed estimates for energy savings broken down by measure and the cost of the SO to energy suppliers, receiving households, and others.

6.3.1 In-depth appraisal of the evaluation

The evaluations carried out by Lees (2006, 2008) essentially correct the energy saving scores used by OFGEM to account for the savings achieved by the obligated parties.

Because the SO always focused on small energy users – first households and small businesses and then just households – the approach taken by the regulator to verify the savings was based on deemed savings rather than measured savings. The values for those deemed savings were generated by using models such as the BRE Domestic Energy Model (BREDEM). Measures for which reliable engineering estimates of energy savings existed were given a specific energy savings score (later carbon emissions savings).

According to Lees (2008), the following steps were carried out to correct the energy savings reported by OFGEM in the evaluations:

- remove any uplift factors from the energy saving values: some measures (called innovative action) received higher energy saving scores in order to incentivise additional technologies with a lower cost effectiveness. These uplifts are subtracted in the evaluations.

- correct for the heat replacement effect for lighting and appliances which results in increased fossil fuel usage: more efficient forms of lighting and appliances result in less waste heat which is subsequently compensated by increased space heating.
- remove the fraction of energy savings taken in the form of increased comfort: see section 6.3.2 on rebound effects.
- update the energy saving values for insulation measures and the lifetimes for heating measures to be consistent with those used in the most recent obligation period. This is based on the assumption that most recent scores have been revised based on new evidence.
- convert from fuel standardised units to the actual units of the fuel: EEC 1 and EEC 2 used a fuel-weighted accounting system depending on the carbon content of the fuel saved.

The SO evaluations also account for free rider effects (section 6.3.3). Prebound effects are addressed by adjusting the modelled savings based on measured savings across a sample of households (see section 6.3.3)

6.3.2 Prebound and rebound effects

Rebound effects are partially taken into account in evaluations of the SO. However, this is related to space heating and insulation only.

During EESoP 1 the energy savings scores used were based on BRE advice and the BREDEM model and modified with EST assumptions on comfort taking (rebound effect). BRE had carried out research during the Energy Efficiency Demonstration Scheme and also the Energy Efficiency Best Practice Programme which followed it on energy savings arising in case studies and also paired test houses. It is not known how the figures BRE produced was weighted between the two routes (model and test houses), but I was told that it is likely to have been heavily influenced by the paired test houses (Eoin Lees, personal communication 29/06/2013).

Subsequently, comfort factors, energy saving values changed slightly due to improving average efficiency of the boiler stock over the various phases. Only later were ‘technical reduction factors’ introduced which then became ‘in use reduction factors’ factors in the successor of CERT, the Energy Company Obligation (ECO). Because energy saving scores were not only based on modelled energy savings but on actual savings in test houses it is likely that the prebound effect was at least addressed partly by the methodology chosen.

When attributing saving scores during EESoP 1 it was assumed that households would take 30% of potential savings from insulation measures in improved comfort. For EESoP 2 and 3 it was assumed that on average households would take 42.5% of savings as increased comfort. For non-building fabric measures, only the fitting of energy-efficient lighting (CFLs) was considered to have a small rebound effect of 2.5%.

The EEC 1 evaluation used a 30% rebound factor for the calculation of savings from insulation (Lees 2006), the same factor was used when setting the energy savings score for the different measures for EEC 2. For low-income households it was assumed to be 45% with 15% for able-to-pay households.

However, the comfort factor was reduced to 15% during CERT (Lees 2008) as a result of research commissioned by DECC on discrepancies between actual and estimated savings (Sanders and Phillipson 2006). DECC states that analysis allows for a comfort factor of 40% for insulation measures in the super priority group, a group of customers thought to be most vulnerable (15% in priority group, a group of those over 70 and on certain benefits) and 25% for heating measures in the super priority group (0% in the priority group) (DECC 2010a). It is likely that similar figures will be used in the CERT evaluation.

Similarly to Germany, the modelled heating energy consumption pre-refurbishment is higher than actual consumption. However, the main difference to the evaluations of the CBRP is that since the beginning of the SO those effects have effectively been cancelled out already at policy design stage by frequent revisions of the energy savings scores used in the target setting and accounting process that follows. The revisions are based on observed savings within a sample of recipients of measures rather than modelled hypothetical savings. Research by the Building Research Establishment (BRE) in the 1980s showed the gap between the two and suggested an overall ‘reduction factor’ of 30% (Henderson et al. 2003), and there is evidence that it still exists (Kelly et al. 2012). This reduction factor includes rebound effects, prebound effects, and technological shortcomings of measures. Although the prebound effect is not explicitly quantified for every measure, it is included in the part of the reduction factor applied to energy savings classified as ‘other’.

Further verification was undertaken by assessing the validity of the energy savings scores used for attributing savings to the various measures. A range of studies was commissioned by government and stakeholders (AEA 2009; AEAT 2004; BRE 2006; Energy Monitoring Company 2008; Energy Saving Trust 2004; Henderson et al. 2003; Hong et al. 2006; Martin and Watson 2006; Sanders and Phillipson 2006). The latest research on energy savings is currently conducted as part of the National Energy Efficiency Data framework (DECC 2011e, 2012e). The results of the above studies were used to optimise the deemed savings scores for future obligations.

Table 11 summarises the energy saving scores used, the lifetime assumed and the comfort factor applied for one example measure, cavity wall insulation, which was one of the key energy efficiency measures delivered by the SO.

Table 11: Reduction factors applied to cavity wall insulation in various periods of the SO

SO Phase	Annual energy savings (kWh/year)	Period savings counted over (years)	Comfort/in use factor then applied	Comments
EESoP 1	3278	15	30% across all incomes	Off peak electricity savings only.
EESoP 2	Not identified – probably same as EESoP 1	15	42.5% (averaged with higher for low income)	Electricity savings mainly but gas if part of block.
EESoP 3	Decreased by 6.8% from EESoP 2 (revised version of BREDEM)	40	42.5% (averaged with higher for low income	Electricity and gas now obligated – savings values depend on.
EEC 1	5470	40	45% PG comfort and 15% NPG comfort factors used	Energy savings values and target include comfort and average over all fuels.
EEC 2	Not identified – probably same as EESoP 1	40	as EEC 1	as EEC 1

Source: Eoin Lees, personal communication 29/06/2013

It is beyond the scope of this paper to validate the reduction factors applied for the various measures, but in theory, this process accounts for both rebound and prebound effects at the policy design and evaluation stage.

6.3.3 Free rider effects

In Britain, free rider effects are explicitly considered in the design of the SO when the savings scores are defined for different types of measures (Lees 2006, 2008). During EEC 1, free rider effects have been estimated to be less than 30% for all measures other than DIY loft insulation. The initial factors used for free rider effects were higher than calculated by the evaluation and total free rider effects were estimated to be 20.7% compared to the initial assumption of 27.6%. These estimates were taken into account in subsequent policy design and the correction factors for free rider effects were amended. The EEC 2 evaluation stresses that free rider effects are below 20% for most of the important measures (in terms of their contribution to the overall target) except for DIY loft insulation. Overall, 14% of the savings were attributed to free riders. However, given the higher free rider effects factors for wet and cold appliances, the overall losses due to free riders accounted for about 20% (Lees 2008). When the SO was extended in April 2011, DECC decided that for the remainder of the obligation period there would be negligible free rider effects being subsidised by the programme. This is due to the high number of filled cavity walls and insulated lofts (DECC 2010b). However, a detailed analysis is missing. Previous evaluations systematically assessed free rider effects and it is likely that the post-CERT evaluation will provide more clarity.

6.4 Evaluations of the CO_2 Building Rehabilitation Programme

The first detailed evaluation of the CBRP, Kleemann et al. (2003), analysed the results achieved in 2001 using the IKARUS space heating model. This gives energy and carbon savings based on calculated building performance. The figures from the sample were extrapolated to all the buildings that received KfW funding. No detailed evaluation exists for 2002-2004, but Doll et al. (2008) provide estimates for the carbon savings achieved in these years, quoting an unpublished presentation of the Federal Ministry of Transport, Building and Urban Development (BMVBS – *Bundesministerium für Verkehr, Bau und Stadtentwicklung*) from 2006. IER and PROGNOS (2004) also offer figures for energy savings achieved in 2002 and 2003. In reports prepared for the KfW for 2005-2010, Clausnitzer et al. (2007, 2008, 2009) and (Clausnitzer et al. 2010) offered detailed evaluations of the programme, including energy and carbon emissions saved. Diefenbach et al. (2011) use a similar method in their evaluations for 2005-2010, also prepared for the KfW.

6.4.1 In-depth appraisal of the evaluations

Clausnitzer et al. (2008) follow the same methodology and format as the bulk of the post-2005 evaluations, and may be used as an example. It estimates CO_2 and energy savings achieved through the support of CBRP funding provided in 2007. The owners of 1022 properties that had received CBRP support were surveyed and 658 responded. Respondents gave details on the type, location and orientation of the building, plus its thermal features (insulation, windows, heating system, etc.) before and after refurbishment, and the energy source used for heating. Using these parameters the authors employed a simplified method, developed by Loga et al. (2005), to calculate heating energy consumption, in line with energy ratings given in German energy performance certificates. This gives theoretical results based on the presumed technical quality of the building, and does not take rebound and prebound effects into account. The authors modified this according to a building typology classification method (apparently produced by the Institut Wohnen und Umwelt, but mis-referenced in Clausnitzer and colleagues' studies) and the likely effects of each building's geographical location and orientation to the sun. A software tool was then used to give the expected energy and CO_2 emission savings per year from this data.

