# *Varieties of Emission Trading*

*Testing Hall and Soskice's Varieties of Capitalism Theory through the Introduction and Use of the European Emission Trading Scheme in Germany and the United Kingdom*

January 2015 by Anne Bickel

For the acquisition of the Master degree in European Studies at the University of Twente in Enschede and the Westfälische Wilhelms-Universität in Münster

First Supervisor (WWU): Prof. Dr. Markus Lederer

Second Supervisor (UT): Dr. Shawn Donnelly

## Abstract

Hall and Soskice's theory of the Varieties of Capitalism is a relatively new approach that has not been tested coherently so far. The theory divides market economies into Liberal Market Economies (LMEs) and Coordinated Market Economies (CMEs). Both are said to have their specific characteristics in regard to how firms react to external pressures. This thesis aims to test this theory qualitatively and exemplary by looking at the introduction and use of the European Emissions Trading Scheme (EU ETS) from 2004 to 2013. As test subjects, the CME country Germany and the LME country of the United Kingdom (UK) have been chosen. Two hypotheses have been formulated from the theory to first test the introduction of the EU ETS concerning its legal integration as well as the political and public debate surrounding the EU ETS, including its participants and the acceptance of the scheme by firms in the two countries. Furthermore, three hypotheses are tested for the specific use of the EU ETS by firms in the respective states. It will be argued, that there were differences in the introduction and use of the EU ETS and most of these differences can be at least partially explained through Hall and Soskice's theory.

## Table of Content

## List of Graphs



## List of Abbreviations

| | |
|---|---|
| BDI | Bundesverband Deutscher Industrie (Association of German Industry) |
| BUND | Bund für Umwelt und Naturschutz Deutschlands (Environmental NGO, in UK: FOE) |
| CBI | Confederation of British Industry |
| CCA | Climate Change Agreement |
| CCL | Climate Change Levy (in Germany: Gesetz zum Einstieg in die ökologische Steuerreform) |
| CCS | Carbon Capture and Storage |
| CDU | Christlich Demokratische Union (German conservative party) |
| CSU | Christlich Soziale Union in Bayern (Equivalent party to the CDU in Bavaria) |
| CME | Coordinated Market Economy |
| $CO_2$ | Carbon-Dioxide |
| DECC | Department of Energy and Climate Change |
| DEFRA | Department for Environment, Food and Rural Affairs |
| DEHSt | Deutsche Emissionshandelsstelle (German head office for ETS allocation and supervision) |
| DGB | Deutscher Gewerkschaftsbund (Confederation of German Trade Unions) |
| DIHK | Deutsche Industrie- und Handelskammer (Association of German chambers of industry and commerce) |
| EA | Environment Agency |
| ECJ | European Court of Justice |
| EEG | Erneuerbare Energien Gesetz (German law for the promotion of renewable energies) |
| ETG | Emission Trading Group |

| | |
|---|---|
| ETS | Emission Trading Scheme |
| EUA | European Union Allowance (emission certificates) |
| EU ETS | Emission Trading Scheme of the European Union |
| FDP | Freie Demokratische Partei (German liberal party) |
| FOE | Friends of the Earth (Environmental NGO, In Germany: BUND) |
| GHG | Greenhouse gas |
| IG Metall | Industriegewerkschaft Metall (German Industrial Union of Metalworkers) |
| IG BCE | Industriegewerkschaft Bergbau, Chemie und Energie (German Industrial Union of miners, chemical- and energy-workers) |
| KfW | Kreditanstalt für Wiederaufbau (German business development bank) |
| LME | Liberal Market Economy |
| $mtCo_2$ | million tonnes of Carbon-Dioxide |
| MP | Member of Parliament |
| MS | Member States (of the European Union) |
| NAP | National Allocation Plan |
| NEP | New Environmental Policy |
| NGO | Non-Governmental Organisation |
| OECD | Organisation for Economic Co-operation and Development |
| PPCC | Pressurised, Pulverised Coal Combustion |
| SEPA | Scottish Environment Protection Agency |
| SPD | Sozialdemokratische Partei Deutschlands (German social-democratic party) |
| TEHG | Treibhausgasemissionshandelsgesetz (German ETS Law) |
| TUC | Trade Union Congress |
| ZIM | Zentrales Innovationsprogramm Mittelstand (German innovation Initiative) |

## 1. Introduction

The battle against climate change has become one of the most important political challenges in many parts of the world in recent years. Reducing greenhouse gas emissions (GHGs) is the most important strategy for most policymakers in Europe. As such, it is central to the EU agenda. The way how emissions should be reduced has sparked a number of heated debates. Using market forces to achieve this goal is a relatively new line of thought and contradicts a common view of the 1980s, that capitalism must be abolished for a society to be able to live climate- and environment-friendly. Protection of the environment and the world climate through capitalism instead of seeing environmentalism and capitalism as diametrical opposites opened up a new way of thinking about the challenge. The trust in market forces in this matter eventually led to the introduction of the European Union Emission Trading Scheme (EU ETS), so far the biggest and most ambitious policy to reduce GHGs in a set region (Koch 2012; Newell & Paterson 2010).

The EU ETS relies on free market forces and was introduced in the same way in 2005 in all Member States (MS) of the Union. It aims at creating a market for emissions and in doing so, giving them a price. By setting a certain "cap" of maximum emissions and thereby creating a scarcity of the commodity, the trade in emission allowances is ought to reduce emission output through market forces. Following this understanding, the added cost of emission allowances will lead to the most efficient reduction of emissions (see section 3.1.).

Although the EU ETS has formally been introduced in the same way, the mechanism seems to work differently in different countries. Although most MS are roughly on track to achieve their respective emission reduction goals, it is striking that the way institutions and firms chose to cope with the new mechanism seems to differ in European comparison.

There are a range of theories and approaches which aim to explain different results and uses of the external pressures in different countries. Most theories would expect the differences between countries to fade with increased globalisation or, in the European context, harmonisation. One exception to this dominating opinion is the approach of Hall and Soskice.

In 2001, Peter Hall and David Soskice published the book "Varieties of Capitalism". They presented a new theory of different capitalist systems that centres around the way how

firms and companies coordinate or resolve coordination problems. They argue that, rather than to assimilate due to the increased interconnectedness of markets, specific types of capitalism specialise on different ways to solve problems. The central point of Hall and Soskice is the statement that firms in 'liberal market economies' (LMEs) will behave differently from firms in 'coordinated market economies' (CMEs) when they are facing the same external pressure. Since both variations of capitalism have distinctive characteristics, these different behaviours should be predictable (see section 2.1.).

Because it is a mechanism that relies on free market forces the ETS can be defined as a market-incentive policy in the sense of Hall and Soskice. The policy also creates external pressure firms have to face and react to. As such, the EU ETS lend itself well to test Hall and Soskice's approach. By testing the theory through the EU ETS, this thesis aims to both gain insight on the theory as well as on possible explanations for the different outcomes of the same policy in the different MS.

### 1.1. Research Question and Method

The research question this analysis follows is, whether the ETS mechanism faced differences in introduction and use in Germany and the United Kingdom (UK) and whether these differences follow the expectations derived from Hall and Soskice's theory of Varieties of Capitalism.

To answer these questions, a comparative case study between Germany and the UK will be conducted. This approach is the most favourable, since the introduction and use of the ETS expands to a variety of factors for research. The two countries are selected through the most-different approach along the criteria of market economies in the theory of Hall and Soskice. It is important to note at this point that even if the ETS is the means to a test of Hall and Soskice's theory, the ETS itself is not the object of analysis. Especially to gauge the success or failure of the measure itself would require a different kind of analysis (see for this Böhm, Misoczky, and Moog (2012), Storm (2009) and Wellman (2014)).

Since only some elements of the introduction of the ETS in Germany and Britain have been researched so far, this study is exploratory in most parts. This exploratory nature is also reflected in the research question. First, a descriptive question must be answered: "How did

German and British firms react to the introduction of the ETS mechanism and how are they using the scheme?" before an exploratory question follows: "Can these differences be explained through Hall and Soskice's theory of Varieties of capitalism?". The connection between Hall and Soskice's theory and the ETS, the most important part, has so far not been drawn coherently. Because of this lack of data, the second research question can be classified as exploratory. The aim is to test, whether Hall and Soskice's approach is able to explain the differences and not, which variables exactly cause which reaction of a firm, which would be explanatory (Babbie 2013).

The two cases, Germany and the UK, are chosen through a most-different approach. The one variable they have in common in this study is the introduction of the ETS. The most defining difference between the two countries is the difference between their capitalist system. While Germany is a very good example for a CME, Britain represents a LME (Hall & Soskice 2001, see section 2. for more details). This is why the design of a comparative case study lends itself perfectly to this research.

Since the main aim of the thesis is to test Hall and Soskice's theory in depth, many variables for each case have to be considered. In this small-*n* design it is possible to create a coherent and critical look at the performance of this theory in practice. Therefore, including more countries would not only complicate the direct comparison. Enlarging the study could also lead to a more superficial look, which increases the chance of missing important variables and characteristics of each case. However, this design of course also encounters its limits.

First of all, as with all small-n studies, this research cannot be generalised. Due to its very particular nature, the aim of this research can never be to reach conclusions for other countries than Germany or the UK. All it can do is to create an insight into the specific cases and maybe inspire further research in this matter to see, if the same outcomes appear in other countries and cases. Therefore, this research cannot answer the question whether Hall and Soskice's theory is "right". It can only provide insights on whether the theory of Hall and Soskice makes sense in the German and British context. The same is true when it comes to the object of comparison. The reactions of German and British firms towards the ETS cannot be taken to mean that these were the only possible reactions. Other corporations might apply other strategies. Additionally, the ETS is just one example for an external pressure to

study the theory in this specific setting. The firms presented here might react differently to other external pressures.

Second, the sampling of this study is biased. Because Hall and Soskice themselves often use Germany as an example for a CME, it was chosen as one subject of comparison. This is also the case for the UK. However, this can also be seen as a strength. Since the study aims to test Hall and Soskice's theory, it makes sense to first test it in those cases, which the two scholars see as prime examples. If the theory fails to hold up, the argument against it weighs stronger. If, however, the theory does explain the British and German firms' behaviour one can criticise that this study does not prove the theory as such since only the two prime examples were used. This can also be referred to the problem of generalisation mentioned above. However, within its limits, it is the belief of the author that a comparative case study is the most promising approach to answer the research question.

### 1.2. Literature Overview

Due to the interdisciplinary and overarching nature of this thesis there is at the same time a large and a limited amount of available literature on the topic. There is ample supply of debates and papers on Hall and Soskice's theory, see section 2.3. for a closer inspection of the literature surrounding the theory.

Regarding the Emissions Trading Scheme, there is a wide variety of case studies of the ETS in specific industrial sectors in Germany or the UK as for example Alberola, Chevallier, and Chèze (2009), Ellerman and McGuinness (2008) as well as Hoffmann (2007). Additionally, studies concerning the ETS as a whole or the mechanism in one of the two countries have been conducted, for example, by Rogge, Schneider, and Hoffmann (2011) as well as Anger and Oberndorfer (2008). Some comparisons between the two countries are also available concerning different aspects of use or acceptance of the mechanism (Bailey 2007). Unfortunately, the studies mostly focus on the political dimension or the overall success of the scheme in terms of reducing carbon emissions. They mostly take on a macro-perspective and do not go into too much detail of the political or legal aspects of the EU ETS introduction.

For the more economic side of this thesis, there are several relevant studies concerning specific aspects of the EU ETS. Examples are the works of Alexeeva-Talebi (2011) and Zachmann and Von Hirschhausen (2008) for the cost pass-through rates in the scheme. A lot of work and studies have been done concerning the innovative activities of firms or sectors. Broad surveys, interview analyses and analyses based on patent-data cover various sectors of innovation (see for example Bartlett 2013; Cecere, Corrocher, Gossart, & Ozman 2012; Dechezleprêtre & Martin 2010; Lanoie, Laurent-Lucchetti, Johnstone, & Ambec 2011). However, most studies focus on the drivers of innovation and the overall statistics. There are only few studies that distinguish between radical and incremental innovations, especially in the low carbon sector. Exceptions are the works of Rennings, Markewitz, and Vögele (2012), Cames (2010) and Rashid et al. (2014).

Regarding the trading behaviour, special mentioning is needed for Engels, Knoll, and Huth (2008) and Engels (2009), who research the trading behaviour of the ETS by British, Dutch, Danish and German firms and connect it to Hall and Soskice. They provide a firm foundation through their annual survey on trading patterns and acquirement of expertise, which will be used extensively for this thesis.

Engels et al. (2008) remain one of the very few investigators which at least briefly connect their findings with Hall and Soskice. The other scholars mainly restrict their observations to the purely economic or to the purely political dimension. A coherent analysis of the ETS according to the theory of Hall and Soskice has so far not been implemented.

### 1.3. Structure

The paper will follow an analytical design and structure. First, Hall and Soskice's theory (section 2) and the nature of the ETS mechanism as well as the detailed hypotheses will be defined (section 3). In the following, each hypothesis will be tested one by one. Thus, the analysis is divided by its unit of analysis. The first two hypotheses will be tested through analysis of the institutional infrastructure (section 4). The three latter hypotheses will be tested by researching on firm level and analysing the behaviour of firms directly (section 5). Finally, the results will be discussed and a conclusion will be drawn (section 6).

## 2. The Theoretical Foundation

### 2.1. Hall and Soskice's 'Varieties of Capitalism'

Hall and Soskice's approach cannot be categorised into one single political or economic school of thought. The theory builds on many understandings from both sciences and combines aspects of several theories. The main focus on market coordination is well-known in neoclassical economics and this approach can therefore be seen as a clear descendant of this school of thought. The main difference between the neoclassical perspective and the Varieties of Capitalism theory lies in the higher importance given to institutions (Bieling 2011; Hall & Gingerich 2009; Hodgson 1996). Other aspects of this approach stem from other schools. For example, the inclusion of an institutional framework can be seen as an aspect of New Institutional Economics, while the incorporation of organised – in this case economic – interests in politics has a neo-corporatist edge to it (Bieling 2011). Finally, it has to be noted, that the Varieties of capitalism sees all actors as generally rational actors with few influences from 'non-rational' variables (culture, societal expectations,…). Therefore the approach has to fall under the umbrella of rational choice theories.

The Varieties of Capitalism approach is actor-centred. Starting on the microeconomic level and using firms as units of analysis, they suggest similarities and patterns that hold up to a macroeconomic comparison. Firms are understood as "actors seeking to develop and exploit core competencies or dynamic capabilities understood as capacities for developing, producing, and distributing goods and services profitably" (Hall & Soskice 2001, p.6). Furthermore, these actors possess different kinds of relational capabilities according to their economic system. It is the firms' reaction to these 'coordination problems' or how they resolve them which constitute the different types of economic system (Hall & Gingerich 2004; Hall & Soskice 2001; Hancké 2009).