Further consideration was given to the likely technical lifetime of the thermal refurbishment measures, e.g. 40 years for roof insulation; 20 for boilers (Clausnitzer et al. 2008, p. 54). From these figures the annual energy and CO_2 emission savings, produced as a result of the refurbishments, were calculated. As a cross-check on survey data a 'sub-sample' (number and selection method not given) of properties were visited. The results were then extrapolated to all domestic properties that received CBRP funding, to produce national totals. The study concludes that the CBRP in 2007 supported a saving of 330,000 t of CO_2 per year and 0.94 TWh of energy per year. Assuming a 30-year average for the technical lifetime of the refurbishments (Clausnitzer et al. 2008, p. 68), this equates to total savings of 9.9 million t of CO_2 and 28.2 TWh.

From these results one can calculate what this implies for the average dwelling. According to the study, the subsidies enabled 88,590 dwellings, of total floor area 7.75 million m^2, to save a total of 940 GWh of heating energy per year. This equates to a saving of 121 kWh/m^2, or 54% of an average pre-refurbishment consumption of 226 kWh/m^2.

The results of Clausnitzer et al. (2010; 2007, 2008, 2009), supported by Diefenbach et al. (2011) show a sharp fall in the savings per m^2 of floor area as from 2008: energy savings rose steadily, from 110 kWh/m^2 in 2005 to 131 kWh/m^2 in 2008, then fell to 84 kWh/m^2 and 82 kWh/m^2 in 2009 and 2010, respectively. This is most likely because prior to April 2009 only whole-house refurbishments were eligible for subsidies, but from April 2009 single refurbishment measures – such as replacing a window or insulating a roof – became eligible.

6.4.2 Prebound and rebound effects

The prebound effect depends, as noted in Section 2, on the (calculated) pre-refurbishment heating energy consumption.

Despite the length of the evaluations (over 250 pages), Clausnitzer et al. give only minimal information on methodology. While their authors must have estimated the (calculated) pre- and post-refurbishment heating energy consumption, they give only the difference between these two. Further, their questionnaire asked only about building characteristics, not about energy bills, so an opportunity to explore the validity of their calculated data was missed.

In the absence of further information, and in line with the growing evidence of prebound and rebound effects, I estimate the actual savings to be lower than the official figures quoted in Table 10. Assuming an average 30% prebound effect (all energy) and a 10-30% rebound effect (heating energy) the total savings from 2002-2007 reduce from 173 TWh (lifetime) to 84-108 TWh (lifetime) or 74 tCO_2 to 36-47 t CO_2 at a price of €60-77/t CO_2 and 2.6-3.4 Cent/kWh. As indicated above, energy prices are well above this range and this makes the policy still cost effective even if rebound and prebound effects are subtracted. To reiterate, the cost figures do not include either the private cost of the investment or the value of the energy savings, only the public cost.

A much more sophisticated analysis would be required in order to establish more reliable figures for carbon and energy savings. Because the rebound and prebound effect differs depending on the energy use of the building before and after a retrofit such an analysis would need to be based on disaggregated data breaking down the refurbished houses into different energy use fragments. Further research could provide insights into the precise scale of the prebound and rebound effects applying to the CBRP. The main conclusion from this initial analysis is, however, that the evaluations systematically exclude prebound and rebound effects which is likely to result in an over-estimate of carbon and energy savings.

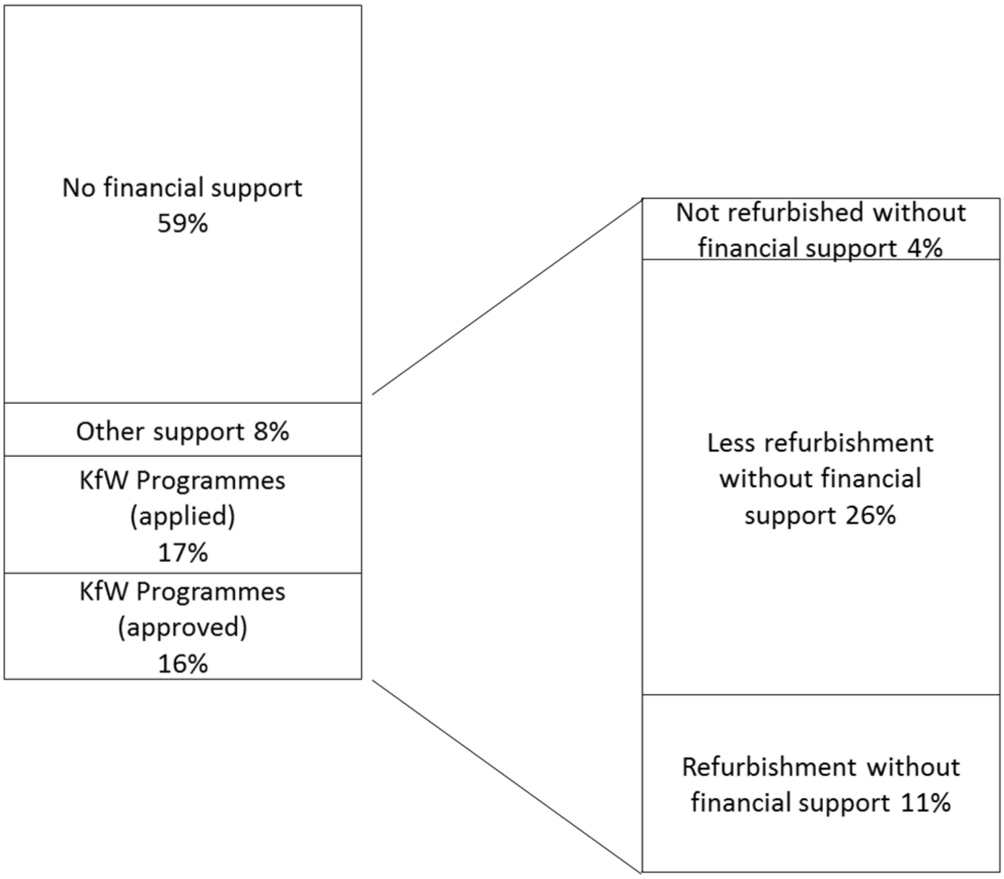
6.4.3 Free rider effects

None of the evaluation studies carried out for KfW (Clausnitzer et al. 2010; Clausnitzer et al. 2007, 2008, 2009; Kleemann et al. 2003) mention free rider effects. An evaluation of the CBRP and other policies focusing on home energy efficiency carried out for the Federal Office for Building and Regional Planning (BBR) stresses that there is no reliable data for free rider effects and models the implications of 0-30% free rider effects

(Kleemann and Hansen 2005). Only one evaluation study of carbon reduction policies carried out for the Federal Ministry for Economy and Labour explicitly discusses free rider effects with regard to the CBRP (IER and PROGNOS 2004). Without quantifying the effect, the authors of the study provide qualitative estimates for various policy instruments. For the CBRP they estimate that free rider effects are high. The study highlights that no reliable data exists and that future research needs to address this gap.

Since the IER study no reliable estimates have been made available (Climate Policy Initiative 2011; Frondel 2008; RWI and forsa 2008). There is, however, some evidence that indicates free rider effects. A survey covering 244 households that received energy efficiency advice shows that 59% of those who invested in energy efficiency measures did not apply for financial support such as the CBRP (Friedrich 2006). Of the 41% who applied for financial support for the investment in energy efficiency measures 81% submitted applications to KfW programmes, most probably to the CBRP. Only 9% of the 41% who did apply for financial support would not have undertaken the investment i.e. just 4% of all households that did invest in energy efficiency improvements would not have refurbished their homes without the financial support offered by programmes such as the CBRP. Of those who applied for financial support 64% stated that they would have done less energy efficiency improvement without any support. More importantly, 11% of those who received or applied for financial support stated that they would have refurbished their homes to the same standard in the absence of any support (Figure 18). This suggests free rider effects of at least 11% plus an unknown percentage included in the 64% of households who would have undertaken some but not all of the investment without financial support.

Figure 18: Financial support for refurbishment and impact on decisions of households



Source: based on Friedrich (2006)

The figures suggest that some of the energy efficiency refurbishments that are supported by the CBRP would have happened anyway. Given that the study was based on a small number of households one needs to be cautious when interpreting the results, even though the overall validity of the study design was critically peer-reviewed and generally approved by the Wuppertal Institute (Schüle and Hanke 2006). In addition to the small sample size, the study is also more than 6 years old and the CBRP's requirements did change over the years. Also, the method used suffers from two problems: a) it may provide unreliable estimates when the wording of the questionnaire is inappropriate and b) it does not allow for an estimate of the level of inaccuracy (Vine and Sathaye 2000). Others question the validity of such methods because intentions are not very good predictors of actual behaviour. Asking people about their decision and whether they would have done it without financial support does not produce reliable estimates of free riders (Peters and McRae 2008).

Still, the evidence illustrates that there is a real need for more research in Germany making use of a much bigger sample size and generating more reliable data. So far free rider effects have been either ignored or downplayed in the evaluations of the CBRP. An evaluation study on the economic effects of the CBRP funded by the KfW argued that an assessment of whether investments in energy efficiency improvements would have been undertaken regardless of the financial support provided by the CBRP was outside of the analysis. The CBRP would raise awareness in the first place and therefore trigger investments in energy efficiency improvements (free drivers, see section 6.2.3), mainly through giving advice to households (Kuckshinrichs et al. 2009). However, research on German energy advice programmes also indicates significant free rider effects of 66-89% depending on the type of energy efficiency measure (Frondel 2008).

Conclusions

The literature on the evaluation of energy efficiency programmes is heavily dominated by US scholars, while contributions from German and British scholars are rare. As a result of critical research, evaluations of energy efficiency programmes in the US became much more sophisticated over time (Vine 1994). Similar attempts could help improve the validity of the evaluations in Germany and the Great Britain. This paper is a first step with its critical evaluation of the evaluations of two prominent energy efficiency policies in Germany and Great Britain.

The UK evaluations account for all three of the savings reduction effects. Rebound effects are explicitly subtracted from calculated savings for some measures both in the evaluations and at policy design stage. Prebound effects are addressed by using adjusted savings scores based on observed rather than modelled savings (although their contribution to the total reduction factor applied is unknown). Free rider effects are explicitly considered in savings estimated from various refurbishment designs. Nevertheless it is beyond the scope of this paper to assess the accuracy of the estimates of these three factors in the UK.

In contrast, evaluations of the German CBRP do not account for any of these reduction effects. My critical review of the evaluation for 2007 Clausnitzer et al. (Clausnitzer et al. 2008) suggest that when rebound and prebound effects are taken into account, actual savings may be less than half as great as the evaluation estimates, quite apart from any possible free-rider effects. However, the costs per unit of energy saved are still well below the cost of energy making it cost-effective.

There are increasing calls for actual, rather than estimated, savings to be used in assessments of energy saved through refurbishments (e.g. Greller et al. 2010; Schröder et al. 2011).

Despite repeated demands for doing so, in Germany free rider effects are not included in any of the evaluations of the CBRP. There is insufficient data on free rider effects in Germany but the evidence that exists suggests that those effects may be significant. A thorough assessment of potential free rider effects and their systematic considerations in the evaluations would improve the reliability of the results.

7 Cross-case analysis: politics of change

Comparison is the death of joy.

Mark Twain (unknown)

Mark Twain, quoted above, suggests that comparison is not a joyful exercise. I would argue that while it may not always be joyful, it is often useful. It is useful because such a comparison, in this case a cross-case analysis, brings both similarities and differences to the fore.

Following the stages of Systematic Process Analysis outlined in chapters 1 and 3, the challenge of this chapter is to draw out the identified mechanisms of policy change and discuss their relation to the theoretical framework and hypotheses developed in chapter 2. The chapter proceeds as follows: first, the case study material is analysed with regard to the causal mechanisms of policy change encompassed in the conceptual framework of this thesis. For each mechanism, its explanatory power is discussed with regard to the case studies. In some instances, additional mechanisms are suggested, not previously covered by the conceptual framework. Second, the hypotheses presented in chapter 2 are evaluated based on the observed changes and the causal mechanisms identified. Finally, the chapter concludes with discussing the limitations of the analysis.

7.1 Mechanisms of policy change

The conceptual framework contained a number of mechanisms of policy change:

- external pressures;
- friction; and

- policy feedback including positive and negative policy feedback.

This section evaluates their explanatory power for both cases in this order.

7.1.1 External pressures

In chapter 2 e*xternal pressures* have been conceptualised as drivers from a wide range of possible sources that put pressure on the policy subsystem to change. The conceptual framework distinguished between short-term events referred to as *systemic perturbations* and long-term pressures called *subsystem spillovers* (Williams 2009). In the following both cases are analysed with regard to the existence of external pressures and their nature. There is no clear definition at which point external pressures constitute systemic perturbations or subsystem spillovers. In this thesis, events such as non-linear price changes over a few weeks or months are treated as systemic perturbations whereas processes taking years to unfold are considered subsystem spillovers.

Subsystem spillovers

In both cases the issue of climate change policy constituted an external pressure falling into the category of *subsystem spillovers* due to the gradual and long-term nature of the driver.

While climate change policy affects a whole range of different sectors, it is particularly relevant for home energy efficiency policy, because homes in the UK and Germany are responsible for a large proportion of total carbon emissions. In both countries climate change was a major driver of policy change of the principal home energy efficiency policy. At its inception, the German CBRP was part of the newly established National Climate Protection Program, and the purpose of the scheme was also mirrored in its name: CO_2 Building Rehabilitation Program (BMU 2000). Extensions of the CPRB in 2003 and 2005 were justified with regard to its importance for climate policy. The CBRP also featured in the 2005 National Climate Protection Programme (BMU 2005), as well as the 2007 Integrated Energy and Climate Programme (BMWi and BMU 2007). Most recently, the CBRP was highlighted in the 2010 Energy Concept as one of the key policies to reduce carbon emissions in the domestic sector.

Similarly, the first SO, EESoP1, was partly introduced as a result of national climate policy: together with the E-factor (the energy efficiency price premium for gas, see below), EESoP 1 was supposed to raise money for the Energy Saving Trust (EST) that was established by Government, British Gas and public electricity supply companies in 1992 to reduce home all energy use and the associated carbon emissions. The EST played a key role in the Government's climate policy strategy for the domestic sector as outlined in the 1994 UK Climate Change Programme (HM Government 1994). Climate change continued to play a major role for the SO. Another example is the 2006 Climate Change Bill that introduced the Carbon Emissions Reduction Target (CERT). While earlier SO scheme names always referred to energy efficiency, CERT explicitly focused on carbon emissions. CERT became the most important climate policy in the domestic sector and is also supposed to deliver the majority of domestic carbon savings in the future (DECC 2009c).

In Great Britain, rising energy prices created another form of external pressure on the SO. As illustrated in section 4.2.4, energy prices increased steadily after 2003. The rising energy prices particularly affected the SO in 2008, when prices increased more rapidly than any increase since the 1973 oil crisis. However, even though there were comparable price hikes in 2006/2007 there was barely any public debate about energy prices and it had no effect on the SO. The main reason for the effect of energy prices on the policy instrument is probably the intervention of macropolitics at this point in time. Interference of macropolitics in subsystem politics is one of the main causal mechanisms leading to policy change hypothesised by PET (Baumgartner and Jones 1993; True 2000; True et al. 2007a; Walgrave and Varone 2008). In 2008, the involvement of the Prime Minister himself led to significant and rapid changes in the subsystem of domestic energy efficiency policy. Attempts to introduce a windfall tax on energy companies' profits in 2008 as a response to rising energy prices failed due to resistance from within government (more precisely the Treasury and BERR) and the companies themselves. However, the pressure to respond politically to rising energy prices and increasing profits of energy companies accumulated to the extent that eventually Prime Minister Gordon Brown dealt with the issue directly. Instead of a windfall tax, the government decided to raise the CERT target and introduce CESP. Without the Prime Minister's intervention the 20% uplift of CERT would have been rather unlikely, given that CERT had run for just about five months and a change to the target half way within a SO scheme had never happened before. While one could argue that rising energy prices fall into the category of systemic perturbation, the phase of increased public attention to the issue was preceded by a gradual upwards trend in energy prices. It is more likely that in 2008/2009 a tipping point was reached after pressure accumulated over a long time period.

An additional external pressure specific to the UK manifested itself in increasing fuel poverty. Even though it took a long time, fuel poverty is now a well-established policy driver in the UK (Boardman 1991a, 2010). As illustrated in section 4.2.6, fuel poverty increased mainly as a result of rising energy prices after 2003. Despite the fact that both fuel poverty groups and the energy suppliers did not favour using the SO as a policy to address fuel poverty, although for very different reasons, the SO continued to contain provisions for targeting fuel poor households (note that it is contested to what extent the SO actually achieved that (Boardman 2010)). The main reason for such an approach was the lack of any other significant enough policy and the hesitation to establish a fuel poverty programme based on public expenditure. However, fuel poverty was not always a driver for the expansion of the SO, the perceived regressive nature of the policy instrument (because it is paid by energy bills) also constituted *negative policy feedback* with demands for scaling it down or replacing it (see section 7.1.3).

Unlike the UK, there is no systematic fuel poverty policy in Germany. The debate has not gone beyond various pilot projects and statements by different stakeholders. Hence there are very few references to fuel poverty in the development of the CBRP. It is also notable that the CBRP is essentially a loan scheme offering loans to those who can prove their financial credibility. The fuel poor are unlikely to receive such loans (at least not directly, they may still benefit as tenants of a refurbished property for example)). There is no convincing explanation for the different level of attention fuel poverty receives in the two countries. One could argue that fuel poverty is simply not a problem in Germany, which is why it does not constitute a major policy issue. However, there is evidence that this is not the case, and that a substantial number of households is affected by it. Unfortunately, there are no reliable estimates that could be used for a meaningful comparison of levels of fuel poverty (Kopatz et al. 2010). More research is required to investigate why this issue became a major policy area in the UK but not in Germany.

Systemic perturbations

A *systemic perturbation* occurred in Germany in 2008: The global financial crisis and the following recession had a substantial impact on the CBRP and its financial resources. Following the financial crisis the German government used the CBRP as part of its attempts to stimulate economic growth. Although the CBRP's contribution to economic prosperity was stressed also prior to 2008, it was only then that the Programme was amended explicitly with the intention of triggering private investment to help overcome the recession. There were no references to other pressures such as climate change (see section 5.2.3), indicating that the recession constituted the primary driver at the time.