Hall and Soskice define two main types of market economies: the LME and the CME.[1] As mentioned above, these types differ by how firms resolve different coordination problems that arise when 'external pressures' affect the economy (such as globalisation or – as in this case – a new mechanism to reduce greenhouse gases). Hereby, a firm in an LME will most likely rely more on direct, competitive relationships based on simple demand and supply logics. Meanwhile a firm in a CME relies more on non-market relationships and collaborations (Hall & Soskice 2001).

There are five main spheres for firm relations: industrial relations, vocational training and education, corporate governance, inter-firm relations and (own) employee relations. With *industrial relations*, Hall and Soskice refer to the challenges surrounding the "bargaining over wages and working conditions" (Hall & Soskice 2001, p.7) including their own labour force, organisations that represent labourers and other employers. *Vocational training and education* tackles the process of securing a suitably skilled labour force and/or investing in the training for labourers. *Corporate governance* concerns the relation to investors and the investment structures used while *inter-firm relations* cover the relation to industrial suppliers and clients. Here, a stable demand for the good or service as well as a reliable supply of needed products and access to technology is of importance. Finally, the relation to its own *employees* to secure a competent and efficient workforce has to be recognised by a firm (Hall & Soskice 2001; Hancké 2009).

Although firms are the focal point in Hall and Soskice's considerations, they acknowledge that strategy often has to follow structure. That is, in many cases differences in firm-behaviour are created by differences in the institutional setup. Therefore, a complete analysis of a market economy has to include the institutional sphere just as much as the economic one. Special interest lies on the interaction between the two realms. Identifying whether firm strategy influenced the institutional structure or the institutional structure determined the firm strategy is very revealing of a nature of a policy. Especially in heavily regulated areas such as environmental policy, this interaction is a widely studied field. For Hall and Soskice, however, institutional structure is also related to the type of market economy. Therefore the government of a country with a CME will regulate and decide differently than the government of an LME, since they both have to adapt to their respective market economies (Hall & Gingerich 2004; Hall & Soskice 2001).

## 2.2. The Market Economies of Germany and the United Kingdom

### Germany

Hall and Soskice see Germany as the prime example for a CME. As such, Germany fulfils all characteristics of a CME almost completely. This can be seen for example regarding the financial system. Whereas many other countries concentrate their investment structures on stock markets and therefore on information that is publicly available, German firms often avoid a stock-market listing and therefore follow a more "insider-knowledge" approach. Investors rely more on confidential sessions and private newsletters. Not being reliant on the fast changing structure of stock-market investments enables a firm to invest in long-term projects with a later pay-off. To secure an investment in such a long-term project, a firm frequently has to create a detailed plan of the project beforehand which has to account for various eventualities in the future. This has a slowing effect on the launch of a new project or innovation while at the same time might help to rule out miscalculations in the long run (Hall & Gingerich 2004; Hall & Soskice 2009; Siebert 2005).

Another defining aspect of Germany as a CME is the employment structure. In Germany, industrial actors, especially unions, are very strong in comparison to other market economies, especially the British one. This results, among other things, in the fact that industrial relations in Germany are based on long debating processes between the different actors involved (mostly between employers and employee-unions). Furthermore, industrial relations are often negotiated on industry- rather than firm-level. This means that working conditions and minimum wages are often regulated for one branch of an industry instead of being dependent on the employer himself. Additionally, worker protection has a high political status, which leads to a high level of political involvement in crisis situations. This in turn is the reason for the high degree of employee-protective regulation in Germany. This situation makes it comparatively difficult for firms to fire employees. Therefore, firms are forced to make long-term decisions also regarding their human resources, while at the same time cultivating a close relationship to the national and federal administration (Estevez-Abe, Iversen, & Soskice 2001; Hall & Soskice 2009). Due to this difficulty of human resources exchange, German firms tend to innovate more incrementally than radically. This means, that new structures are usually built on existing ones and restructuring is much more common than a full abandonment of one sector or branch of the firm (Hall & Soskice 2001).

This high level of worker-protection also has an impact on the educational system. Since workers mostly stay with a company for a long time, it makes sense for a firm to invest in

education and vocational training more. In Germany, therefore, most firms offer vocational training schemes. Additionally, the already mentioned close relationship between economic system and state can be observed through the amount of state-subsidies for education and training schemes. The German government and the federal states invest heavily in universities and other types of educational facilities as an investment into domestic economy. In return, industrial bodies are often contacted in respect to the design of a degree. A high focus is set on cooperation between industry and educational facilities to ease the transfer from the educational sphere to the working environment (Hall & Soskice 2001; Heinrich 2012; Siebert 2005).

Typically, representatives of the staff in general, specifically unions, are also members of supervisory boards. These also include major shareholders and most often former managers of the firm in question. Since managers of a firm need to ensure support from the supervisory boards for their decisions, they have to respect the needs of staff and union representatives in their decisions. Therefore, a "structural bias toward consensus decision-making" (Hall & Soskice 2001, p.24) leads to a high degree of data-sharing and places importance on reputations to ensure reliable information. This internal structure mostly leads to network monitoring instead of clear hierarchical control (Hall & Soskice 2001).

Inter-firm relations in Germany are also influenced by the employment structures. Since there is less movement of scientific or engineering personnel between companies, companies rely stronger on a system of cooperation. Many institutions for scientific research can be found which are funded by businesses (such as business associations) and/or state subsidies. The collaboration of firms with such institutions or with each other for the purpose of technology transfer is regulated through often quite vague contracts. Although this might seem like an invitation for disputes, a degree of flexibility in the contracts allows for better cooperation and underlines the consensus-nature of the economic system. The cooperation and collaboration of German firms also leads to a strong specialisation, in a e.g. with regards to the products created within a single company, and a stronger reliance on external suppliers of needed products than in many LMEs (Casper 2001; Hall & Soskice 2001).

Finally, as shown above, German firms need to cultivate a close relationship to the government for various purposes. To have a significant amount of power and influence on

the administration, the size and the market share of the respective company is one of the most relevant factors. Therefore, a vital aim of a German firm is to expand and sustain its market share rather than to show the maximum profitability every year. A big share of the market also helps to secure investors for long-term projects (Hall & Soskice 2001).

**United Kingdom**

The prime example for an LME in Hall and Soskice's explanation are the United States of America. However, in a European context it can easily be seen that the UK qualifies as a liberal market economy as well since it fulfils most of the key aspects. The most obvious characteristic here is the financial system, with its high dependency on stock market investments. Traditionally, the London stock market played a central role in British economics and in many respects firms are still heavily dependent on it today. Companies in the UK get most of their funding through stock market investments. Therefore, the ability to secure investors relies on their "valuation in equity markets" (Hall & Soskice 2001, p.28) through open publicly available information and direct profitability. If the shares of a firm lose in value, often the investors bail out before a project is finished. Therefore direct profits are paramount. This leads to a rather short-term orientated planning of firm strategy, especially compared to the German solution. Additionally, when a firm has the choice between a higher profitability or a higher market share it is most likely to choose the former since a higher profitability in the short run is more important to acquire investors for the following years (Coggan 2009; Hall & Soskice 2001).

This reliance on a high estimated value affects also the inter-firm relations in the UK. It is paramount to be more profitable than the direct competitor to acquire investors as well as to avoid stock market attacks such as hostile takeovers, which are generally accepted in the British economic system. Therefore, inter-firm relations are based much stronger on direct competition and profitability rather than cooperation. Another firm in the same sector is foremost seen as a competitor and only in rare cases do firms cooperate to achieve a common goal (Hall & Soskice 2001; Krumm & Noetzel 2006).

The employment structure in the UK differs in key aspects from the German one as well. Generally speaking, there are significantly less clear rules for the employer-employee relationship in Britain. Most contracts are based on personal agreements and trade

agreements of the industry, if there are any, only gain effect if specifically stated in these personal contracts. Since the major strengthening of the employers during the Thatcher era, many rights have been regained by the employees and their representative bodies. However, although unions are of importance for wage negotiations, these negotiations barely ever take place on industry level. Additionally, few trade agreements for whole industries exist. The central stage for industrial relations is inside the firm itself. This 'closed-shop' principle varies in success depending on the firm and the 'shop steward' elected by the employees who is most responsible for industrial negotiations (Krumm & Noetzel 2006).

The government mostly tries to stay out of industrial relations. The ideal of very little state involvement in economic affairs is prevalent most of the time. Yet this has not always been the case in British history and the state does get involved in economics significantly more than for example the American government does. As a matter of fact, the amount of state involvement and regulation has increased in the last decades especially thanks to the New Labour programme and the introduction of the European Social Charta in 1999. Since then even minimum wages have been agreed upon. Still, the UK stands out in the European context as the state with least government involvement in its economy. The general notion, that the government should only intervene if the firms and companies repeatedly fail to self-regulate in an effective manner, remains the most prominent in the UK (Baldwin, Cave, & Lodge 2012; Coggan 2009; Donnelly 2011). The introduction of some labour protection laws through EU law seems to remain the exception (Krumm & Noetzel 2006).

This ambivalent relationship between firms and the state can also be observed when it comes to educational politics. Although, education is seen as a personal investment in the own skill set of a person, the educational system after school is not as privatised as it is the case in the USA. The British government does invest strongly in training and higher education and imposes regulations on study fees and educational standard. Again, the British system stands between most of the European countries and the most archetypical LME – the USA – in being the most LME-country of Europe when it comes to the educational system. This holds true despite the fact that the UK does not fulfil the LME characteristic perfectly (Hall & Soskice 2001; Krumm & Noetzel 2006).

As shown above, the employment situation is not as extreme 'pro-employer' as in the US. The advance of 'partnership agreements' between unions and management as well as the

incorporation of European law for some key aspects, such as a mild form of dismissal- and maternity protection, improved the situation for employees. Still, it is clear that employee protection in the UK is one of the lowest in EU context[2] (Bercusson 2009). It is therefore safe to say, that employees are easier to hire and fire in the UK than in Germany. This allows more radical innovations for a company, since it is easier to build a whole new sector of a firm and drop another one than in Germany. Also, technological transfer happens more easily through the acquisition of new labourers who are skilled in that particular aspect, rather than through cooperation with other, often competing firms (Akkermans, Castaldi, & Los 2009; Hall & Soskice 2001; Krumm & Noetzel 2006).

The greater fluctuation of human resources also leads to a very hierarchical internal structure of a British firm. Generally speaking, managers are able to make decisions on freer terms than in Germany because they do not have to pass every step along a supervisory board (in the UK these boards are more responsible for controlling afterwards). This leads to a faster decision-making process which is of special importance in an economy heavily reliant on stock-market logics (Coggan 2009; Krumm & Noetzel 2006).

Although recent literature, eg. Allen (2006), who reveals some LME-characteristics in globally active firms, suggests a more complex understanding of the different market economies, the German and British market economies can still be grasped easily through Hall and Soskice's theory. Germany is a nearly perfect paradigm for a CME and fulfils all characteristics nearly spot-on. The UK may strain the typology because it does not fulfil all characteristics perfectly. However, when it comes to the most important aspects for a comparison in the the EU context, it is easy to see that the UK is at least the most LME-country of the European Union and lends itself well for this comparison.

### 2.3. Criticism of the Theory

Hall and Soskice's considerations about the varieties of capitalism have gained significant popularity in recent years as well as having sparked an array of debates. Next to the obvious supporters of the theory, the authors of the many articles in the original miscellany "Varieties of Capitalisms" such as Thelen (2001), Culpepper (2001) and Teubner (2001), many other scientists have embraced the new approach. Notably, Hancké, Rhodes, and Thatcher (2008) as well as Hancké (2009) present the firmest defenders of the theory apart

from Hall and Soskice themselves. These scholars present a range of analyses and cases which in their opinion support the theory. Generally speaking, the theory earned enough supporters in recent years to make it well worth testing and debating.

Like every theory, this approach also bears some weaknesses and not all scholars agree with this new perspective on different market economies. Allen (2006) presents an in-depth analysis of the German economy and manages to reveal some grey areas between the clear typological division between LMEs and CMEs according to Hall and Soskice. Allen reveals that Germany does feature a range of liberal characteristics between the coordinated structures of its market economy. One of the strongest, if not the most outspoken adversary to the theory is Coates (2005). He sees the approach as another of the many "dialogue[s] of the deaf" (Coates 2005, p.3) because the theory contains itself to only one discipline, political economy, without connecting too much to interlinked disciplines such as political theory or sociology.[3]

To "bridge the gap between comparative politics and political economy" (Callaghan & Ido 2012, p.3), Schmitter and Todor (2012) and Ido (2012) try to expose the connections and interrelations between the types of democracies and the types of market economies. They both doubt that all differences pointed out by Hall and Soskice are caused solely by the market economies. Callaghan (2012) goes even further and reveals a causal connection from ownership structures in the economies to positions in the main parties of the countries. He thereby tries to prove that politics cannot be analysed without economics and vice-versa.

The common ground between these critics is the notion that Hall and Soskice's approach is incoherent because it concentrates only on the market economies of the countries. Although both authors do acknowledge that culture, political system and society can influence firms as well, they do not develop this idea any further.

Other debates centre on specific aspects of the theory. A very common point of criticism is based around the static nature of institutions in the theory. Hall and Soskice's approach does not offer any explanation for a change in the institutions which frame the market economies. Streeck and Thelen (2005) And V. Schmidt (2006) are only three of a number of scholars, who take this to be the biggest flaw of the strategy. The question of institutional change has sparked a lively debate in recent years, with many scholars seeing Hall and Soskice's approach as easily expandable to explain institutional and societal change as well

(Liebmann 2009). Further, the functionalistic bias of the theory, to see the different categories of market economies as result of strategic actions in the respective countries, is often lambasted (Becker 2007; Bieling 2011).

Another aspect of ample criticism is the method of analysis concerning the innovation hypotheses of the two authors. As Akkermans et al. (2009) and Werle (2005) argue, the concentration on patent data in Hall and Soskice's analysis leaves important aspects out of the equation. Often patents are issued although the actual implementation of the innovation does not automatically follow. Furthermore, the division between radical and incremental innovations along types of technology can be misleading in some cases. Technological advances have lifecycles, which can begin with radical innovations and move on to containing mostly incremental innovations later on (Herrmann & Peine 2011).

Despite a range of aspects limiting the theory, Hall and Soskice's approach still presents an interesting new view on at least the majority of firm decisions. Since the theory does not claim to be always applicable, the approach remains an enlightening tool to explain differences of firm behaviour. If the theory is regarded within its limits, it remains well worth of testing and analysing.