No systemic perturbations could be identified in the case of the SO, although the issue of rising energy prices could perhaps be viewed through the lens of systemic perturbations given the relatively short timescales (see discussion of energy prices above). However, in this case the pressure built up over many years and it was not a single event, such as the financial crisis, that led to the policy changes which took place in 2008.

7.1.2 Friction

As outlined in chapter 2, Jones and Baumgartner (2005) provide two causal mechanisms of friction: cognitive limits of organisations and institutional procedures.

Cognitive limits of organisations result in disproportional information-processing. Because organisations can only process a limited number of issues, most issues do not get attention of major policy makers most of the time. Therefore, the ‘cognitive architecture of institutions creates an inevitable bottleneck of attention’ (Walgrave and Vliegenthart 2010, p. 1149).

'Resistance built into the *institutional structure* of policymaking [my emphasis]’ (Jones and Baumgartner 2012, p. 4) is a second reason for friction. Past legacies of institutions can add friction due to sunk costs, long-term budgetary commitments, and bureaucratic inertia. Therefore, political institutions are comparable to ‘rusted gears’ in the sense that some force is required to make them move (Workman et al. 2009, p. 80). This makes the reallocation of resources to other areas more difficult and the response is slow (Baumgartner et al. 2009).

Recent studies also suggest that there may be other sources of friction for example *political parties* (Jensen 2011; Walgrave and Varone 2008). This thesis identified an additional causal mechanism which can explain the phenomenon of friction: the *role of key personnel in organisations* which will be elaborated on below.

Friction resulting from changes in key personnel

Changes in key personnel in the SO and the CBRP impacted on the degree of friction. This observation fits with other studies that stress the role of key personnel for driving or inhibiting policy change (Andeweg 2000; Chabal 2003; van Asche 2012).

In Germany, tied in with other drivers such as budgetary constraints, the change of personnel at the ministerial level in late 2009 had an impact on the CBRP when Peter Ramsauer (CSU) succeeded Wolfgang Tiefensee (SPD) as minister of the BMVBS. Of course, one would expect some alteration of priorities following the change in government (Jensen 2011), but Ramsauer's appointment appeared to have an impact far beyond party politics. As illustrated in section 5.2.5, Ramsauer opposed the expansion of the CBRP and even proposed to curtail the CBRP's funding significantly, even though he faced opposition from his own party and ministry. The opposition from within his own ministry and party shows that Ramsauer did not simply represent an official party or ministry position, but rather followed his own agenda on the matter. Interviewees described him as a 'transport minister' primarily interested in transport infrastructure but not in buildings. One should, however, also take into account the on-going debates at the time around budget constraints and the debt brake. Ramsauer linked his arguments to this debate and embedded the cuts in a wider discussion about public spending. It seems that, while impossible to prove, a different minister with more balanced priorities giving more consideration to the overall coalition parties' positions would probably have reacted differently and have been more open toward the CBRP's expansion and would have tried to prevent the cuts to its budget. Therefore, the minister constituted a source of friction in the sense that he actively blocked the expansion of the programme. The role of a minister in slowing down or increasing the speed of policy change can be observed in other cases as well and the academic literature suggests that 'ministers do make a difference because they develop their own style at the head of the ministry' (Chabal 2003, p. 45).

Also in case of the SO in the UK changes in key personnel contributed to friction. However, while in Germany it was the minister who inhibited further change, in Britain the director of the gas market regulator blocked an expansion of the SO to the gas sector. This process can also be understood by applying the concept of friction: the Director General of OFGAS, Claire Spottiswoode, was supposed to establish domestic sector energy efficiency programmes in order to help with achieving the national carbon reduction targets set by government (see section 4.2.5). However, she acted as a bottleneck blocking most of the pressure put onto the regulator. As a result, policy inputs (such as demands to promote energy efficiency in order to reduce carbon emissions) were not translated into policy outputs (in the form of an effective E factor or a SO for the gas sector, see section 4.2.2). Hence Spottiswoode's objection was a source of friction leading to the accumulation of pressure to reduce carbon emissions: EST frequently raised concerns that without the promised funding from the E factor or a SO in the gas sector it would be unable to generate the carbon emission reductions of the scale required. The fact that shortly after his appointment McCarthy implemented the SO in the gas sector indicates that at the time Spottiswoode was the primary source of friction rather than cognitive limits or constrained institutional capacities as theorised by PET. However, as the next section will show, there were also significant institutional constraints which caused substantial friction.

The observations made indicate that the concept of friction could be enhanced by encompassing the role of key personnel in addition to the other causal processes already theorised by PET as outlined above. One might, however, argue that the appointment of new personnel with different priorities might simply represent a shift in organisational priorities. However, in the case of Ramsauer's appointment criticism came even from within his own department and from his own party as illustrated in section 5.2.5. Also Claire Spottiswoode did not seem to simply mirror the priorities of OFGAS at the time. Shortly after the new director was appointed, OFGAS changed its approach and became more receptive for the SO in the gas sector again which it also was before Claire Spottiswoode's term as Director General (see section 4.2.2).

Friction resulting from limited institutional capability

Cortell and Peterson (1999) point out that institutional structures may prevent policy makers from implementing changes in public policies. Hence it depends on the institutional capability of a system whether policy change takes place or not. Institutional capability refers to 'how institutional arrangements create opportunities for, or place limits on, an official's ability to translate her desire for structural change into policy' (ibid., p. 190). In other words, the institutional capability determines to what extent policy inputs can be translated into policy outputs, which is precisely how institutional friction is theorised in PET (Jones and Baumgartner 2012).

In both cases there is evidence for the existence of institutional friction. In Britain, the allocation of the target setting powers to the regulator resulted in many years of deadlock due to a limited institutional capability. In Germany, the financial architecture of the CBRP and its dependence on public expenditure was the cause of institutional friction.

In the 1990s, the SO was not only administered by the regulator, as is the case today, but also designed by them. Both regulators argued that a substantial increase of the SO's scale would be a matter for the Central Government to decide given the implications with regard to energy bills. The regulators compared the SO to a tax, which would not be something they felt competent introducing (see section 4.2.3). Due to the inability of the institutions in place (in this case OFGAS and OFFER) to raise the target, pressure to generate the carbon emission reductions elsewhere accumulated. Directing the target-setting powers to Central Government instead of the regulator was seen as the only way of dealing with the pressure to achieve carbon emission reductions in the housing stock. Analysed through the lens of friction, the institutional constraints (unwillingness and inability of OFGAS and OFFER to increase efforts beyond a low level) limited the system's ability to translate policy inputs (pressure to cut domestic carbon emissions) into policy outputs (effective SO). In order to realise substantial carbon emission reductions in the domestic sector modifying the institutional framework appeared to be the only option and the accumulation of pressure eventually led to reform. Hence the institutional change that took place was a deliberate means to achieve carbon reduction goals in the housing sector rather than an unrelated coincidence.

Historically, the German CBRP had been funded by public expenditure coming out of the overall annual budget; only recently a partial funding mechanism was introduced independent of the budget (see section 5.2.4). As any other budgetary item the CBRP requires parliamentary approval and the responsible government department does not possess direct decision-making powers. There is a cascade of bureaucratic procedures that need to be followed when budgets are designed and approved. Historically, budgets had been built bottom-up. First, the government departments propose a fiscal plan (called *Referentenentwurf*) allocating funding to the respective areas of their responsibilities (in case of the CBRP this is the BMVBS). The next step is to reconcile the proposal with the preferences of other government departments. The Treasury has the responsibility to draft a proposal taking into account the preferences of the various departments and other fiscal criteria. Based on the draft by the Treasury, the government agrees on a so-called cabinet proposal (Kabinettsentwurf) which is then presented to the *Bundesrat*, a council representing the 16 Länder (federal states) at the federal level. The Bundesrat discusses the draft budget and submits proposals for amendments to government. After finalising the draft budget the government forwards it to the *Bundestag*, the parliament, which holds a vote on the budget. The Bundestag refers the draft budget to its various committees for further amendments – the CBRP's budget is mainly discussed by the Budget Committee and the Construction Committee. The Budget Committee has the overall responsibility to draft the annual budget and needs to consider any requests for amendments. With regard to the CBRP, the Construction Committee cannot directly make amendments to the funding proposals. However, the political parties usually submit the same amendment proposals to both committees at the same time. Once the Budget Committee reaches an agreement, the draft budget is discussed in the Bundestag and often referred back to the Budget Committee with additional proposals for modifications. Eventually, the budget is presented to the Bundestag for a final vote.

Within this rather complicated process the original proposals can change significantly. Compared to the SO, the legislative procedures which need to be followed when calibrating the policy instrument are more complex. In Great Britain, DECC can make a decision about the SO target by setting out secondary legislation (under powers given to them by primary legislation) that requires parliamentary approval, but parliament can only outright reject or accept the proposed secondary legislation. Rejection happens very rarely - the last time a piece of secondary legislation was not approved by the House of

Commons was in 1969 (House of Commons Information Office 2008). Hence the parliamentary approval of secondary legislation on the SO is mainly a formality with no political significance. In contrast, the CBRP's budget is set as part of the overall budget process requiring consent from multiple institutions such as the Treasury, the Cabinet, the Budget Committee of the Bundestag, and the Bundestag itself. However, no evidence could be identified that illustrates an impact of these structures on the CBRP's funding.

Friction as a result of cognitive limits

As outlined above, PET theorises that friction arises from cognitive limits of organisations (Jones and Baumgartner 2005, 2012). However, this thesis found no evidence in both cases supporting this hypothesis. This may relate to the difficulties of investigating such a phenomenon with the methods chosen. Hence cognitive limits could have played a role for the evolution of the two programmes. It would be a worthwhile question for further qualitative research to explore the role of cognitive limits for friction.

7.1.3 Policy feedback

'Because things are the way they are, things will not stay the way they are' (quoted in Cook 2007, p. 390)– this quote by the German playwright and theatre director Berthold Brecht sums up the principle behind policy feedback nicely. The status quo is never stable and consequences of the status quo, even though they may take years or even decades to develop, eventually lead to transformation. The conceptual framework distinguished between two such processes: those that dampen and inhibit expansion of the existing policy regime and those that drive it.

Negative policy feedback

Chapter 2 introduced the concept of negative policy feedback. Following Weaver (2010), this has been conceptualised as consequences of a policy that undermine, rather than reinforce, the persistence of this very policy.

There is evidence in both countries for negative policy feedback. However, in Germany the evidence is more profound. In Germany, the CBRP was subject to fiscal pressures that had a negative impact on the CBRP's budget. A good example is the expansion of the CBRP's budget in 2008 (see section 5.2.3). In order to help with recovery of the struggling economy after the financial crisis, the German government decided to increase the budget of the CBRP substantially as part of the first Economic Stimulus Package. However, the large amount of public spending and the required additional debt could only be justified with a commitment to limit the budget deficit in the future, which resulted in the introduction of the debt brake (Dietrich 2009). In 2010, the debt brake had a visible impact on the CBRP and the responsible minister announced significant cuts of the CBRP's budget justified with the debt brake. This is an interesting case whereby an expansion of a policy instrument driven by *positive* policy feedback processes had knock-on effects in the form of *negative* policy feedback processes. In order to provide more long-term stability with regard to the CBRP's financial resources a budget-independent Energy and Climate Fund was introduced subsequently. However, it looks like the introduction of the fund may have caused the opposite as it was based on rather unreliable financial sources itself. Again, even though unintended, the modified finance structure started to generate *negative* policy feedback effects in the form of unreliable funding for the programme.

As indicated above, the SO was not subject to negative policy feedback to the extent the CBRP was. There were at least two dynamics that can be classified as negative policy feedback. Using energy suppliers as a vehicle to promote energy efficiency measures (probably inevitably) resulted in resistance from the obligated parties. Throughout the history of the SO attempts have been made by suppliers to weaken the targets or change the rules in their favour (see section 4.2.8). Resistance to existing policies from negatively affected vested interests constitutes one form of negative policy feedback (Schrad 2010). However, even though some observers predicted significant obstacles in the form of resistance from the incumbent energy industry against a utility energy efficiency programme (Dawkins 1987), this kind of policy feedback proved fairly weak and *positive* policy feedback in the shape of the targets consistently being achieved more than outweighed the negative policy feedback. Eventually, Government did pay less and less attention to the energy suppliers' concerns based on the experience that they always delivered the targets (they did not at the end of CERT but this is outside the scope of the thesis because it happened after 2010).

Another dynamic representing negative policy feedback is the circumstance that most of the cost of the SO is passed through to households via the energy bills. This led to concerns around social equity and its impact on the fuel poor with some deeming the SO as a policy with regressive impacts (Boardman 2010), which it clearly is one the revenue raising side. In order to address such concerns, the SO contained provisions for directing a significant proportion of the effort towards households in fuel poverty, although this also was very controversial (see section 4.2.6). However, even though the SO had regressive effects due to the way revenues are raised, there was no evidence showing that it had a negative impact on the overall size and ambition of the policy instrument i.e. that Government deliberately did not expand or scale down the SO in response to those concerns.

Positive policy feedback

Based on the historical institutionalism literature (Campbell 2002a; Mettler and Soss 2004; Pierson 1993b, 2004a; Skocpol 1992) and PET (Baumgartner and Jones 1991, 1993, 2002a, 2002b, 2009; True et al. 2007a), chapter 2 introduced the concept of positive policy feedback defined as mechanisms that stabilise and reinforce existing policy regimes.

Such processes are apparent in both cases, the SO and the CBRP. The SO provided significant funding for energy efficiency measures and the energy efficiency industry undoubtedly benefited substantially from the SO. Markets such as the cavity wall insulation sector grew rapidly over the last decade as a result of the incentives put in place by the policy instrument. With growing market size, the number of jobs in home energy efficiency retrofits increased and thereby created interest groups that are heavily dependent on the SO. As discussed in chapter 2, such effects whereby a policy creates new interest groups which then support the maintenance and expansion of this policy are well-known in the literature on policy feedback (Campbell 2002a; Campbell 2002b; Pierson 1993a; Skocpol 1992).

Policies do not only provide resources for particular interest groups, they can also help the *organisation* and *formation* of interest groups (Pierson 1993a) because '[p]rogram[me] resources also create material incentives for groups to band together in political activity' (Mettler and Soss 2004, p. 62). In the UK energy efficiency industry lobbying organisations can trace their roots back to the 1980s and expanded subsequently as a result of a growing industry. Organisations such as ACE, NIA, and BEEF managed to get involved more directly in the decision making processes, for example by being consulted prior to the official consultation stage and being part of important stakeholder forums such as EEPH.

While maybe not as visible as in the UK, the CBRP also created powerful interest groups and associations representing the construction industry, housing corporations, homeowners, and tenants. Expansion of the CBRP was generally supported by these groups and budget cuts opposed. Particularly the announced reductions of funding for the Programme in more recent years triggered a response from interest group organisations trying to make the case for stopping the contraction of the CBRP. However, historically the German energy efficiency industry was not as well organised as their British counterpart. Only in 2010 was the German Industry Initiative for Energy Efficiency (Deutsche Unternehmensinitiative für Energieeffizienz – DENEFF) founded; the leading UK organisation, the Association for the Conservation of Energy, can trace back its roots to 1981 (Pickvance 2009). In the UK, the expansion of the energy efficiency industry as a result of the SO and with it an increasing lobbying power certainly did contribute to maintaining and enlarging the SO. The picture in Germany is quite different: since the mid-1990s the construction industry, and as part of it the energy efficiency industry focusing on building refurbishment, had been in decline (see section 5.2.2). One would expect a negative effect on the CBRP assuming decreasing lobbying power over time. However, the struggling construction industry was used as an argument for *expanding* the CBRP rather than scaling it down due to the perceived positive impact of the Programme on employment and economic activity, which constitutes another form of positive policy feedback.

The different responses to labour market dynamics can be explained by Esping-Andersen’s (1990) typology of welfare regimes classifying states in three distinct groups - liberal, conservative and social democratic regimes. Germany and the UK are considered ‘ideal’ types falling into the conservative and liberal category respectively. According to this classification, Germany puts emphasis on maintaining its status quo whereas the UK employs a laissez-faire approach leaving it to the market forces. While probably too stylised, this tendency can be observed when looking at past active labour market policy: using public policy for job creation has a long legacy in Germany (Sommer and Rosenthal 2012). Historically, Germany allocated significantly more public expenditure to active labour market programmes than the UK (Bonoli 2010; Kluve 2010). According to Chung and Thewissen (2011), in times of economic slowdown Germany tends to employ labour market policies that are intended to keep the workforce in the labour market in order to preserve their skills, an approach that is seen as crucial in Germany to maintain its comparative advantage (Hall and Soskice 2001). The UK appears to rely more on market forces and displays a low degree of active government intervention with regard to labour market policy. This became particularly apparent after the financial crisis in 2008 when Germany introduced two economic stimulus packages (which included an increase in the CBRP's funding, see section 5.2.3). The UK, in contrast, did not implement any measures comparable to the German response (Chung and Thewissen 2011) relying on the continuation of the past growth regime (Clegg 2010). This is also mirrored in the history of the SO: arguments around the positive effects of the SO on the labour market or industry did not play an important role if any for the development of the policy instrument.

To conclude, in Great Britain and more muted in Germany, the SO and the CBRP did create new interest groups associated with increased lobbying power, which in turn put pressure on the Government to maintain and expand the policy instrument. It is a classic example of positive policy feedback according to the theoretical literature (Pierson 1993a). Additionally, the perceived positive effects of the CBRP on employment and economic activity, and the recognition that policy makers should make use of such instruments to stimulate the economy and the labour market fall into the category of *ideational and symbolic legacies*, another form of positive policy feedback (Béland 2010).

7.1.4 Summary

In both cases, many of the processes of policy change can be understood through a lens of external pressures, friction, and policy feedback. The following table categorises the observed processes according to the previous sections.

Table 12: Summary of policy change mechanisms identified

Mechanism	*Germany – CBRP*	*Great Britain – SO*
External pressures – subsystem spillovers	Climate change policy	Climate change policy Rising energy prices Fuel poverty
External pressures – systemic perturbations	Financial crisis	
Friction – key personnel	Resistance from Construction Minister	Resistance from Director General of the Regulator
Friction – institutional structures	Budget process	Target setting powers with Regulator
Friction – cognitive limits		
Positive policy feedback	Perceived positive employment effects	Growing energy efficiency industry Perceived successfulness
Negative policy feedback	Negative fiscal effects	Resistance from energy suppliers Regressiveness of SO

Interestingly, there are idiosyncratic as well as common drivers. For example, fuel poverty has been an important driver in the UK, but, until recently, has barely been mentioned in Germany. The reason for this is not that fuel poverty does not exist in Germany, it does and in more recent years more attention is paid to this issue, even though data availability is poor (Kopatz et al. 2010). The welfare system in Germany does not accommodate for rising energy bills either. As things stand, there is no convincing explanation for this remarkable difference.