# 3. The Emissions Trading Scheme

## 3.1. Emission Trading as a Market Incentive Mechanism

The Emissions Trading Scheme or 'Cap and Trade Scheme' aims to use capitalist market forces to reduce greenhouse gas emissions. By setting a Europe-wide cap to all emissions and allocating emission allowances to governments and firms, emissions are transformed into a scarce commodity with a price. This, so the theory, will give firms and businesses the incentive to save emissions not only to save the extra cost but also to gain some extra money through the sale of excess allowances. The driving force behind this scheme is the belief that businesses will find the cheapest way to save emissions – something that would arguably be harder to do with emission taxes. (Bailey 2010; Giddens 2009; Schäfer & Creutzig 2008; Wellman 2014). The concept of a cap and trade scheme was developed by economists in the late 1970s as an economic solution to the overproduction of sulphur dioxide leading to acid rain in the USA. The scheme in the 1980s was very successful and the fact that this mechanism was introduced very successfully in the USA as the prime example of an LME market economy stresses the LME character of the mechanism itself. In fact, it is mainly tribute to American efforts that emission trading was included as the most desirable way of achieving the climate protection goals in the Kyoto agreement (Baldwin et al. 2012; Giddens 2009; Meckling 2011; Newell & Paterson 2010).

Before and during the Kyoto negotiations, the EU opposed the idea of such a carbon market. But not long after Kyoto was signed, Europe decided to press ahead for the EU ETS. This embracement of this market-based mechanism as advocated in the Kyoto agreement on EU level stems from two basic considerations. First of all, the emission trading scheme was in the long-term meant to be a world-wide mechanism anyways.[4] Therefore it would not have been efficient in any way to introduce differing national systems. Further a fast Europe-wide implementation of the mechanism would give the EU considerable weight in the design of the systems to follow in other parts of the world and make Europe more competitive in the process (Meckling 2011). Additionally, the European Union is an economic union. Even though European directives and regulations have increasingly reached out to environmental and social topics in the years since Lisbon, the core of the union still lies in its single market and the EU has only limited jurisdiction in other political areas. Because of this, the EU concentrates a lot of economic expertise and competences in its hands and hence prefers

economic solutions as such. Therefore a joint EU-plan seemed to be the logical answer on how to reach the Kyoto protocol goals for many European bureaucrats and politicians (Lay 2012; Meckling 2011; Newell & Paterson 2010; Skjærseth & Wettestad 2010).[5]

Secondly, Great Britain was one of the main – if not the main – negotiator in the process of finding a European way to reach the Kyoto goals. It seems very fitting that the most liberal country in the EU preferred a very liberal emission trading system based on market mechanisms. The UK actually managed to start the implementation of their own, voluntary emission trading scheme as a reaction to the Kyoto protocol already in 2001 (Meckling 2011; Robinson 2007). Other EU Member States were less involved in European climate politics for a variety of reasons. Some countries concentrated more on other big European issues such as the enlargement plans for 2004 or the aftermath of the introduction of the Euro, which left many details to be regulated. Other countries, such as especially Germany, were very involved with internal political and economic reforms, often also a consequence of the currency change. Additionally, Germany in particular expected to have a final veto-power in case they opposed the ETS-plan. Such efforts were frustrated since the European legal department decided that a large majority of countries would be enough for this directive to be passed (Massai 2011; Meckling 2011; Skjærseth & Wettestad 2010).

So far the ETS has received fierce criticism for its implementation. In the first two phases, emission allowances were so over-allocated that the price of one EU Allowance (EUA, $1tCO_2$ or equivalent other greenhouse gas) was far too low to be considered market relevant. At the end of the first (test-)phase in 2007, the price for one EUA was only around 10 cents and therefore not significant for business. In the following phase, significantly fewer allowances were allocated. However, the cost of one EUA only once rose higher than 30€ in the second phase until 2012 and currently meanders between 5€ and $7€/1tCO_2$ (European Commission 2014; EEX 2014; Lay 2012; Massai 2011; Nell, Semmler, & Rezai 2008; Ulreich 2010).

The yearly allocations of emission-allowances have been organised centrally since 2008. Therefore the ETS is now implemented in roughly the same way in all EU Member States (Lay 2012). Although it has been criticised and discussed widely for its effectiveness[6], the ETS can serve as a great object of comparison for different countries and – as in this case – market economies. As a centrally operated mechanism, all variations in its use and implementation

must be based on the national interpretation by firms as well as the institutions which see themselves responsible for the implementation or maintenance of the mechanism.

### 3.2. Varieties of Emission Trading: The Hypotheses

The ETS is based on free market forces. Except for the central allocation of allowances, which follows complicated calculations for each economic sector, allowances are meant to be traded freely. Additionally, allowance trading is strongly based on a stock market and therefore follows general stock market logic concerning price determination. As such, emission allowance trading is deliberately little regulated and left mainly to the market forces. In an ideal implementation of the system, government intervention remains very low and firms will competitively bid on allowances (Brunnengräber 2008; Newell & Paterson 2010). Because this ideal is also one of the key concepts of an LME, the ETS can be considered a market-incentive policy in the sense of Hall and Soskice which can be expected to integrate more easily into an LME (Hall & Soskice 2001).

Seeing the introduction of the ETS as an external pressure in the sense of Hall and Soskice allows for certain predictions as to how institutions and firms will behave around and react to the mechanism. In the following, five hypotheses towards the behaviour of the ETS in Germany and the UK are formulated according to Hall and Soskice's theory. Each one will be presented with the according way of how this hypothesis can be tested in the context of this thesis. The first two hypotheses concern the institutional infrastructure, while the latter three focus on the firms themselves.

**Hypothesis 1:** The more coordinated a market economy is by its nature, the more the legal framework will have to be adjusted for the implementation of the ETS.

Since the ETS can be considered a market-incentive mechanism, the legal framework of the mechanism and surrounding it is expected to need more adjustment in CME-Germany than in LME-UK. The liberal market characteristic of the ETS fits much better with the nature of an LME, therefore less contradicting regulation (direct or surrounding) will need to be adjusted to fit the mechanism into the market. If the market economies are really that divided along

the coordinated and liberal division-line as Hall and Soskice suggest, a CME should have considerable problems to fit a LME-mechanism into its institutional setting.

To test this first hypothesis, the legislation surrounding the ETS in Germany and the UK will be compared qualitatively.[7] The main focus will lie on the previous legislation that had to be discontinued or changed. Additionally, the litigations brought forth to the European Court of Justice (ECJ) will be briefly analysed. The amount of legislation that had to be changed as well as the amount of litigation will be the base of the comparison. However, the qualitative aspect of the legal impact of the changes and litigation cases are also considered.

**Hypothesis 2 (a & b):** The more liberal a market economy is by its nature, the faster the ETS will be accepted and the less debate around it will be created. The more coordinated the market economy is, the more prominent the participation of unions and NGOs will be in the debate.

Regarding the acceptance of the scheme, again the liberal nature of the mechanism is crucial. Since it should be easier for LME-firms to incorporate the new system according to the theory, they are more likely to accept it faster. Additionally, Hall and Soskice suggest that the parties involved in the debate will differ since non-governmental actors such as unions are more influential in CMEs. Therefore, while in the UK, firms and investors probably dominate the debate, in Germany a high influence of industrial unions and trade unions is to be expected.

This hypothesis is somewhat harder to test. The acceptance of the mechanism on firm-level will be analysed solely through secondary literature and press reports. The comparison of the acceptance in firms will therefore remain limited in expressive value. To determine the quality of the debate and its actors, first of all the duration of the political debates surrounding the ETS implementation will be compared through the official documents. Additionally, next to secondary literature, the amount of press reports and press releases concerning the debate in that period will be compared. For this, two representative papers for each country were chosen, the “Frankfurter Allgemeine Zeitung” (FAZ) and “Die Zeit” for Germany and “The Guardian” and “The Times” for the UK. Although the spheres are always interconnected, the debate can be roughly divided into the political sphere (parliament debates and politicians statements) and public sphere (newspaper coverage and non-

political participation). The analysis of the political and public debates will follow the research design of Maarten Hajers dispute analysis, identifying the main narratives and story lines in the discourse process (Hajer 2002, 2003, 2005).[8] Completing this process, the political implications of the ETS introduction for the ruling party in each country will be briefly analysed as well.

**Hypothesis 3:** Additional costs through the ETS are more likely to be passed on to the customers in the liberal market economy and more likely to be internalised within the companies in coordinated economies.

The different forms of capital in LMEs and CMEs are the main determinants when it comes to the extra costs through Carbon trading. LME-firms rely mostly on fluent capital and give the highest priority to staying competitive. Therefore, Hall and Soskice would suggest that these firms are more likely to pass on the extra costs of emissions to their customers. In CMEs however, companies need to retain market share in order to keep their influence. These firms are thus more likely to "swallow" the additional costs in order to keep their customers.

For this hypothesis, the cost pass-through rates of the additional costs for Carbon certificates are compared in two representative industries. Because of the low price of certificates in the second phase of the EU ETS, on which this analysis will focus, only very carbon-intensive industries faced additional costs through it in that time. Since there are some very revealing in-depth studies of the cost pass-through rate for the energy-producing industry and the petrol markets, these two are chosen as main examples.

**Hypothesis 4:** Innovation towards fewer emissions is more likely to be radical in nature in LMEs and incremental in CMEs.

The difference in innovation in LMEs and CMEs is a core aspect in Hall and Soskice's theory and has been the issue of many studies in the past years. It can be expected that firms in LMEs are able and willing to innovate more radically, incorporating big changes in production and company-structure. The less flexible workforce arrangements in CMEs favour

incremental innovation, meaning more changes within the existing structures and through the already present workforce.

To test this hypothesis, a case-study concerning the innovations by the big German and British power companies will be conducted. Power companies are among the most heavily affected firms, since traditional methods of power generation are all very carbon-intensive. It will be analysed whether the 'Big Six' British and the 'Big Four' German power suppliers used radical or incremental innovations to achieve a higher increase in renewable energy in their energy mixes.

**Hypothesis 5:** Trading of ETS allowances is likely to be more volatile in LMEs and more likely to be based on cooperation and direct trades between emitters in CMEs.

Finally, the firm's handling of the trade mechanism is also expected to be determined by their market economy. According to theory, LME firms should be more used to competitive market forces and can therefore be expected to trade allowances in a more volatile and competitive manner to maximise competitiveness. In a CME, firms can be expected to cooperate more in emission allowance trading. Therefore, more direct trades and cooperative contracts regarding emission allowances can be expected here.

This last hypothesis will be tested by means of the data collected by Engels et al. (2008). Through their analysis, the different uses and trading patterns will be highlighted for the German and British case.

# 4. Analysis I: Introducing the EU ETS to the Market

## 4.1. Adjusting the Legal Framework

In this chapter, the first hypothesis is analysed. It states that 'The more coordinated a market economy is by its nature, the more adjustment of the legal framework in form of direct and surrounding regulation will be needed for the implementation of the ETS'.

To grasp the difficulty of legal integration of the ETS, two indicators are being analysed. First of all, an overview of the pre-existing and parallel legislation will be given (4.1.1.). Hereby, special focus is set on the evolution of the UK greenhouse gas trading scheme. Secondly, the litigation cases from the two countries will be shortly analysed (4.1.2.) before a conclusion is drawn (4.1.3.).

### 4.1.1. Earlier Laws and Regulations Concerning Emissions

**Germany**

Long before both countries signed and ratified the Kyoto agreement, environmental policies were a big issue. However, climate policies, meaning policies specifically designed for the reduction of greenhouse gas emissions, started in the mid-nineties. Germany was one of the first countries to act on the new threat of climate change and started its first policy already in 1995. The 'Industrielle Selbstverpflichtung' was a self-commitment by members of the Association of German Industry (Bundesverband der Deutschen Industrie, BDI) and 4 energy-related sectors to reduce greenhouse gases in general. This policy was widened one year later, in 1996, to 14 of the 37 BDI sub-associations and 4 other energy-related associations who committed to a reduction of carbon emissions and energy use by 20% by 2005 compared to the base year of 1990. In 1996 also, an independent monitoring process was agreed on. This policy was again extended in 2000 to 19 industry associations who agreed to reduce their carbon emissions by 28% by 2012 as well as to cut 25% of other greenhouse gases in the same time period (Bailey 2007; see also Graph 1). This self-commitment was the most ambitious reduction plan in the EU at its time and set the stage for the very intense conflict during the introduction of the EU ETS in Germany because many industries did not want this ambition translated to the new scheme (see section 4.2.). This policy did not

continue after the introduction of the EU ETS and therefore any interference with the new mechanism was avoided.

Besides the Industrielle Selbstverpflichtung, Germany also introduced a climate change levy (CCL, Gesetz zum Einstieg in die ökologische Steuerreform) in 1999. This tax applied to motor fuels, gas, heating oils and electricity. However, some sectors like manufacturing, agriculture and silviculture were granted an 80% tax reduction on the CCL. Additionally, coal was excluded of the tax because of political sensitivities surrounding this sector. The CCL was increased in 2000 and 2003, and experienced a slight reduction in 2004, after the introduction of the EU ETS (Bailey 2007; see also Graph 1). The tax is still being levied to this day and there are no signs of abolition in the foreseeable future.

**Graph 1: Summary of German Climate Policy until 2002**

Table 2. Summary of German climate policy

| Policy | Sector | Requirements |
|---|---|---|
| 1995 Self Commitment | BDI members and 4 energy-related sectors | • General commitment to reduce greenhouse–gas emissions |
| 1996 Self Commitment | 14 BDI members and 4 energy-related associations | • Voluntary efforts to reduce carbon emissions and energy consumption by 20 percent by 2005<br>• Independent annual monitoring reports |
| 2000 Self Commitment | 19 industry associations (mostly BDI members) | • Reduce carbon emissions by 28 percent by 2012<br>• 25 percent cut in other Kyoto greenhouse gases<br>• Energy industry agreement in 2001 to reduce carbon emissions by additional 23 million tonnes by 2010 |
| Act on Ecological Tax Reform (ETR) (1999) | Industry, transport, domestic | • Taxes on motor fuels, gas, heating oils, and electricity<br>• 0.8 percent cut in social security contributions. Manufacturing, agriculture, and silviculture are granted 80 percent *Ökosteuer* reduction and can apply for net-burden rebate |
| Continuation of the ETR (2000) | As above | • Staged increases in energy taxes 2000–2003 |
| Further development of the ETR | As above | • Concessions for manufacturing reduced to 40 percent<br>• €1 billion earmarked for general budget consolidation<br>• €190 million investment in renewable energies |

*Note:* BDI = German Industry Federation (*Bundesverband der Deutschen Industrie*).
*Source:* BMU (2002).

Source: Bailey (2007, p.538)

Early on, the German CCL met with criticism because of the significant exceptions for industrial actors. Through the taxation of fuels, domestic households immediately felt the tax in their budgets. The impression was that the tax did not at all apply to many businesses, which led to a broad feeling of unfairness regarding the CCL. However, at the same time, Germans generally did and do accept the tax as a necessary levy to combat climate change. The use of the tax revenue has initially been planned to completely flow into social securities. However, since the introduction of the CCL, the revenues have been used quite

flexibly, in 2003 for example for the general budget deficit as such. The revenue of the tax not being used to invest in projects combating climate change is a regular target of critics (Bailey 2007).