Also, there are unexpected 'non-drivers' such as the influence of EU policy. Neither of the two case studies indicated that EU policy had an impact on the SO and the CBRP. The reason for this may be that both Germany (Lees 2007a) and the UK (Jordan 2004) are now considered EU members that 'upload' their own political agenda to the European level rather than following EU directives. However, Germany has been reluctant to adopt market-based instruments (Lees 2007a), such as the SO, and transposition of existing building directives into national law in the UK has been somewhat muted (Ekins and Lees 2008). Potentially, European policy could become more important in the future with the adoption of the new EU Energy Efficiency Directive.

The next step is to evaluate to what extent the hypotheses developed in chapter 2 are supported by the evidence reviewed so far.

7.2 Hypotheses

In chapter 2 four hypotheses were presented in order to focus the research on a number of key issues.

7.2.1 Hypothesis 1

The first hypothesis related to the patterns of policy change resulting from long-term pressures:

> *H1/1: Long-term gradual pressures lead to changes of policy instruments that follow a pattern of punctuated equilibrium. The scale of change is substantial compared to the status quo.*

PET predicts that policies remain relatively stable for long periods of time followed by short periods of rapid, dramatic change.

The rival hypothesis to this is that policies change gradually in line with the pressures, keeping a balance between the policy inputs and outputs:

> *H1/2: Policy instruments change incrementally as a result of gradual pressures. The scale of change is minor compared to the status quo.*

With regard to hypothesis H1/1, the following observations can be made: neither of the two cases showed policy change along the patterns of punctuated equilibrium.

Methodologically, PET scholars plot policy changes as a histogram and overlay it with a Normal curve with similar standard deviation. However, the number of changes measured in this thesis is <20 and not suitable for such an approach. Rather, a qualitative assessment of the degree of punctuation is required (Baumgartner, personal comm. 05/10/2012).

In case of the SO, the energy savings targets can be used as an indicator of the scale of policy change. Using the settings of policy instruments as an indicator of policy change is common practice (Hall 1993; Howlett 2007; Howlett and Cashore 2009). A good metaphor to describe the pattern of past SO targets is a staircase with steps getting higher and higher, but not that of punctuations and equilibrium. For the CBRP, the budget of the programme can be used as an indicator of policy change; budgets are often used as proxies when investigating policy change in PET (Breunig and Koski 2006; True 2000). Again, the development of the CBRP's budget over time follows a more gradual pattern of smaller changes or steps, but punctuations are not apparent.

However, H1/1 proves correct in the sense that 'the scale of change is substantial compared to the status quo'. In both cases there has been significant change. The SO targets increased by a factor of almost 70 from 1994-1998 to 2008-2012 (annual lifetime savings) (see section 4.1.2). While less profoundly, the CBRP's budget increased tenfold between 2001 and 2009. There was a dip in 2010, but the budget going forward of €1.5 billion is an eightfold increase compared to 2001 (see section 5.1.2). The scale of change, particularly in case of the SO, is certainly substantial compared to the status quo.

Hypothesis H1/2 predicted incremental and minor change. In the cases observed in this dissertation, the magnitude of change observed exceeds the ranges usually considered as incremental. There is no widely acknowledged cut-off point beyond which change is considered non-incremental, making it difficult to refute the claim that all change is incremental. With regard to budgets, a threshold of 10% has been suggested as the cut-off point (LeLoup and Moreland 1978) and is used by Anderson and Harbridge (2010) in a recent study reviewing the range of cut-off points in the literature.

Using the 10% cut-off point, the changes observed in case of the CBRP fall into the non-incremental category with an increase close to 20% on average per year. The SO also exceeds the 10% threshold showing almost a 30% increase on average per year.

In summary, hypothesis H1/1 is only partially supported by the evidence in the two cases analysed in that change is substantial compared to the status quo, but not in that the pattern of change are punctuated. Hypothesis H1/2 is not supported by the evidence because the scale of the observed change is not incremental as predicted.

The patterns of gradual but profound policy change is in line with observations by others that policy *outcomes* are not punctuated (Cashore and Howlett 2007; Givel 2008, 2012; Perl and Dunn 2007). Much of the literature using PET focused on the *policy inputs* for example in the form of media attention (Givel 2012).

The latest research by Givel studying the 2004 anti-tobacco law of the country of Bhutan suggests that policy change can indeed be ‘sweeping but nonpunctuated’ (Givel 2012, p. 645). Givel stresses that this is a result of the complex policy process and the interplay of multiple factors such as the state, corporate actors, interest groups, and the market.

It is noteworthy to mention that the concept of friction developed by PET predicts that the degree of punctuation depends on the stage in the policy process. Policy inputs such as media attention are assumed to be highly punctuated whereas policy outputs will be less punctuated. Hence the further an issue is processed by the policy system (from agenda setting to implementation), the lower the degree of punctuation. This is driven by cognitive limits and institutional structures (see sections 2.3.1 and 7.1.2). There is evidence for this phenomenon in recent analysis of PET scholars (Baumgartner et al. 2009; Jones et al. 2009; Jones et al. 2003; Walgrave and Vliegenthart 2010).

To conclude, the results of the two case studies that policy outputs can be substantial, but not necessarily punctuated, are supported by a body of literature critical of PET as well as the notion of friction established by PET itself.

7.2.2 Hypothesis 2

The second hypothesis is related to friction:

> *H2/1: Friction significantly limits the capability of institutions to respond to gradual pressures and creates a misbalance between policy inputs and policy outputs. The result is the accumulation of pressures.*

The rival hypothesis is that there may as well be no evidence for friction of any kind and policy inputs are linearly translated into policy outputs.

> *H2/2: Friction does not limit the capability of institutions to respond to gradual pressures and there is a balance between policy inputs and policy outputs. Pressures do not accumulate as a result.*

Both cases displayed the occurrence of friction at various points in time (see section 7.1.2). Therefore, hypothesis H2/1 is supported by the evidence whereas H2/2 is not. Instances where friction can be observed are discussed in the following section.

7.2.3 Hypothesis 3

Given that in both case studies there is evidence for friction, the next hypothesis conceptualizes the two causal mechanisms that lead to friction according to PET:

H3/1: Friction is caused by a) the limited ability of institutions to deal with information i.e. policy inputs, and b) prohibitive institutional structures that do not allow for effective translation of policy inputs into policy outputs.

Theoretically it is possible that other factors than those proposed in hypothesis 3 cause friction resulting in alternative hypothesis 3/2:

H3/2: Friction is caused by other factors.

Section 7.1.2 illustrated that there is ample evidence for friction caused by *prohibitive institutional structures*. In case of the SO, the responsibilities for target setting lay with the regulator for a long time essentially causing an impasse in terms of policy change. The regulator refused to expand the targets arguing this was outside its remit. Only when the Government took over the target-setting process did significant policy change occur, a clear indication that the institutional structure did not allow for a substantial modification of the SO (see section 4.2.3).

The budget of the CBRP is subject to parliamentary approval and the responsible government department does not possess direct decision-making powers. The cascade of bureaucratic procedures that needs to be followed makes rapid and dramatic modification difficult to facilitate, even if the department in charge of designing the CBRP supports such change (see section 7.1.2). Procedures like this add to the degree of friction within the policy process.

As discussed before, establishing whether *cognitive limits* cause friction is difficult to establish - in both cases the evidence was not sufficient to either validate or refute the role of the constraint ability of institutions to process information. However, this does not mean that cognitive limits did not play an important role. Further research investigating the role of cognitive friction at the level of organisations could systematically assess to what extent cognitive limits have an effect on the degree of friction.

Therefore, hypothesis H3/1 is supported in that it attributes friction to prohibitive institutional structures, but the predicted impact of cognitive limits cannot be validated or falsified due to a lack of data.

Hypothesis H3/2 proposed that other factors than the two suggested by hypothesis H3/1 may cause friction. H3/2 is correct in the sense that for both cases an additional causal mechanism leading to friction has been identified, but false in that it disqualifies the impact of prohibitive institutional structures. As section 7.1.2 demonstrates, in both cases changing key personnel played a pivotal role in the history of policy change and caused friction. Probably more profound than in case of the CBRP, the role of Claire Spottiswoode as Director General of OFGAS demonstrates how changing key personnel can increase or decrease the degree of friction. Similarly, the political priorities of Peter Ramsauer, the Minister of the BMVBS in charge of overseeing the CBRP, slowed down the CBRP’s expansion in terms of its budget and almost resulted in budget cuts of 50% in 2010.

Integrating the role of key personnel in the friction concept would, at least based on the two case studies analysed here, improve its explanatory power. The academic literature also indicates that focusing on the role of key personnel can enrich analysis of public policy (Andeweg 2000; Chabal 2003; van Asche 2012).

7.2.4 Hypothesis 4

Hypothesis 4 relates to feedback mechanisms, including positive and negative policy feedback. H4/1 proposed that:

H4/1: Existing policy instruments create positive and negative feedback processes. Positive policy feedback leads to an expansion of the policy whereas negative policy feedback results in a dampening of the expansion or contraction of the policy.

Alternatively, H4/2 suggested that politics independent of the policy instrument itself determine its modification:

H4/2: Existing policy instruments do not create positive and/or negative feedback processes. Policy change is a result of political processes not influenced by existing policies.