Parallel to the CCL, the 'Erneuerbare Energien Gesetz' (EEG) was being introduced. This policy aimed to promote the use and expansion of renewable sources of energy in the energy mix in Germany. Generally speaking, subsidies were handed to the producers of electricity from renewable sources, so these methods could compete with the traditional, 'dirty' ones like coal or oil. The law was first introduced in 2000 and has been expanded and reformed regularly in 2004, 2009, 2012 and 2014. The law is very complex and has seen its share of criticism for market distortion by overly high subsidies or for the subsidy of technologies that are not energy-efficient or profitable in any way (Laes, Gorissen, & Nevens 2014). This law does not directly relate to the reduction of greenhouse gases as such. Yet it is perceived as one of the main climate policies by many politicians and citizens in Germany, hence the debate around this law is deeply intertwined with debates about climate policies in total. This could also be seen when the EU ETS was introduced in 2004, when many politicians pointed at the EEG and demanded adjustment of the policy. However, even though the political discussions often connect the two policies and although the EEG was subsequently changed slightly due to the introduction of the EU ETS, from a legal perspective the two policies do not interfere with each other and the EEG did not have to be changed directly because of the EU ETS (Kobes 2004; see also section 4.2.).

**United Kingdom**

In the UK, the reaction to the new threat of climate change was not as immediate as in Germany. The first policy was a CCL that affected all businesses in 2001. The levy applied to oil, gas, electricity (except some renewable sources) and coal. The levy was designed to promote energy efficiency and the use of renewable sources of electricity. This was supported by an annual investment of 120 million to promote renewable energies. All revenue gained from this regulation was returned to the non-domestic sector through reductions in employers national insurance contributions. The levy came under criticism because many energy producers just added the tax on to their energy prices instead of restructuring their supply. Thereby, the CCL was blamed for the aftereffects of the increase

in prices for electricity, which in extreme cases even lead to cases of energy poverty (Bailey 2007; Gough & Meadowcroft 2011; Robinson 2007).

In the same year as the CCL, Britain also agreed to its first set of climate change agreements (CCAs) to reduce emissions. In exchange for an 80% reduction in the CCL, 44 energy-intensive sectors agreed to reduce a set amount of emissions which were negotiated between the government and the relevant industrial sector association. The targets agreed on were the result of strong bargaining and therefore often fell short of more ambitious goals. This policy is, just as the CCL, still in operation. The progress is monitored every second year by the Department for Environment, Food and Rural Affairs (DEFRA) which remains responsible for all climate policies. If a sector does not comply with the set targets, its CCL reduction becomes annulled for at least two years. Both policies, the CCL and the CCAs, do not interfere with the EU ETS on a legal basis and did not have to be adjusted (Bailey 2007; DECC 2008; Ekins & Etheridge 2006; GOV.UK 2014; Scottish Government 2013; see also Graph 2).

**Graph 2: Summary of UK Climate Policy until 2002**

Table 1. Summary of U.K. climate policy

| Policy instrument | Sector | Effects |
|---|---|---|
| Climate Change Levy (CCL) (2001) | All businesses | • Levy on oil, gas, electricity (exempting certain renewable and efficient energy sources), and coal<br>• Rebate through 0.3 percent reduction in employers' national insurance contributions<br>• £120 million annually invested in promoting renewable energy |
| Climate Change Agreements (CCAs) (2001) | 44 energy-intensive sectors | • 80 percent reduction in CCL in exchange for binding emissions reductions<br>• Performance measured at biennial milestones |
| U.K. emissions-trading scheme (2002) | Direct participants (not in CCAs)<br>CCA participants | • Voluntary emissions reductions in exchange for share of £215 million incentive fund to counter abatement costs<br>• Buy permits to meet CCA milestones or sell/bank surpluses as insurance for future milestones |

*Source:* DEFRA (2000).

Source: Bailey (2007, p.536)

One year after the introduction of the CCL and the CCAs, in 2002, Britain introduced an ETS. The British industry was keen to start its own trading scheme. Especially British Petroleum (BP) was one of the biggest supporters for Emission trading in the early 2000s. The reasons for this were that BP tried to demonstrate that such a scheme could work efficiently and by doing this tried to avoid other approaches to limit carbon emissions like taxes and levies which would be more costly for the company. Additionally, BP aimed to gain experience in reducing emissions as it saw that task becoming more important in the near future

(Meckling 2011). BP succeeded in providing facts to back up the claim that carbon trading works and can be efficient (Meckling 2011). Shortly after, Shell also began their own trading scheme. Both companies used the help of the NGO “Environmental Defence” (Meckling 2011). This resulted in the UK Emissions Trading Group (ETG), started by thirty organisations under the Confederation of British Industry and with the help of the Advisory Committee on Business and the Environment in 1999. This trading mechanism was mainly of symbolic nature and aimed to explore the regulations needed for such a mechanism to work properly. However, it still can be seen as a first commitment to greenhouse gas emission trading, driven by the industrial private sector itself, not by government intervention (Meckling 2011; Smith & Swierzbinski 2007).

The Chancellor of the Exchequer at that time, Gordon Brown, shortly after decided that it would be advantageous for Britain to start a pilot project of an ETS. The idea was that because of the decisions in Kyoto there would probably be an international ETS in the near future. Starting a pilot project in the UK would give significant advantages to the needs of the British economy in this scheme, since the first ETS would be ‘tested’ in that environment. Another aspect was the growing voices in the Tory-opposition increasingly calling for more substantial climate policies especially in the context of a European comparison. As the Tory Member of Parliament (MP), Mr. Horam, put it, many Britons felt that the British “Government was merely talking but the Germans "were acting"“ (Kallenbach 08.03.02; Robinson 2007).

Britain therefore introduced the world’s first emission trading scheme in 2002: the “UK Greenhouse Gas Emissions Trading Scheme”, which was basically an official version of the UK ETG. This scheme, developed in close cooperation with the industry, was completely voluntary. Participating businesses could choose two ways to profit from the mechanism. The first, and most popular one, was the incentive payment. If a business could reach a certain target of emission reduction, decided in the beginning of the year, they were to get an incentive payment as a reward. Another method of participation was limited to the trade with emission certificates, the core of such a mechanism. Before the introduction of the European ETS, only 32 companies took part in the voluntary scheme, only two more than there had been in the founding group. The relatively low number of participants was the main reason for the limited success of this first scheme according to Bailey (2007). Other

factors were the flexible interpretation of mechanism rules as well as a lack of penalties in case of non-fulfilment of an greenhouse gas savings agreement (Bailey 2007; Meckling 2011; Newell & Paterson 2010; Robinson 2007). The latter problems became basically solved with the introduction of the European ETS. Interestingly though, the UK greenhouse gases trading scheme continued parallel to the ETS until 2012, only being closed to new entrants in 2009. This brief continuation was designed to attract other businesses, which do not have to participate in the EU ETS to join the new scheme as well (Robinson 2007).

#### 4.1.2. Legal Integration and Litigation

The actual integration of the EU ETS law into the legal system was quite simple in both countries. The transferral of the regulation, agreed upon in Brussels into the respective 'legal languages' of Germany and the UK, was naturally a lengthy process but went comparably smooth. In Germany, this process resulted in the 'Treibhausgasemissionshandelsgesetz' (greenhouse gas emission trading law, TEHG). Here, the main difficulty was the question, how to organise the exact allocation and supervision of certificates in the federal system. As a compromise, it was decided that there would be a head office of emission trading in Berlin, the Deutsche Emissionshandelsstelle (DEHSt), next to smaller offices in every federal state which were to be responsible for the direct supervision of emitters in the scheme (DEHSt 2014; Kobes 2004). The same position was first filled by DEFRA in the UK, except for Scotland, where the Scottish Environment Protection Agency (SEPA) took over this task. In 2008, DEFRA created a subsidiary agency called the Environmental Agency (EA), which covers all ETS related matters. In 2013, the EA Wales and the EA Northern Ireland were created to cover the Welsh and Northern Irish businesses. Finally, already in 2008, the administration of offshore installations was outsourced to the Department of Energy and Climate Change (DECC) (DECC 2008; GOV.UK 2013; Scottish Government 2013; SEPA n.d.).

In Germany, concerns that the TEHG would not be constitutional because the European Commission could decide upon certificate allocations without Parliament, were voiced very early on. However, they were dismissed quite speedily since the Bundestag has to accredit every National Allocation Plan (NAP), therefore they would always have a formal right to veto the NAPs which were changed by European bureaucrats (DEHSt 2014; Fickinger 24.12.03). In the UK, similar concerns were voiced, but since in the British system everything

related to the levying of taxes and public expenses has to be decided upon by the House of Commons, the same logic to dismiss such fears applied (Robinson 2007).

Other concerns in Germany were voiced about the general freedom of business being interfered with through the ETS. However, this concern was only scarcely voiced out loud, since this logic can be applied to any government measure such as taxes and therefore would suggest a completely regulation free sphere for businesses, something which is especially unthinkable in a CME. Finally, some lawyers and businesses tried to sue the German government because the TEHG makes a difference between facilities that are planned but where construction has not began yet and completely new facilities. This claim was rejected because the difference only applied for the first two years of the ETS and not having this differentiation would have created a disadvantage for businesses which spent a lot of time planning and designing new facilities in the years before the law was even discussed (Bohl 24.03.04; Kobes 2004). Especially in a CME, this kind of consideration for long-term planning fits the theory.

Another indicator for difficulties in legal integration is the amount of litigations. In total, 10 litigation cases managed were brought before the European Court of Justice (ECJ). From these, three country-litigations were made by the Netherlands, Germany and Poland, while seven litigations were issued from companies or groups of companies. Three of these cases came from German companies, one from a Slovakian company, two from French firms and one from an Italian one (Massai 2011).

Among the cases brought forth by companies, all German cases relate more to details of the NAP rather than the TEHG itself. The three cases were all dismissed and are generally seen as single sectors trying to gain more certificates for themselves or less certificates for another sector. Subsequently they all were dismissed, since details of the NAP cannot be decided upon in the ECJ, which only has jurisdiction for whole country NAPs (Case C-503/07; Case T-28/07; Case T-387/04; Klage gegen Emissionshandel 28.09.04; Massai 2011). The case of Germany against the Commission enforced prevented a proposal by the Commission on ex-post adjustments to the NAPs. These adjustments would have limited the room for MS to manoeuvre in order to achieve individual Emission reduction aims. Additionally, ex-post adjustments would have to be again accredited by the parliament which was not intended

by the original Commission proposal (Case T-374/04; Fickinger & Kafsack 23.09.04; Massai 2011).

#### 4.1.3. Conclusion

Although Germany started earlier to adopt climate change policies, the UK had a much easier task, adopting the EU ETS in its national system. This has to be attributed to the decision to start the UKs own Greenhouse Gas Emission Trading Scheme in 2002. Together with the eagerness of some British industries to try out an ETS, which led to the industry having substantial influence on the design of the details, this pilot-project paved the way to a fast and uncomplicated legal integration of the ETS. The advantages of this project can also be seen in the British influence in the design of the EU ETS (see section 3.1.) which in turn made it easier to adopt the scheme.

While the UK just phased out the predecessors of the EU ETS, Germany discontinued the 'Industrielle Selbstverpflichtung' and had to reform the EEG after the introduction of the ETS. Therefore, it can be argued, that Germany had to adapt more to the new law. The CCL was not significantly adapted in either country, except for the lack of significant further increase after the introduction of the ETS. In general no big adaptations had to take place in either country but Germany's adaptations were slightly more extensive due to the EEG.

The transferral of the legal details to the countries can also be considered smoothly as no big problems had to be confronted. Although the number of litigations from German companies is significant, the dismissal of all cases except for the ex-post adjustments of the NAP suggests a lack of acceptance of the scheme and the German NAP by German businesses rather than legal problems of integration (see also section 4.2.4).

Hence, no big problems of legal integration in either country can be observed. Even more so, it has to be noted, that the UK had great advantages in the integration process, since the design of the scheme is inherently British and the country simply started earlier to adapt to such a measure. Therefore, the hypothesis that the German legal underwent greater adjustments cannot be completely dismissed. However, the reasons for this cannot be pinned down to the differing types of market economy rather than to other factors. The conclusion for this chapter therefore has to be, that this hypothesis can be confirmed in the

analysis conducted here but this result has to be checked for other variables such as the additional adaption time in the UK and the British influence in the design of the EU ETS.

## 4.2. Debating and Accepting the EU ETS

In this chapter, the second hypothesis is analysed, which states that 'the more liberal a market economy is by its nature, the faster the ETS will be accepted and the less debate around it will be created. The more coordinated the market economy is, the more prominent the participation of unions will be in the debate'.

The hypothesis will be tested in five subchapters. First, the political debate (4.2.1.) and the debate in the media (4.2.2.) will be explored to answer the question, whether the debate was more intense in Germany as would be expected from its CME-nature as a reaction to an LME-mechanism. Following this, the participants in this debate will be discussed to see whether unions and NGOs were involved more strongly in Germany than in the UK (4.2.3.). Finally, the acceptance of the ETS among German and British firms will be analysed (4.2.4.) before a conclusion is drawn (4.2.5.).

### 4.2.1. The Political Discussions

**United Kingdom**

Tony Blair was prime minister of the UK from 1998 to 2007. His Labour government therefore accompanied the whole process from the first white paper that mentioned climate change in Brussels in 1998 to the beginning of the second phase of the EU ETS in January 2007. The most important era for the introduction of the ETS was the years 2003 and 2004. In these two years, the UK greenhouse gases trading schemes were implemented and the EU ETS was introduced to UK legislation. During this time, Margaret Beckett served as the Secretary of State for Environment, Food and Rural Affairs. She was, and often still is, seen as the most vigorous defender of Labour's climate policies introduced during Blair's time in office (Vogler 2005).

Michael Howard was the leader of the opposition from 2003 to 2005. He himself used to be secretary of state for the environment in 1992-93 and had clear views on how the EU ETS should be implemented. Consequently, he was the most vocal disputant of the opposition during the implementation of the EU ETS (HC 2003b). The Greens naturally voiced their opinion on this matter as well, since it was one of the party's flagship issues. However, the party had no member in Parliament at the time and therefore had to resort to open letters and statements (Tempest 27.04.04).

Since the first version of an emission trading scheme had already been implemented in the UK (see section 4.1), the transition to the EU ETS was handled as a change in an already ongoing piece of policy rather than a new law. As such, the EU ETS was not strongly discussed in the parliamentary setting and the UK became the first and only MS to actually pass the law before the deadline of December 2003. The legal incorporation of the EU ETS was seen as a necessary harmonisation of laws, so other European countries could join the British pilot project. Furthermore, the basic debate about which path should be followed had been fought out beforehand, when in 2002 the first voluntary emission trading scheme had been discussed. The discussion concerning the introduction of the greenhouse gas emission scheme stayed very restrained as well. Although most Tories had preferred a climate tax in the beginning, the acceptance of the UK greenhouse gas trading scheme by the industry convinced politicians of all parties. Therefore, there had been no major discussion of the ETS as such before 2004, neither in the House of Commons nor in the House of Lords (Clover 14.09.04; Kallenbach 08.03.02; Lovell, Bulkeley, & Owens 2009; Massai 2011).

This general agreement on the introduction of the ETS as such, however, did not transfer on to the discussions regarding the NAP. The first draft paper for the NAP was designed mainly by Margaret Beckett and aimed at an ambitious 16% cut of greenhouse gasses by 2010. This would have equalled an allocation of approximately 785.4 $mtCO_2$. This proposition instantly met with vehement opposition both from the industry and in parliament. The plan was called overambitious by both opposing factions and was discussed extensively. Blair was accused by a number of people that he would be the destroyer of British industry. The main problem lay in the difference between the UK goals of emission saving and the goals of other EU Member States such as Spain or Italy.[9] As long as not every state in the EU would design NAPs which were similarly ambitious, so the most repeated argument, the UK would destroy

its own economy by trying to fulfil an ideal (HC 2004a, 2004b; Thorniley 15.09.04; Tran 19.01.04; Walsh 21.03.04).

CEOs and speakers of specific companies, especially in the power-generating industry, feared that domestic prices for electricity would rise substantially. At the time, this was a very forceful argument, as the problem of energy- or fuel-poverty – households not being able to cover the costs of adequate heating and use of electricity – was first discussed in 2003 as well. Energy companies warned that such an ambitious implementation of the EU ETS would undermine the efforts of the government to reduce energy poverty and make the situation worse for affected households (Gough 2013; Milner 18.10.04; Thorniley 05.11.04).

While the industry was leading the public opposition in the UK, members of the conservative party voiced the same concerns in the political arena. A number of MPs feared shortages of electricity or products made in Britain because of the financial burden of $CO_2$ certificates companies would have to carry. Especially small businesses such as brick- or "artisan soap producers" (Booker 09.03.04) were thought of being the victims of the new regulations (Clover 14.09.04; Happold 13.09.04; HC 2004a; Lovell et al. 2009).

European politics and the EU had been a contentious topic in Britain at the time of the introduction of the EU ETS. This was due to the 2004 EU enlargement.[10] In this climate it was a challenge to create support for any European law. The threat that an over-ambitious NAP could harm the British industry just fed into concerns over the general competitiveness of the UK economy (HC 2003b, 2004c; Lucas 08.06.04).

On the other side, the NGO Friends of the Earth (FOE) strongly supported the ambitious goals of the first UK NAP.[11] The FOE accused Blair of being under the spell of the industry as the NAP was said to be reduced to an emission reduction of merely 12,5% by 2010 compared to 1990. In the end, Margaret Beckett, with support from the FOE managed to get the cabinet to agree to a compromise of a 15% cut of emissions by 2010, equalling 736.3 $mtCO_2$, which was submitted to the Commission with a slight delay (Blair attacked 27.10.04; Massai 2011; Notebook 01.05.04; Vogler 2005)[12].

The submission of the NAP to the Commission did not mean the end of industry lobbying and negotiation though. After it became clear that the UK's NAP was indeed the most ambitious plan of all MS including Germany (which the UK politicians thought would join the UK in setting an example), the industry and Michael Howard again pressured Blair to

increase the amount of certificates. In November 2004, Blair finally agreed to 'adjust the NAP to more recent data' and set the cut to roughly 14% by 2010, equalling 756.1 $mtCO_2$ (Milner 28.10.04; Tickle 03.11.04; Vogler 2005). How the negotiations which lead to this decision were conducted is unknown.[13]

In general, the political discussion around the implementation of the EU ETS focused on the details of the NAP and can be reduced to a struggle between pro-industry and pro-environmental forces. As important as this struggle was to the participants, the political struggle to implement the EU ETS was relatively mild in comparison to other EU MS, or, as Lovell et al. (2009, p.14) put it: "surprisingly free of visible conflict".

**Germany**

Already during the European negotiations regarding the ETS, Germany figured as a strong adversary to the system. Relying on other regulatory methods and most prominently on an agreement with the industry to self-regulate towards a lower carbon-dioxide economy ("Industrielle Selbstverpflichtung", see section 4.1), Gerhard Schröder, the German chancellor of the time, held a view that Germany did not need the ETS to meet its Kyoto agreement goals. As Europe decided to pass the directive anyway (see section 3.1), it was already clear that Germany would not be too enthusiastic about its implementation.

This was reflected in the following political and public debate. The problem started with the delay in tackling the ETS introduction in the government. The deadline for the transmission of the intended implementation of the directive was originally the 31st of December 2003. Since only the UK achieved to meet this deadline, the Commission allowed an extension to the 31st of March 2004. Paradoxically, it was not until January 2004 that the German government started to draw out the TEHG and the accompanying NAP. By passing the two acts together, the Bundestag managed to at least meet the deadline for the NAP, something which the UK did not manage (BT 2004b; Massai 2011).

The reason for this delay can be most likely attributed to a set of ambitious reforms called the "Agenda 2010", which kept the German government under Schröder, a coalition of the Social Democratic Party (SPD) and the Green Party (Bündnis 90/Die Grünen),very busy.[14] Politicians of the opposition also accused the government to delay the process on purpose

to diminish the parliaments' possibility to lament and change the proposed law and NAP (BT 2003, 2004a, 2004b).

Before a first draft was presented in parliament, the content of the law and most significantly the NAP was already discussed aggressively inside the coalition. The secretary for economy, Wolfgang Clement, and the secretary for the environment, Jürgen Trittin, both claimed authority to negotiate the implementation of the EU directive. At the same time, the two politicians could not have been much more divided in their views on the issue. Clement, a member of the SPD had close connections to the classical SPD-voting group of the North Rhine-Westphalian coal unions and heavy industry and therefore strongly wanted to protect them. Further he had a "close and trustful relationship" with the head of the Federation of German Industry (BDI), Michael Rogowski (Schmid & Hamann 16.09.04). Clement therefore took a critical stance to the EU ETS and tried to implement a very weak NAP.

Trittin meanwhile can be characterised as a typical member of the Green Party who bears significant amounts of suspicion towards the heavy industry in general and the environmentally very harmful industries, such as the coal-based ones, in particular. The secretary therefore tried to implement a stricter NAP and supported the EU ETS much stronger than Clement (BT 2004a, 2004c). The dispute around the ETS-implementation was not the first case of dispute between these very different secretaries. But this was to create the most intense example of the power struggle of "economy versus ecology", as the newspapers called it (Fickinger 31.01.04; Lohse & Schuller 04.04.04; Vorholz & Geis 01.04.04).

Clement relative openly opposed the idea of the ETS as a threat to the German economy and feared a further economic downturn if the German industry were to be burdened with costs for their emissions. As a result, he proposed an amount of 505mt$CO_2$ to be allocated per year for the German industry until the revision in 2012. This was actually more than the industry emitted in 2003 (approximately 502mt$CO_2$) and the proposition would have de facto negated the intended effect of the ETS entirely (Bannas 31.03.04; BT 2004a).

Trittin meanwhile was a strong believer in the ETS as being a medium to combine economic growth and innovation with climate policy. He already compromised after talks with representatives of the industry to limit his proposal regarding the certificate allocation to the amount that the industry already promised to limit itself to in the "Industrielle

Selbstverpflichtung". This would have been, according to Trittin, 488mt$CO_2$ per year (Fickinger 13.02.04; BT 2004a). This proposal led the oppositional parties, Christlich Demokratische Union (CDU) and Christlich Soziale Union in Bayern (CSU) as well as a significant number of members of the SPD including Clement to accuse Trittin of willingly destroying the competitiveness of the German industry (BT 2004a; Schäfers 29.03.04b).[15]

Throughout this whole process, the German association of industry (BDI) as well as several unions and smaller industry and trade associations lobbied heavily to stop Trittin's proposal. The BDI openly threatened the government with open endorsement of business emigration to neighbouring countries. Some unions openly voiced their concerns of rising unemployment and an increase of prices for fuel and electricity, should Trittin's NAP pass. Environmental and scientific panels however, including the environmental panel of the Bundestag, strongly supported Trittin, as did environmental NGOs (Fickinger 06.05.04; Vorholz 03.06.04; see section 4.3.2. for the detailed analysis of participants). It was only through lengthy overnight-discussions and the intervention of chancellor Gerhard Schröder and the head of the office of the chancellor, Frank-Walter Steinmeier, that a compromise was reached (Mihm 20.02.04; Kanzleramt 21.02.04; Mihm & Leithäuser 30.03.04).[16] Certificates for the first phase of the ETS were finally agreed to be 503mt$CO_2$ per year. After 2007 the amount was planned to be reduced to 495mt$CO_2$ per annum (Fickinger 30.12.04).[17]

Trittin acted as the leading advocate in all parliamentary discussions. In the parliamentary (Bundestag) and second chamber debates (Bundesrat), the ETS implementation was coupled with a proposal for a law endorsing renewable energies, the "Erneuerbare Energien Gesetz" (EEG). This proposal attracted immense criticism, repeated calls for amendments and general discussion in all forums. Energy politics are a traditionally intensely contested field in German politics and, a few months earlier, Trittin had already clashed with Clement on questions concerning the further development of wind energy in Germany (BT 2004a, 2004b; Laes et al. 2014; Vorholz 04.09.03). Due to the connection of the two policies, the plenary discussion surrounding the introduction of both measures was significantly longer than most discussions on climate or environmental laws. Furthermore, many high-ranking politicians of both within the government and the opposition took part in the debate, raising the general political significance of the ETS itself. Many, including Clement, also argued that the introduction of the ETS would make the EEG obsolete (BT 2004a, 2004c; Mihm 22.03.04,

25.03.04; Vorholz 25.03.04, 05.08.04). It is hard to isolate the specific effects the combination of ETS and the EEG had on the debate about the ETS-introduction. Nevertheless it bears importance to keep such an intertwining of two policies in mind when analysing the debate.

The opposition in the Bundestag, formed by the CDU/CSU and Freie Demokratische Partei (FDP) fractions, was very strong in 2004 and debates were equivalently heated. Although especially the market liberal FDP welcomed the introduction of the ETS, criticism remained strong.[18] Due to the ongoing clashes between Clement and Trittin, even the members of the SPD and the Grünen feared a crisis of the whole coalition if this conflict wasn't resolved (BT 2004c; Fickinger 18.03.04; Vorholz 25.03.04).[19]

The discussion in the second chamber, the Bundesrat, was not quite as divisive as in the Bundestag, but the representatives still had many issues to tackle. The debate naturally focused on the implications of the ETS for the federal states as well as the role and authorities of the federal states in the new mechanism. The main point of discussion was the new institution for the distribution of certificates. The federal states initially opposed the idea of a federal institution (the Deutsche Emissionshandelsstelle or DEHSt) and wanted individual institutions in every state (Mihm 05.05.04). After this point and some other remarks[20] were discussed in the conciliation committee, a hybrid solution was agreed on. The Federal states got additional smaller institutions to manage the allocation locally which were agreed on national level (BR 2004; Fickinger 2004-06-12).

To sum up, the political debate in the UK and Germany largely circled around the same arguments and topics. In both countries, the main criticism was the fear of a loss of competitiveness against other EU MS if the NAP would be too strict and ambitious. However, the debate in Germany was further inflated by discussions of other policies like the EEG and the personal battle of two secretaries with very differing views. As a result, the political integration of the EU ETS was much more difficult in Germany than in the UK.

#### 4.2.2. The EU ETS in Media Perception

The introduction of the ETS was naturally accompanied by news coverage of the matter. To exemplify the differences in the coverage between the two countries, four newspapers were

picked out for a comparison. For the British side, *the Guardian* and the *Daily Telegraph* were chosen, the German side is represented by the *Frankfurter Allgemeine Zeitung (FAZ)* and *Die Zeit*. These newspapers were chosen because they can be considered to represent comparable target audiences. The *Daily Telegraph* and the *FAZ* both cater to a more conservative audience with a special focus on economic affairs. *The Guardian* and *Die Zeit* aim for a more liberal audience with a focus on science and politics and a generally more international outlook (Carvalho & Burgess 2005; Wilke 1998).

All articles related to emission trading[21] which were published in these newspapers were analysed for the four papers. As a time-frame, the full year of 2004 was chosen, since the political debate in both countries peaked during that year. Compared to British papers, German papers covered topics relating to the ETS and its implementation approximately twice as often when it comes to sheer numbers (the *FAZ* issued 84, *Die Zeit* 21, *The Daily Telegraph* 19 and *The Guardian* 38 articles). However it has to be noted, that *Die Zeit*, as a weekly newspaper naturally publishes less articles in the same amount of time than daily papers. Additionally, German newspapers covered a broader area of topics concerning the ETS (see also appendices 1-4 for the detailed data).

During the intense debate between Clement and Trittin, the newspaper *FAZ* printed at least one article about the discussions almost every day from March 18th until April 4th, including its Sunday edition, many on the front page. *Die Zeit* did not significantly increase its amount of articles, however, the articles concerning the ETS in the same period are significantly longer than before and after. The debate was therefore covered extensively in the German media. Both secretaries were stylised strongly and the debate between the two was often called the “economy vs. ecology” battle (Leithäuser 19.03.04; Vorholz & Geis 01.04.04).

The coverage of the parliamentary dispute can be roughly separated into three stages. First, the contrary positions and lobby-groups were presented and discussed in a relatively factual way in both newspapers (Gammelin 22.01.04; Schmidt 28.02.04). Following this, from roughly the beginning of March up to the middle of April, the debate became more intense and the battle of the secretaries dominated all articles. Articles in *Die Zeit* most of the times defended Trittin and accused Clement quite directly of acting in the interest of the industry (Geis 25.03.04; Vorholz 04.03.04, 11.03.04). The *FAZ,* while still acknowledging that Clement had close ties with the industry, defended the industry’s interests in many articles, claiming

that an ETS in Trittin's sense would hurt the economy too much (Germis 21.03.04; Leithäuser 19.03.04; Trittin muss sich bewegen 01.03.04). During this phase, both papers clearly took a position and attacked the opposing side often very directly.[22] The last phase is the analysis of the agreed compromise. Here, news coverage is dominated by the question of who won and who lost this clash, again portraying the debate in a very simple, polarised way.[23]

Besides the coverage of the secretaries' debate, there were a number of articles in the German newspapers which discussed the method of emission trading and its advantages and downsides as such. The *FAZ* alone printed 7 articles concerning the question, how the $CO_2$ concentration and global warming developed and whether an emission trading system is at all beneficial for the German market (Küffner 24.02.04; Schäfers 02.02.04a; Sturbeck 10.04.04; von Petersdorff 28.03.04; Böhringer, Lange & Moslener 20.03.04; Schmidt 04.03.04). Another concern was the alleged detachedness of the ETS discussions from the public (Hermani 20.01.04).