The analysis above clearly supports hypothesis H4/1 and refutes hypothesis H4/2. Policy feedback occurred in both cases. *Positive policy feedback* includes the perceived positive employment effects (CBRP), the growing energy efficiency industry (SO and to some extent the CBRP), and the perceived success of the policy instrument (SO). There is also evidence for *negative policy feedback* in the form of negative fiscal effects (CBRP), resistance from energy suppliers (SO), and the regressive impact of the policy instrument on energy bills (SO).

7.3 Limitations of the analysis

The analysis carried out potentially suffers from at least two weaknesses. One is methodological, the other conceptual. The methodological weakness stems from the fact that case studies employing systematic process analysis based on interviews potentially suffer from various biases that may skew the results (Tansey 2007). As outlined in chapter 3, document analysis and academic literature were used as a means of triangulation. However, in some instances the analysis relies mostly on interviewees' responses particularly in areas where the interpretation of the interviewee could not be cross-checked with other forms of evidence.

A conceptual limitation is the treatment of the various causal mechanisms and policy drivers which cause policy instrument change. For the purpose of the analysis, the different mechanisms and drivers have been discussed separately. It is, however, very difficult to determine the relative importance of the causal mechanisms and the various policy drivers due to difficulties of measuring their relative importance. Also, the separate treatment of the mechanisms and drivers, which was chosen for analytical purposes, is somewhat artificial and obscures the fact that they are interrelated. One driver could, for example, reinforce (for example climate change policy and the positive effect on the energy efficiency industry) or undermine (for instance in case of the CBRP negative fiscal effects resulting from increased spending) another driver. Where possible, the connectedness has been discussed, but there may have been instances where the analysis missed links between the drivers and mechanisms.

However, one can be confident in the broad results of the analysis. With regard to the causal mechanisms, in both cases there was substantial evidence that external pressures, friction, and policy feedback played a major role for the policy changes observed. Also, an additional mechanism of friction showed in both the UK and Germany indicating that it may operate elsewhere too. Further research, as outlined in the next chapter, could help exploring the role of friction further and increase the confidence in the proposed mechanism.

8 Conclusions

> *If a man will begin with certainties, he shall end in doubts: but if he will be content to begin with doubts, he shall end in certainties.*
>
> Sir Francis Bacon (quoted in Wormald 1993, p. 39)

The purpose of this last chapter is to step back from the detail presented in the previous chapters and to locate this thesis in the wider energy literature and the theories of policy change.

I do this by answering the initial research questions posed in chapter 1 and summarising this thesis' contribution to the academic literature. Furthermore, this chapter suggests avenues for further research and discusses policy implications.

8.1 Answering the research questions

Each of the research questions stated in the introduction is reconsidered below.

1) How did the key domestic energy efficiency policy instruments in the UK and Germany change since their inception?

Overall, both the SO and the CBRP changed significantly in terms of scale, scope, and structure. In terms of *scale* this can be seen by looking at the target size of the SO and the funding base of the CBRP. The SO's targets increased by a factor of almost 70 from 1994-1998 to 2008-2012 (annual lifetime savings) and the CBRP's funding was raised from about €100 million to €1,500 annually post-2010 (see sections 4.1.2 and 5.1.2). In both cases the *scope* in terms of the eligible measures evolved as well. The SO increasingly focused on insulation measures and allowed new technologies and even behavioural measures into the scheme. The CBRP moved from strictly defined packages of measures towards setting an energy performance standard based on the Energy Saving Ordinance. The *structure* of both programmes changed too. Since 2002, the target for the SO is set by the responsible Secretary of State rather than the regulator. Historically, the CBRP's funding was based on the budget, now an additional, budget-independent mechanism provides a large share of its resources.

2) What kind of pressures were drivers of policy change?

There were many pressures that acted as drivers for policy change in the case of the SO and the CBRP. I focused on those pressures seen as key drivers by interviewees and prevalent in the documents analysed. Both cases showed that climate policy and the perceived impact of climate change was a key pressure particularly in the last decade. In case of the SO, in the early days, climate policy played a lesser role. Instead, energy market liberalisation, and with it the idea of Least-Cost Planning, triggered the implementation of a policy that used utilities as a vehicle for delivering energy efficiency measures. The German CBRP's inception was clearly driven by climate policy considerations, but this was aligned with labour market policy objectives given the decline of the German construction industry since the mid-1990s and because the CBRP was seen as an employment-generating instrument. Labour market dynamics and the economic climate in general also came to the fore at other times, for example during the financial crisis and the following recession, when the CBRP was explicitly used as part of an economic stimulus package. The SO was also driven by rising energy prices and increasing fuel poverty, the former resulting in a significant uplift of the energy savings target of the SO in 2008. Although the SO was never intended or explicitly used to reduce fuel poverty, the social equity provisions and their maintenance over time are clearly linked to pressure on the government to alleviate fuel poverty.

3) How did the principal policy instrument of the policy subsystem of domestic energy efficiency policy respond to gradual pressures?

Even though the scale of change was remarkable, both policy instruments changed gradually over time and, on the whole, not abruptly. Both policy instruments showed periods of stagnation as well as times of faster change. Times of stagnation in the case of the SO can be found particularly in the first 8 years of the policy instrument when the regulator resisted an expansion of the scheme. More recently, the CBRP was subject to budget constraints and its expansion slowed down with no foreseeable increase in the scheme's financial resources. More rapid change happened in the case of the SO after the Secretary of State had been allocated the responsibility for setting the target in the 2000 Utilities Act. Large increases in the target could be observed from EESoP 1 to EEC 1 (2002), EEC 1 to EEC 2 (2005), and EEC 2 to CERT (2008) - more or less doubling the target every time. Furthermore, during 2008, on the back of the discussions around a potential windfall tax on energy suppliers, the CERT target was increased by 20%. Substantial increases in the funding of the CBRP took place in 2003 when the budget was almost doubled, in 2005 when the new coalition government decided to allocate about three times more funding per year, and in 2008 when the budget was increased again as part of the economic stimulus measures. Overall, there was a pattern of increasingly large changes with each shift in the program (although the CBRP's expansion slowed down after 2009).

4) How well can the concept of friction explain these processes? If there is evidence for friction, which factors caused it?

The evidence provided in chapters 4, 5, and 7 shows that friction can indeed explain many of the changes observed. PET conceptualises two sources of friction - prohibitive institutional structures and cognitive limits. This thesis illustrated the effect of prohibitive institutional structures on policy change, mainly in the case of the SO prior to the transfer of target-setting powers to the Secretary of State, but also in the case of the CBRP which has been dependent on bureaucratic budget setting processes involving multiple institutional hurdles. Friction resulting from cognitive limits and the inability of organisations such as government departments and agencies to process incoming information proportionately, has proven difficult to investigate within this research project. To what extent cognitive limits played a role therefore remains an open question. Both case studies suggested that key personnel can, under some circumstances, constitute a source of friction that goes beyond mere institutional structures. In the case of the SO, Claire Spottiswoode, former Director General of OFGAS, deflected political pressure to expand the SO primarily driven by personal preferences as illustrated in sections 4.2.2 and 7.1.2. Similar patterns can be observed for the CBRP - Peter Ramsauer, Minister for Transport, Building and Urban Development, attempted to scale down the Programme due to his personal priorities even though his own government department and party were in favour of maintaining its funding base. So far, the literature on friction does not account for such mechanisms.

5) Which role did policy feedback processes play for policy change?

There is ample evidence for policy feedback processes in both cases. I distinguished between two types of policy feedback processes – negative and positive policy feedback. *Negative policy feedback* processes included negative fiscal effects of increased funding for the CBRP; increased funding contributed to public expenditure at a time when public debt was becoming a political issue, revenue raising under the SO had a regressive character, there were increasing costs that had to be paid by consumers, and, to a limited extent, there was resistance from energy suppliers to increasing the SO targets. *Positive policy feedback* was evident in the form of a growing energy efficiency lobby benefiting from the SO and the CBRP, the perceived positive labour market and economic stimulus effects of the CBRP, and the perceived success of the SO. Overall, positive policy feedback probably outweighed negative policy feedback given the significant expansion of the programmes.

8.2 Contribution

This thesis started from the presumption that politics are underplayed in the current body of literature on energy efficiency policy. I argued that most scholars focus on technological questions, the cost of different technologies, and the economics of policy instruments, all of which are important research areas. However, the reality of how policy instruments are implemented and modified over time does not simply follow such factual information. If it is not just ‘facts’ that cause policy change but political factors, a detailed analysis of the politics driving energy efficiency policy can illuminate those mechanisms.

Understanding under which conditions policy change is likely to be feasible can help a great deal when it comes to future policy design. Too often policy proposals are doomed to failure because the constraints and drivers of policy change are not paid sufficient attention. Furthermore, using a comparative approach and looking at two countries that both have implemented ambitious policies to reduce domestic all energy consumption offers potential for policy learning, lesson-drawing and policy transfer.

More specifically, this thesis made the following contributions:

first, this thesis not only demonstrated that politics affected the two policy instruments over time, but also which mechanisms more generally were responsible for the changes observed.

Second, it provided the first comprehensive account of the history of both the CBRP and the SO, two policy instruments which attract a lot of attention both nationally and internationally. Such an historic perspective enables other scholars to understand where those policies were coming from, how they changed, and why they ended up the way they did.