The ETS was also discussed in terms of the increasing European influence on German national politics. This topic was brought up due to the European elections in 2004, so it is hard to judge how much the ETS opened this debate or was merely used as an example for long-running grievances (Bünder 08.06.04). In many articles, Germany was depicted as a pioneer in climate change policies while European politics were being perceived as unfair towards German reduction plans in comparison with other MS. The argument was, that the Commission expected too much from the German ETS implementation because Germany started early with reducing its carbon emissions (Bünder 18.05.04). This motive returns in the debate over the tight schedule and the general tardiness of most MS (Bünder 02.04.04; Seiser et al 04.03.04). The UK, however, occasionally received better verdicts from the German press for being an example for the ETS introduction (Sturbeck 20.03.04c).

Summing up, the German newspaper coverage was extensive and highly politicised. Although general concerns about the effect of the ETS mechanism as such were also issued, the vast majority of articles concentrated on the political debate. The industry's concerns about German competitiveness were most of the time not analysed in a neutral way, but rather one aspect in the explanation of two contrary political opinions.

In the UK, the coverage of the EU ETS introduction extended over a far longer period than in Germany. This is partly a result of the earlier introduction of the UK GHG trading scheme, which led to an earlier discussion of the shortcomings and merits of a EU ETS as well as the effect of such a scheme on industry and society. After the decision on the NAPs, however, the coverage of the intense lobbying efforts of industrial bodies continued. Especially in connection with comparisons of the way other EU MS designed their NAPs, the fear of Britain losing its competitiveness pervades most articles. It is of importance here that the idea of an ETS is not discussed widely in the UK throughout the whole coverage. The lion's share of the articles concentrated on the result of an EU ETS that is being implemented more harshly in the UK than on the continent. Therefore, the design of the NAP was the focal point of discussion (Notebook 20.01.04; Thorniley 07.05.04).

Despite the longer period though, the number of articles is significantly smaller in the UK than in Germany. Even taking the German one-column articles out of the equation, the British papers only issued about half the amount of coverage. This discrepancy can be mainly explained by the extraordinary intense political debate surrounding the NAP design in Germany.

A substantial share of articles analysed concentrated on the effects of a strict NAP on the UK's industry, business and domestic households. Furthermore, those articles in *The Guardian* and *The Observer* (the Sunday issue of The Guardian) are mostly written quite objectively and tend to shed light on both sides of the issue. In most cases, predictions of the CBI or other industrial bodies on the NAP design are contrasted with views of environmental NGOs, scientists or politicians of another view (Gow 20.11.04; Walsh 21.03.04). There does not seem to be an obvious agenda the newspaper followed. The only recurring argument without counter seems to be the fact that other EU MS do not design their NAPs as ambitious which was predicted to lead to problems in the long run (Milner 28.10.04; Townsend 11.01.04).

*The Telegraph* followed this very balanced approach in many respects. Although the articles concerning the effects of the planned UK NAP on British industry only rarely included counter-arguments, the newspaper did also issue a range of articles that depict views from scientists and politicians who did not necessarily agree with the industry's dire predictions. It is interesting to note, however, that views of representatives from environmental NGOs

were not mentioned at all in any of the articles analysed. Meanwhile, speakers from industrial bodies were given many opportunities to voice their concerns in the paper (Pfeifer 21.03.04; Thorniley 15.09.04). In both newspapers, concerns about price rises in domestic bills such as electricity and gas were recurrent and deeply discussed topics (Adam 17.06.04; Gow 31.03.04; Gribben 16.09.04; Murray-Watson 23.05.04). It is also interesting that political discussions in parliament and between secretaries take a back-seat in both papers. Only 13 articles report on the political dispute as a main topic.[24] This shows that the political debate was not nearly as intense as in Germany.

Articles that did not focus on the adequateness or over-ambitiousness of the UK NAP covered mainly two other topics. One focus lay on the chances that the EU ETS might hold especially for business opportunities. Several reports of new technologies to be sold Europe-wide as well as models of emission-derivatives and -securities to be traded at the stock market can be found (City-briefs 22.06.04; Moore 10.06.03). The other main category of articles could be called climate-change-information. While purely informative articles in the German papers are more numerous, these kind of articles in the UK focus more on the facts of $CO_2$ concentration in the atmosphere and scientific analyses on the role of renewable energy production within the ETS rather than on the ETS itself. Articles on different political answers to climate change mostly focused on the merits of the ETS instead of a further development of the climate change levy (Cadbury & Adams 21.10.04; Clover 25.02.03; Environmental Scorecard 09.12.04; Moore 19.07.04; Vidal 07.05.04).

As shown above, the newspapers in both countries covered the introduction of the ETS broadly. However, the comparison of the four newspapers reveals some key differences. First of all, the number of articles is significantly higher in the German coverage. Furthermore, the coverage on the political discussions is very contained in the British case, while German newspapers ran hot with articles of the secretaries' clash. The coverage in *The Telegraph* and *The Guardian* also does not lend itself to identify several stages of reporting such as in *FAZ* and *Die Zeit*. Nor did British newspapers represent such clearly defined opposing corners in the discussion as their German counterparts did. One could say that the news coverage in Germany seemed to be more ex- and intensive during the discussions of the EU ETS and the NAPs.

The longer period of coverage in the UK seems to reflect the slower process of EU ETS introduction in the country, which contrasts to the fast and intensive introduction in Germany. Considering the other topics, apart from the political dispute, some general similarities of the debate can be observed. In both countries, the industry opposed a strict introduction of the EU ETS. In Germany, some even opposed the EU ETS as a whole. Furthermore, the amount of explanation given in various reports on the EU ETS as to how the scheme actually works, shows that the idea of an ETS is more familiar for British newspaper readers than for German ones. However, this most likely also has to be attributed to the earlier introduction of the voluntary trading scheme in Britain.

#### 4.2.3. Participants of the Debate

Next to the politicians, there was a range of participants from other sectors in both countries. As already mentioned above, the biggest participants outside the political institutions came from an industrial background. In the UK, the biggest lobbyist for the industry was Digby Jones, head of the CBI, a role taken in Germany by Michael Rogowski, head of the BDI. Both men used their close ties to the Prime Minister Blair or secretary Clement to influence the decision towards a laxer NAP. In direct comparison, Rogowski's approach has to be considered a little bit more blunt though. Contrary to his British colleague, he used tactics such as boycott and pure threats in a very open and public way. Jones did also voice his opinion openly, often through speeches, letters and panels. His approach toward Blair, however, was based more on cooperation rather than open confrontation (Carter 2008; Gow 20.01.04; Mihm 21.03.04; Okereke 2007; Pfeifer 21.03.03). Another player in the German debate was the Association of German chambers of industry and commerce (Deutsche Industrie- und Handelskammer – DIHK), which opposed a strict NAP (Fickinger 25.02.04a; Mihm 23.03.04).

Apart from these major representatives of the industry, a number of businesses also voiced their individual concerns. In both countries, oil and energy producers were at the forefront of the protest against a strict ETS. On several occasions, companies like BP in the UK and E.On and RWE in Germany openly opposed a strict NAP (Carter 2008; Meckling 2011). In Germany, a number of associations of other branches such as the Association of automobile-industry or the association of chemical industry also issued statements of opposition. Such

associations did the same in the UK, but most attention was paid to individual companies and the CBI, since branch associations less tightly knit in the UK than in Germany (Bercusson 2009). There are two big exceptions to this finding though: Shell internationally declared his support for radical policies to tackle climate change, therefore also a strict ETS implementation. BP officially supported the EU ETS as well, stating that rather than reducing the ambitions of the British NAP, the other EU MS should adjust their NAPs towards a higher goal (Bailey 2007; Carter 2008; Meckling 2011; Okereke 2007).

In Germany, some unions also participated in the debate. Especially the unions for metal and steel producer employees (IG Metall) as well as the union for employees of mining-, chemical- and energy producing industries (IG BCE) voiced their opposition to a strict NAP. Atypically to most political debates, the unions in this case fully supported the industries' claims and demands, a fact that was reported on widely (Fickinger 25.02.04a; Staud 19.05.04). The IG Metall and the IG BCE voiced their concern of an impendent loss of jobs in their sector due to the ETS on several occasions. Together with the industry, they formed a firm opposition to Trittin's plans. The Confederation of German Trade Unions (DGB) did not issue an official opinion since the unions could not agree on one stance. Furthermore, the DGB and all other unions were very occupied with the ongoing reforms of German employment policies and therefore left the case of the EU ETS more to the industrial lobbyists (Fickinger 25.02.04a; Schmidt 28.02.04).

In the UK, the Trade Union Congress (TUC) issued an official statement as well, which endorsed the general implementation of the EU ETS, but concerns about losses of jobs especially in the steel and energy sector are expressed. However, there are no indications of further participation in the debate beyond this statement, neither in news coverage, nor in official statements about negotiations or conferences regarding the British implementation of the EU ETS (Lovell et al. 2009; TUC 2004). Due to the traditionally stronger role of unions in Germany, this finding is not very surprising.

Promoting a stricter NAP in both countries, NGOs joined the debate as well. Although most NGOs concentrated their effort for the EU ETS implementation on Brussels, the biggest ones also lobbied in the respective MS. Most notably, the FOE (in Germany Bund für Umwelt und Naturschutz Deutschlands, BUND) participated strongly in the debate and even had one-on-one talks with Trittin in Germany and Beckett in the UK. Apart from FOE, Greenpeace and

the World Wide Fund for Nature (WWF) also issued statements. As already noted, most efforts were concentrated on Brussels and the impact on national debates therefore remained limited (Convery 2009; Meckling 2011).

#### 4.2.4. The Firms' Reactions to the Scheme

The British industry was deeply involved in the initial design of the ETS. Therefore it seems obvious that businesses in the UK did not mind the introduction of the scheme as much as businesses in other countries. This expectation seems to be confirmed by Bailey (2007). The scholar sent a postal survey to 2400 British and German manufacturing firms and conducted "in-depth interviews with representatives from energy-intensive companies and trade associations." (Bailey 2007, p.539). Although the response rate was quite low in Germany (26%) and mediocre in the UK (50.4%), Bailey managed to give a comprehensive overview on the acceptance of different types of so-called New Environmental Policies (NEPs). He specifically asked, which kind of NEP the businesses preferred as an effective measure to reduce greenhouse gas emissions.

Interestingly, the British businesses mostly supported the CCL more than negotiated agreements. Resistance to a reform of the CCL can be attributed in large parts to the higher risk of uncertainties in that case. The overwhelming majority declined an energy-production or consumer tax in place of the CCL because it was widely believed that these forms of taxes can damage businesses more in the long run and would take some cost control away from the businesses themselves (Bailey 2007; see also Appendix 5).

Regarding negotiated agreements, the German firms overwhelmingly supported the NEP. German firms supported the 'Industrielle Selbstverpflichtung' in strong parts due to the smaller need for bureaucratic supervision in contrast to taxes or, even stronger, the ETS. The biggest difference regarding negotiated agreements between the two countries can be found in the question of effectiveness. While 56.6% of German participants believed that negotiated agreements will "be a major contributor to achieving emissions targets" (Bailey 2007, p.542), only 29.3% of British companies agree with this notion. Among British firms, 33.9% had no opinion on this matter and 36.8% did not agree that such agreements will ever

be the major contributor to achieve the greenhouse gas reduction targets (Bailey 2007; see also Appendix 6).

The difference in reactions became even more obvious when the same questions were asked for the ETS. While 51.8% of British businesses supported the ETS and only 16.5% disapproved of the scheme, only 23.8% of German businesses agreed to that point, while 40.7% of German businesses were disapproving of the ETS as such. Even a few more German businesses (41.3%) did not agree that the ETS will "increase chances of target achievement" (Bailey 2007, p.543). The British businesses actually remained quite divided on that point with 35.1% believing in the capabilities of the ETS and 34.2% doubting its means (Bailey 2007; see also Graph 3).

**Graph 3: Industry opinions on carbon trading in Germany and the UK**

**Table 6.** Industry opinions on carbon trading (percentages)

| Variable | Score | Strongly disagree −2 | Disagree −1 | No opinion 0 | Agree +1 | Strongly agree +2 | Mean | Mann Whitney sig. and mean rank |
|---|---|---|---|---|---|---|---|---|
| Company supports emissions trading | | | | | | | | 0.000 |
| U.K. | | 6.1 | 10.4 | 31.7 | **45.0** | 6.8 | 0.36 | 465.65 |
| Germany | | 11.9 | 28.8 | **35.6** | 20.9 | 2.9 | −0.26 | 321.19 |
| Emissions trading will lower cost of emissions reduction | | | | | | | | 0.025 |
| U.K. | | 8.0 | 22.2 | 33.3 | **33.5** | 2.9 | 0.01 | 425.05 |
| Germany | | 7.6 | 21.1 | **48.7** | 21.8 | 0.7 | −0.13 | 387.45 |
| Emissions trading will increase chances of target achievement | | | | | | | | 0.006 |
| U.K. | | 9.8 | 24.4 | 30.7 | **31.5** | 3.6 | −0.05 | 428.06 |
| Germany | | 8.8 | 32.5 | **35.0** | 22.3 | 1.5 | −0.25 | 381.26 |

*Note:* Highest responses are shown in bold.

Source: Bailey (2007, p.543)

Bailey's analysis shows that German businesses overall supported negotiated agreements and most businesses questioned the use and abilities of the EU ETS. Meanwhile, the views were more diverse in the UK, where most companies supported the scheme as such and preferred it to other NEPs. Even though many businesses in the UK were not sure whether the EU ETS can achieve its goals, there was a significantly higher acceptance of the scheme and therefore willingness to work with the system.

Another indicator for the acceptance of the ETS is the number and nature of the litigation cases against the scheme. As already explored above, from the 10 litigations which were heard before the ECJ, four came from Germany, one from the state itself and three from German businesses, while not a single one was coming from the UK or UK-based businesses. This shows the difficulty German firms had with this new scheme as well as the effort some firms put into resisting the scheme (see also section 4.1).

Finally, German businesses also stood out with their unwillingness to cooperate in the necessary data-collection for the NAP. By delaying this process, the industry shortened the already small timeframe for the development of the German NAP, a fact that especially Trittin criticised (Fickinger 25.11.03; Körner & von Schweinitz 10.12.03; Schmidt 18.09.04). The German industry therefore from the beginning on opposed the introduction of the ETS in many ways. This opposition remained very strong throughout the debate as illustrated above. However, it is hard to measure how intense the resistance in the two countries was, even more so as the industry acted much more discreet in the British debate setting.

#### 4.2.5. Conclusion

The hypothesis was that the ETS would have been accepted faster in the British system, would have provoked less debate and would have seen less participation of unions in the debate due to its LME nature than Germany. Generally speaking, this hypothesis can be deemed correct and affirmed in the limits of this analysis.

First of all, the political debate and the debate in the media in Germany was clearly more intense and, especially regarding media coverage, more extensive than in the UK. Although both countries had a vivid discussion surrounding the NAP, the ETS itself was not discussed in the UK and the discussions surrounding the NAP were less explosive as well. The German political debate is often seen as the most intense debate about the EU ETS in all of Europe and had the potential to tear the ruling coalition apart. Therefore, this part of the hypothesis can be clearly affirmed.

Following this, the acceptance of the ETS by German firms can be deemed significantly lower than in the UK. As Bailey has shown in his paper, the ETS had been widely accepted in the UK already in 2005, while German firms disputed the scheme massively.

The part of the hypothesis which is hardest to fully confirm concerns the question of who participated in the debate. NGOs were active in both countries and there was no sign of difference in influence to be found between the two countries. Regarding unions, the German unions expressed their opinion more loudly than the TUC in the UK. However, the unions remained a minor participant in the debate in both countries, perhaps due to the

other reforms in Germany at the time. Therefore this part of the hypothesis can be affirmed, however not as clearly as the other parts.

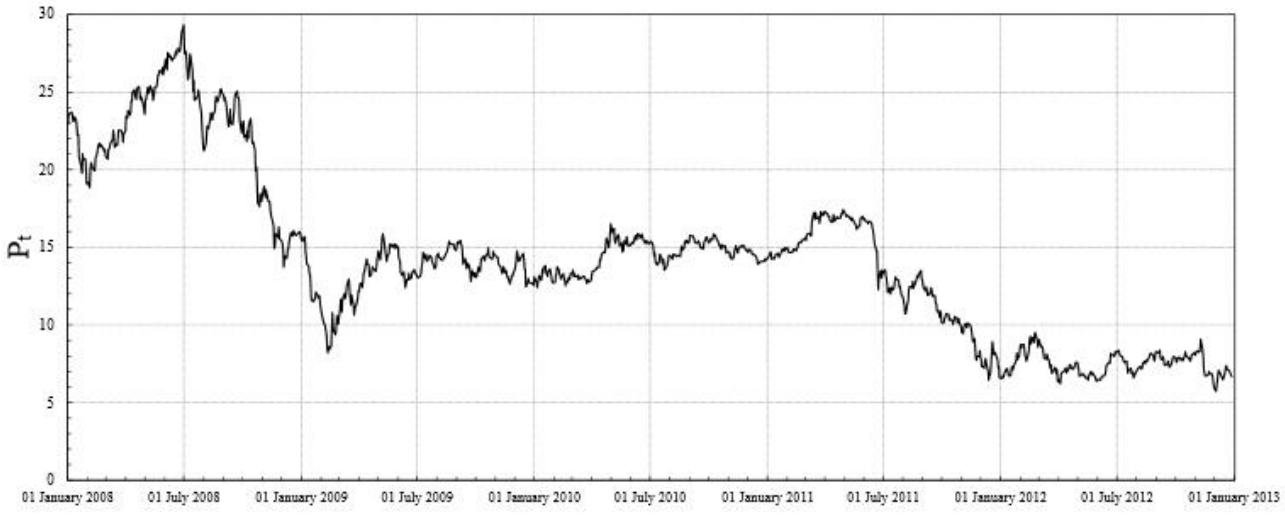
Evaluating the result of this analysis, one has to keep in mind, that this hypothesis, more than the following ones, has to be seen in the context of the early introduction of the UK Greenhouse Gas Trading Scheme. To get a clear answer to the question asked at the beginning of this chapter, one would need perfect conditions that rarely exist in the real world. However, even though it is hard to judge with certainty the British reaction to the EU ETS introduction, the German case corresponds strongly with the predictions inferred from the theory of Hall and Soskice. Furthermore, the German debate surrounding the EU ETS introduction reached an intensity that was never matched in the British debate even before the EU ETS. Therefore, this chapter is able to confirm the hypothesis derived from Hall and Soskice's theory insofar as the introduction of the EU ETS into the CME country Germany did provoke more debate than in the UK. Furthermore, NGOs and unions were generally more involved in the process.

# 5. Analysis II: The EU ETS in practice

## 5.1. Cost Pass-Through Rates

In this section, the third hypothesis is tested. It states that additional prices through the ETS are more likely to be passed on to the customers in an LME and more likely to be internalised in a CME. This means that one would expect the additional costs created through the ETS to have a high pass-through rate in British firms, while having a low pass-through rate in their German counterparts.

Due to the over-allocation of carbon-certificates (EUAs) in the first two phases and a lack of data about the third phase of the EU ETS, the analysis in this chapter remains somewhat limited. During phase I, certificates were allocated so liberally that very few firms had to actually buy additional EUAs at all. Furthermore, the prices for certificates quickly dropped to only a few cent after a short high note in 2005 (Sijm, Bakker, Harmsen, Lise, & Chen 2005). At the end of the first phase, one EUA had the price of merely 32 cents (Rotfuß 2009).




**Graph 4: EUA prices during phase II of the EU ETS**

Source: Lutz, Pigorsch, and Rotfuß (2013)

The second phase started off on a stronger note, with an EUA at the price of about 30€ in the summer of 2008. However, the price again quickly dropped as firms and brokers realised the scope of the remaining over-allocation. At the end of phase II, the price for one EUA was between 6 and 7€. This price-crash carried on into the third phase of the scheme and meant that the costs for carbon emissions were so low, that they in many cases remained

insignificant for a firm to consider (Alexeeva-Talebi 2011; Lutz et al. 2013; see also graph 4 and section 3.1.).

Significant costs due to carbon trading can only be visible in the most carbon-intensive sectors. As a result, the cost pass-through rates derived from the EU ETS has so far only been calculated in the power-sector and for petrol refineries. In the following, the results of these studies regarding first the power sector (5.1.1.) and then the petrol refineries (5.1.2.) will be summarised. Following this a short conclusion of the limited amount of data will be given (5.1.3.).

### 5.1.1 The Power Sector

Electricity production is very carbon-intensive both in Germany and in the UK. During phase II of the EU ETS, Germany used 46% coal and lignite and about 14% natural gas to produce its electricity. In the UK, about 40% natural gas and 30% coal was used (Castagneto-Gissey 2014). The share of fossil fuels being over 50% in both countries makes the power sector crucial in the effort to save carbon emissions. The market for energy providers in Germany and the UK is dominated by a few big companies. In Germany, about 80% of market share belongs to the 'Big Four': E.ON, RWE, EnBW and Vattenfall (Rubner 2009). In the UK, over 90% of the supply market is owned by the 'Big Six': British Gas (owned by Centrica), EDF (part of the French EDF), E.ON UK, npower (owned by the RWE group), Scottish Power and SSE (Pauli 2010).

Castagneto-Gissey (2014) shows that the average carbon cost pass-through rate in German electricity production between January 2008 and December 2012 was a staggering 135%. The average carbon cost-pass through rate in the UK during the same time period was 109%. On first sight, the electricity firms in both countries therefore passed on more costs than actually existed. These findings are put in perspective again by mentioning possible higher costs for trading partners with higher emissions. However, the findings could also suggest anti-competitive behaviour by the power companies themselves (Castagneto-Gissey 2014).

Anti-competitive behaviour by firms in the power sector is not unheard of. As Mokinski and Wölfing (2014) show, German electricity producers exhibited a high rate of asymmetric cost pass-through before. They show, that the Big Four electricity producers in Germany had

their prices react much more strongly to increases in carbon prices than to decreases. This asymmetry seemed to end in 2006, when the German Cartel Authority (Bundeskartellamt) began to investigate the matter. However, as the results of Castagneto-Gissey suggest, this habit of asymmetric pass-through rates may have resumed from 2008 onwards (Castagneto-Gissey 2014; Mokinski & Wölfing 2014; Zachmann & Von Hirschhausen 2008).

Before this investigation began, some power companies passed on over 130% of the added costs through the EU ETS. They tried to legitimise with added expenses in research and development. In fact, there were few additional expenses compared to the years directly before the price increase. Furthermore, as the first phase of the ETS suffered under severe over-allocation (as mentioned above), the 'Big Four' German power companies actually did not have to buy a significant amount of certificates. RWE even had more EUAs than they needed. The other three of these firms only bought small amounts, with a maximum of 350 EUAs in a given year. At a price of only a few cents, these costs were often not even listed separately. The actual costs of the EU ETS however were higher for the firms due to the additional administration costs and the reporting requirements (Traber & Kemfert 2011; Weigt & Hirschhausen 2008).[25] This continued somewhat weaker into the second phase of the EU ETS. Here no exact numbers of EUAs are available, but at the price of about 7€ at the end of 2012, the firms again did not experience any significant costs due to the acquisition of EUAs (Traber & Kemfert 2011; Zachmann & Von Hirschhausen 2008). Comparable studies concerning the cost pass-through for British power companies have so far not been conducted.

### 5.1.2. The Petroleum Markets and Sectoral Evidencce

Regarding the petrol markets, Alexeeva-Talebi has analysed the carbon cost pass-through rate in many EU MS. She came to the conclusion that rises in crude oil prices and carbon costs were generally passed on in German firms at a rate of a little less than 100% in most cases, while British firms passed on only around 30% of the additional costs (UK Diesel: 30-60%; OPAL UK: 10-30%). There was no indication of a general pattern of how carbon costs were passed on in European petroleum markets, but German pass-through rates among the highest in the European context while British ones remained in the lower third. Therefore it seems highly unlikely that these firms reacted in the way, the hypothesis predicted it

(Alexeeva-Talebi 2011; Oberndorfer, Alexeeva-Talebi, & Löschel 2010). If they had, pass-through rates would have developed exactly the other way round. According to theory, German firms in a CME should refrain from passing on additional costs, while British, LME firms would do just that.

It has to be noted at this point that the petroleum refineries in Germany and the UK too, have been accused of forming syndicates and investigations have been conducted in both countries concerning this matter. Although price arrangements seem very likely from an economic perspective, proof of this matter has not been found concerning the time period in question here (Mohammadi 2011).

Alexeeva-Talebi also conducted a similar study regarding different sectors in the German economy. She concluded, that nearly all firms in her study passed at least parts of the costs on. The exact amount of costs that were passed on to the consumer is sector specific, but generally firms with higher additional costs through the EU ETS also passed on a higher proportion to the consumers. In Alexeeva-Talebis study, she did not encounter a single firm that both had significant costs through the EU ETS and internalised all costs. This contradicts the expectation from Hall and Soskice's theory (Alexeeva-Talebi 2010; Oberndorfer et al. 2010).

### 5.1.3. Conclusion

Since the prices for carbon allowances remained too low to be counted as significant additional costs for most firms, this analysis cannot provide conclusive outcomes. The sectors for which there is some data on how additional costs were passed on are overshadowed by accusations of cartel-building and general anti-competitive behaviour which in turn negates the desired effect of the EU ETS. The theory itself is based on a free market situation. Therefore it is hardly surprising that it can neither be confirmed nor falsified by the results of the studies conducted under imperfect conditions so far. Generally speaking, more research and studies are necessary but hard to come by under these real-world conditions.

From the looks of it one could assume that German firms actually pass on more costs than British firms do. In the two cases presented above this certainly seems to be the case.

Unfortunately, the presented data remains far from proving statistical significance and has to be treated with care. Therefore such a conclusion cannot be drawn yet. However, it will be interesting to compare these results again, possibly with more data, in a few years. A more comprehensive analysis would have to be based on a significant initial carbon cost for the firms and an environment of completely free market forces. In the wake of the difficult monopolist structures of the German power and petroleum markets, it will be interesting to see how firms in other sectors react once they have significant costs to pass on or internalise. Until a wider, comprehensive study can be carried out, one can only conclude that the hypothesis, that German firms internalise the additional costs in a greater scale than British firms, cannot be confirmed. From the initial looks of it, it might actually be the other way round. This would strongly contradict Hall and Soskice's theory. However, this statement has to be tested again under different circumstances and for different sectors to be of satisfying scientific value.

### 5.2. Innovating for the ETS

This chapter deals with the fourth hypothesis, which states that innovation towards fewer emissions is more likely to be radical in nature in LMEs and incremental in CMEs. This entails the prediction that German firms followed incremental innovation plans, while British ones preferred more radical solutions.

Hall and Soskice (2001) tested this innovation factor of firms through an analysis of patent databases. By classifying some technological sectors as more prone to be incremental and others as more likely to be of radical nature, the authors came up with a system to assign patents to one of the two categories. This kind of patent-based analysis though, has clear limits. First of all, the classification into technological sectors which are by their nature more incremental or radical creates some difficulties. First of all, this analysis concentrates on innovations to lower carbon emission, which entails modern and new technologies which are not yet classified by Hall and Soskice. Furthermore, as Akkermans et al. (2009) point out, the nature of a technology being more radical or incremental can also be part of the lifecycle of a new technology, which by definition has to be radical in its very beginning and can become more incremental later on, the more it is being implemented.

Additionally, not all types of innovation are patented. Patents are a good indicator for inventive activity. Even though not all inventions are patented due to industrial secrecy or costs of the procedure[26], patent databases still act as an important source to analyse inventive trends. Innovation, however, entails more than only inventive activity. Research and development (R&D) and the innovation output are equally important, meaning that innovations were not only developed, but have actually been implemented. Furthermore, adoption of existing innovations can also count as innovative activity as such (Akkermans et al. 2009; Fankhauser et al. 2013; Kemp & Pontoglio 2011; Rogge et al. 2011). Many authors therefore propose a broader way of testing innovation, which includes company case studies and surveys as well as patent data (Kemp & Pontoglio 2011; Werle 2005).

When talking of innovation, one first has to define what can be considered an innovation at all. Armbruster, Bikfalvi, Kinkel, and Lay (2008) define five types of innovations: new products, new production methods, new markets, new sources of supply and new forms of organisation. These can be again divided into technical- and non-technical innovations as well as product and process innovations. The innovative activity considered in this analysis will be limited according to the OECD definition to innovative activity or restructuring to lower GHG-emissions from the introduction of the EU ETS in 2005 onwards. The exact list of these "eco-innovations" includes innovations concerning increases in energy efficiency, reductions in waste generation, low-carbon technologies, optimising logistics, reductions of output emissions, renewable energies, less carbon intensive inputs and carbon offsets (Azevedo, Brandenburg, Carvalho, & Cruz-Machado 2014; Bartlett 2013; Kauffmann & Less 2010; von Hauff & Jörg 2009).

To divide between radical and incremental innovations, this thesis will use the innovation matrix as summarised by Rashid et al. (2014). It presents the dominant perception of incremental innovations being innovative action aiming at modification or re-design of a process or product. Radical innovations on the other hand are said to aim for alternative or completely new processes or products. Regarding eco-innovation, innovative activity for eco-efficiency can fall into both categories depending on how it is achieved (Rashid et al. 2014). In other words, radical innovations are therefore advances in green technology that "depart from current […] knowledge" while incremental innovations "reinforce, modify or extend current […] knowledge" (Chen, Chang, & Lin 2014, p.7789).