Third, this thesis employed a relatively novel theoretical framework based on the concept of friction coming out of PET and the more recent policy feedback literature. The analysis in chapter 7 identified areas for potential extension of those theories in future revisions.

Finally, by contrasting the two cases, I demonstrated similarities and differences between German and British energy efficiency policy.

8.3 Policy implications

This thesis started with an observation – that the impact of politics on policy is rarely considered in the academic literature on energy efficiency policy even though it has long been recognized in political science that ‘policy determines politics’ (Lowi 1972, p. 299).

However, particularly the underlying funding mechanism plays a key role when it comes to politics.

Taxpayer-funded energy efficiency policies

Energy efficiency policies based on public budgets are always at risk from future funding cuts due to fiscal politics. This is partly the result of negative policy feedback in the form of contributing to increasing public debt but also due to the exposure to external events such as financial crises. In Germany, the CBRP is taxpayer-funded and the Finance Ministry and the parliament are directly involved in the budget-setting process. During times of austerity, the CBRP almost always became subject to budget cuts. Ideally, in order to protect energy efficiency policies that require a large amount of funding the finance for the policy or parts of it should be provided independently from the overall budget. However, this is by no means an easy task.

Consumer-funded energy efficiency policies

One could argue that consumer-funded programmes, such as the SO, are better protected against potential austerity measures. In fact, this was the part of the rationale when the SO was implemented in Britain: the costs are borne by energy bill payers and therefore the Treasury has no involvement in the financial transactions taking place. Hence, even substantial spending cuts as seen at the moment did not affect the SO whereas taxpayer-funded energy efficiency programmes such as Warm Front were terminated. The example of the SO illustrates that consumer-funded energy efficiency policies may indeed be better protected from fiscal politics and external pressures.

However, consumer-funded energy efficiency policies create their own politics due to negative policy feedback: the downside of consumer-funded programmes is that their revenue raising part is always regressive in a system where costs are passed on to consumers without considering their financial status. If social equity provisions are not sufficient, this effect can potentially undermine the programme’s financial stability.

Counterbalancing regressiveness

Those negative policy feedback effect can be counterbalanced either by keeping the scale of funding required for energy efficiency policies based on energy bills small so the regressive effects are minimal or by providing a large number of measures to the majority of households and particularly those on low incomes and in inefficient properties. This has been the approach of the SO in the UK in the early years of the obligation where the contribution from households was less than £10 per year and most households received an energy efficiency measure. (at least CFLs).

However, over the years the scale of the SO increased and contributions are now more than £50 per year per household (see analysis in chapter 4). In addition, more recently, the UK government decided to reform the SO and in the future energy suppliers will be forced to deliver mainly high-cost measures including solid wall insulation and hard-to-treat cavity wall insulation. Such a move has serious equity implications. If the SO is reoriented towards high-cost measures this results in a smaller number of households who benefit from the policy instrument and increases the number of those who pay but do not receive any energy efficiency measures (Rosenow et al. 2012).

Lessons learned for the fiscal implications of consumer-funded energy efficiency policies

Germany is increasingly looking at energy efficiency policies that can be financed independent of the public budget. Energy savings obligations could potentially play an important role for the delivery of low-cost measures. Policy makers considering energy savings obligations need to consider the limits of such programmes due to negative policy feedback in the form of regressive effects. Counterbalancing regressive effects by progressive delivery of measures (i.e. by allocating a large share for households on low incomes living in low-energy efficiency homes) becomes more difficult when energy savings obligations are focused on high-cost measures. This is because a smaller number of measures can be financed with the same amount of money leaving more households that contribute but do not benefit from the policy.

Questions that should be asked when designing energy savings obligations include: what is the scale of funding required to provide the energy efficiency improvements aimed for in the long term? What are the implications for energy bills and the impact on fuel poverty? Which measures can be promoted that benefit the majority of households in order to offset the regressive impacts? Dealing with those questions early on can avoid some of the negative feedback consumer-funded policies tend to develop but also illustrate that additional policies are needed.

Lessons learned for the fiscal implications of taxpayer-funded energy efficiency policies

Taxpayer-funded energy efficiency policies avoid regressive effects assuming that taxes are progressive overall. However, they develop negative policy feedback too in form of increasing public debt and are exposed to the interference of fiscal politics. In theory, one could use hypothecated taxes to fund energy efficiency policies. This would essentially ring-fence the finance for those policies and protects them from budget cuts. In Germany, the ecological tax is partly used to fund the pension system – the CBRP could potentially also be financed through such a mechanism. Using the revenues from the auctioning of EU ETS permits proved to be an unreliable source of funding in Germany and did not provide more certainty with regard to future funding. Similar ideas are currently promoted by the Energy Bills Revolution in the UK and some important lessons could be learnt from the CBRP.

8.4 Avenues of further research

There are at least two areas where avenues of further research can be found – within the literature on policy change theory and the cases analysed in this thesis.

Regarding the latter, the timeframe of the two cases covered by this thesis ended in 2010. However, in the last two years interesting policy changes took place that represent a fairly radical diversion from the past in many ways: in the SO's next period the Energy Company Obligation (ECO) succeeds CERT. Although similar in principle, ECO differs in many ways from previous obligations. It has a much stronger fuel poverty focus in that it has a deliberate fuel poverty objective and an affordable warmth sub-target. Most support will go toward high-cost measures such as solid wall and hard-to-treat cavity wall insulation, resulting in much lower carbon and energy savings than CERT/CESP. Also, ECO is supposed to support the Green Deal, a new on-bill finance scheme for building retrofits, and the two are closely linked (Rosenow and Eyre 2012). Analysing the implications of those changes and the politics that led to them would be a fruitful area for future research.

For both policy instruments the issue of funding deserves more research. The CBRP is now financed through a new funding mechanism, the Energy and Climate Fund. Although this new funding mechanism was supposed to provide long-term stability in the CBRP's budget, it seems to have added, rather than alleviated, uncertainty (Rosenow in press). This situation is likely to trigger further policy change and the implications of the modified funding mechanism are worth investigating. Also the SO's funding mechanism is likely to be subject to modification. Since 2011/2012, some consumer-funded policies are included in the Levy Control Framework, essentially a cap on off-balance sheet spending imposed by the Treasury on DECC (HM Treasury 2011). So far, the SO is not covered by the Levy Control Framework (DECC 2011b), but there is no reason why it could not be included in the future, particularly in response to concerns about the increasing costs of the SO (NERA 2012). Exploring the limits of utility-funded energy efficiency policies in terms of the financial burden put on energy bills and the political tensions this involves is an interesting avenue for more scholarly work.

Unanswered questions also include the varying importance of issues such as fuel poverty in Germany and Britain – so far no convincing explanation exists for why this area is treated so differently in the two countries (Kopatz et al. 2010). However, more recently, there are signs that the debate is starting to pick up in Germany as well. It is also unclear to what extent EU policies will alter domestic energy efficiency policy in the future given its limited impact in the past on the SO and the CBRP. The new Energy Efficiency Directive could have significant repercussions for national policy, for example, the directive prescribes the introduction of energy savings obligations like the SO in all member states and Germany considers whether it should do so or make use of the exemption provisions (Bürger et al. 2012).

Concerning the theories of policy change, this thesis showed that there are a number of promising questions that could be asked. First, under which circumstances do key personnel contribute to friction and when do they not? To what extent does this impact on the institutional structures causing friction and vice versa? Second, how can cognitive friction be analysed in qualitative research? How significant is its impact? Finally, what role does the societal and political 'memory' of external pressures play? Does it matter how long the pressure lasts? Do pressures always accumulate if the response is disproportionate?

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Appendix

List of Interviewees

UK

INDEX NUMBER	POSITION	DATE
I_UK1	Senior Energy Researcher	05/05/2011
I_UK2	Civil Servant at DECC	25/05/2011
I_UK3	Former Senior DETR Official	31/05/2011
I_UK4	Former Director of UK Energy Agency	09/06/2011
I_UK5	Official at OFGEM	20/06/2011
I_UK6	Civil Servant at DECC	21/06/2011
I_UK7	Representative of the Energy Efficiency Industry	23/06/2011
I_UK8	Independent Policy Adviser	28/06/2011
I_UK9	Former Energy Efficiency Manager at an Energy Supplier	05/07/2011
I_UK10	Former Director General at Energy Efficiency Office	05/07/2011
I_UK11	Representative of the Energy Efficiency Industry	14/09/2011
I_UK12	Senior Manager at Energy Supplier I	26/09/2011
I_UK13	Senior Manager at Energy Supplier II	06/10/2011
I_UK14	Fuel Poverty Expert, Consumer Focus	27/11/2012

Germany

INDEX NUMBER	POSITION	DATE
I_G1	Energy research institute, Researcher	05/08/2011
I_G2	NABU, Energy Efficiency Expert	22/08/2011
I_G3	BMWi, Civil Servant	23/08/2011
I_G4	KfW Banking Group, Member of Staff	28/09/2011
I_G5	DENA, Member of Staff	27/09/2011
I_G6	BMVBS, Civil Servant	24/10/2011
I_G7	Researcher for Member of Parliament, Green Party	14/11/2011
I_G8	Member of Parliament, SPD	15/12/2011
I_G9	Member of Parliament, FDP	14/12/2011
I_G10	Member of Parliament, CDU	15/12/2011
I_G11	Researcher for Member of Parliament, The Left	15/12/2011
I_G12	Member of Parliament, Green Party	19/12/2011