In the following, the innovation-incentive policies in Germany and the UK will be analysed to test for outside variables, especially with regard to the subsidies put in place by the respective governments in both countries (5.2.1.). Afterwards, the innovation concerning new facilities of renewable energy by power producers will be used as an example for innovative activities (5.2.2.). Finally a conclusion will be drawn (5.2.3.).

### 5.2.1. Innovation-incentive Policies in Germany and the UK

As already mentioned numerous times, British firms had a head start in the preparation for the EU ETS which might be one reason why they started to prepare and innovate for operation with fewer emissions earlier. The involvement of BP and other firms in the policy-design (see section 4.1.) serves as a good example for this early consideration of emissions in the business plans. In Germany, however, even after the introduction of the EU ETS was decided in Brussels, firms continued to futilely resist the scheme. As a consequence, German businesses remained in the hypothetical phase up to the point that they had to comply with the new law (Hielle 15.12.03). The plans of reduction, which the German firms had to present in the second half of 2004 to show their commitment to the NAP, reflected this unpreparedness. Many plans were rejected by the government because they simply were not compatible or demanded even more emission rights than the business produced at the time and thus also exceeded the amount of emissions granted through the NAP (Schmidt 18.09.04; Söderholm 2010).

This slow reaction pushed the German firms into a very disadvantageous situation, especially in comparison with their British counterparts. One could expect from this initial situation that the German firms have a higher rate and speed of innovation, which entails a higher percentage of investment into innovation, to catch up with their competitors. However, since the EUA prices were so low and the biggest emitters in Germany, the power producers, were not subject to tough competition (Söderholm 2010 see also section 5.1.1.), the need to quickly catch-up with the firms in other European countries somewhat diminished at the same time.

There are several studies which discuss whether the introduction of the EU ETS accelerated eco-innovation or not. A number of authors insist that the EU ETS did not have a significant

effect on the speed of innovation and R&D due to its structural flaws such as heavy subsidies for affected firms as well as over-allocation of EUAs (Gagelmann & Frondel 2005; Greenacre, Gross, & Speirs 2012; Schleich & Betz 2005; Söderholm 2010). Despite some contrary evidence, the majority of scholars believe in the accelerating effect on eco-innovation of the EU ETS. Although the first two phases had severe limits in its effectiveness, the pure expectation of stronger measures against emissions seemed to motivate many firms to invest more in innovation and R&D (Cames 2010; Dechezleprêtre & Martin 2010; Fischer 2008; Kemp & Pontoglio 2011; Lanoie et al. 2011; Rogge & Hoffmann 2010; Ziegler 2008).

Generally, innovations to reduce GHGs have gained importance worldwide. Eco-innovations can help to increase competitiveness, lower costs and acquire new markets through new technologies (Kauffmann & Less 2010; Lanoie et al. 2011; Ziegler 2008). As such, governments are increasingly interested to support innovation activity through according policies. Germany supports a range of individual projects and joint cooperations with other countries or with industrial partners through special funds. These funds are supervised and organised through special initiatives such as the Energy Research Programme of the Federal Government which, periodically renewed, subsidises projects for alternative energy sources and cleaner technologies in energy production (BMWI 2011). Several other funds also provide subsidies for research concerning energy efficiency and energy storage. The “high-tech-strategy” initiative also supervises a special fund to subsidise new technologies and high-tech innovations with a special focus on sustainability (Bundesregierung n.d.). The final and biggest initiative to subsidise innovative activity in Germany is the “Deutschland – Land der Ideen”-initiative. This very broad programme derives from a cooperation with German industrial bodies and subsidises a range of research and innovative activities including eco-innovations (Deutschland – Land der Ideen n.d.; Laes et al. 2014; Schiellerup & Atanasiu 2011).

Additionally, there are several programmes aimed at smaller and medium-sized businesses concentrated under the Zentrales Innovationsprogramm Mittelstand (ZIM) which are open to all kinds of innovative projects. The focus here also lies on networks and alliances between firms and businesses to research for a common cause (BMWI n.d.). The Kreditanstalt für Wiederaufbau (KfW) as the biggest business development bank in Germany also provides assistance in form of cheap loans for businesses or individuals (KfW n.d.).

Finally, Germany also supports renewable energy development in a number of additional ways due to its commitment to the “Energiewende”, most importantly, the feed-in tariffs for energy from renewable sources reward investments into this sector. In a European comparison, the German government remains in the top-five regarding the proportion of GDP it spends on innovation-incentive programmes and policies. It also supports the biggest variety of subsidy and support schemes (Jänicke 2012; Schiellerup & Atanasiu 2011).

The UK introduced its first initiative which was solely focused on eco-innovation in 2007 in form of the Low Carbon Transport Innovation Strategy (Dft 2007). This innovation support fund later became the Low Carbon Vehicles Innovation Platform (LCVIP 2012) and concentrates on innovations in the transport sector. Another major fund is supervised by the Energy Technologies Institute; here the focus lies on energy efficiency, clean technologies and renewables. All these funds rely on cooperation with the industry. To that end, the Technology Strategy Board helps to connect single projects with industrial partners and additional government subsidies (Demirel & Kesidou 2011; ETI n.d.; Laes et al. 2014; Schiellerup & Atanasiu 2011).

Concentrating on the support for small and medium sized businesses, many small regional funds are available. Across the nation two main funds, the UK Innovation Investment Fund (BBB n.d.) and the ‘Innovation Nation’ initiative since 2008 (Innovation Nation n.d.) have to be mentioned. Both initiatives fund single projects and work as a connector between small and medium sized firms for joint research. The Innovation Nation initiative also prides itself for connecting international investors and researchers as well as firms from all over the world to combine their knowledge on carbon mitigation and clean production technologies (Catney & Doyle 2011; Demirel & Kesidou 2011; Schiellerup & Atanasiu 2011).

Just as Germany, the UK introduced a number of smaller schemes for the development of energy efficiency and renewable energies as well as feed-in tariffs. Many schemes are based on a regional level and therefore act on smaller scales to support individual projects and communities. In connection with its energy-poverty-strategy, the central government also offers cheap loans for landlords and house-owners to improve housing insulation and encourages innovation in that sector (Catney & Doyle 2011; Fitzpatrick 2011; Gough 2013; Gough & Meadowcroft 2011; Schiellerup & Atanasiu 2011).

To sum up, both countries invest heavily into innovation towards carbon saving. Firms in Germany as well as in the UK are being supported in various ways to adjust their business for a low-carbon economy. Especially fossil fuels are tackled in various ways and equally in the two countries. Although there are small differences in the source and way of funding, for the following analysis one can assume that power companies in both countries receive roughly the same amount of incentives and subsidies to innovate. Energy firms in Germany as well as in the UK are provided with incentives, needs and additional funding to change their energy portfolio towards a more sustainable mix of energy (Pauli 2010; Praetorius et al. 2008).

### 5.2.2. Innovations in the Power-Sector

As already explained in section 5.1., the low EUA prices reduced the number of firms who were de facto affected by the EU ETS. Therefore, the first look in this section will also lead to the electricity sector. As Cames (2010) shows by comparing innovation data from patents and surveys, the vast majority of innovative activities in German power plants since at least 2004 can be classified as eco-innovation. Although this shift towards eco-innovations started in the 1980s and consistently increased in importance during the 1990s, it was the prospect of the EU ETS and the EEG in combination with the high reliance on coal as a power source in Germany that led German electricity firms to focus their R&D mainly on possibilities to reduce their GHG output. Cames (2010) suggests that 85-95% of current R&D in electricity firms in Germany tackle eco-innovation.

In the UK, the development towards eco-innovation also started in the 1980s and accelerated through the 1990s. Just as in Germany, the main focus of innovative activity since the early 2000s and especially since 2004 lies on reducing the carbon footprint (Bolton & Foxon 2011). Resulting from this and in combination with the assumptions from Hall and Soskice, one would expect power companies in both countries to have implemented a range of innovations to reduce their emission output. In Germany one would expect incremental changes such as an improvement of energy efficiency, modifications in the electricity generation process to reduce emission output or further development of existing facilities for renewable energy generation. In the UK, a more radical solution would be expected such as discontinuation of strongly polluting generation methods and large-scale investments in new technologies and power generation through renewable sources. Due to the

overwhelming market power of the German 'Big Four' and the British 'Big Six' (see section 5.1.2), these firms will be the focus of the following analysis which will concentrate on the innovative activities of these firms from 2007 to 2013 (Pauli 2010).

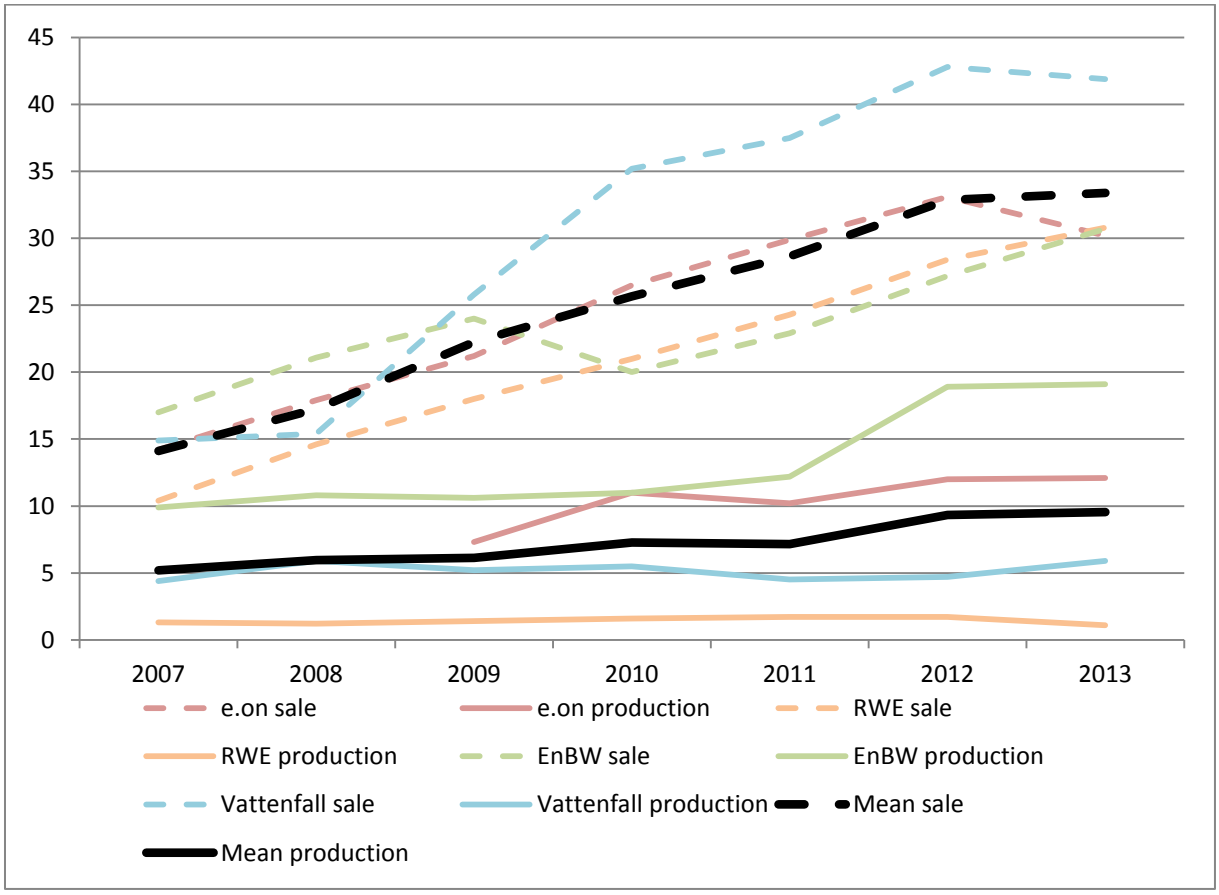
Offering a certain percentage of electricity from renewable sources, or even completely renewable energy plans for domestic and industrial clients is profitable for power companies in two ways. Next to government subsidies or tax reductions in order to achieve the EU-set goal of 20% renewables in the respective national mix until 2020, electricity from renewable sources also acts as a marketing tool and reacts to a growing demand by the customers (Rubner 2009). However, most subsidies, regulations and marketing-strategies aim at the energy mix which is sold by the company and not directly at the amount of renewable energy in the power generation sector of the company. As a result, many firms opt to buy a large proportion of the renewable energy they sell from subcontractors or import it from other countries. In doing so, the companies reduce the financial risk for themselves by avoiding expensive investments in cases of regulatory or market uncertainty. This also has been the case in the first phase of the EU ETS as well as during the second phase due to the already mentioned EUA price crash.

Graph 5 shows the differing percentages of electricity from renewable sources, the 'Big Four' German firms sold to what they actually generated themselves. In comparison with the same information for the British 'Big Six' (Graph 6), the German firms clearly sold a higher percentage of renewable energies over the whole time period (see Appendix 8 and 9 for the exact percentages). However, the mean difference between the produced and sold amount ranges between about 9% in 2007 to a staggering 24% in 2013. The main reason for this incredible difference in the mean percentages stems from Vattenfall. The firm produces electricity mainly through coal and nuclear energy in Germany. Through a clever cooperation with Scandinavian hydroelectric power producers, the company was able to cheaply increase its percentage of renewable energy sales by about 33% in these seven years (Vattenfall 2008, 2009, 2010, 2011, 2012).

The second biggest producer, EnBW, increased its production with a range of smaller wind-energy projects. The largest step though was again achieved through the further development of hydroelectric power plants in combination with the discontinuation of the two nuclear power stations Neckarwestheim and Philippsburg in 2011 due to the German

decision to phase out the use of nuclear power. By abstaining from substituting the loss of generation power through coal and gas plants as the other three firms opted to do, the percentage of renewable energy in the EnBW mix naturally increased while the overall generation power slightly decreased (EnBW 2009, 2010, 2011, 2012; RWE 2011, 2012; EON 2011, 2012, Vattenfall 2011).

**Graph 5: % of renewable energies in sale and production of the 'Big Four' German energy suppliers**




For exact percentages and sources see Appendix 7

Except for RWE, the 'Big Four' German firms all increased their production of renewable energies. It is worth noting that this was a slow, steady process. The overall strategy for these German firms was to buy the majority of the renewable energy they sell. Large-scale investments in new facilities have been avoided by the 'Big Four'. Meanwhile there are several studies that show investments in renewable energy generation thrive in small German public utility companies. Such projects usually include a small investment from bigger firms. Cooperation between big firms is also a common phenomenon, but these investments all remain relatively modest in generational capacity (Knoll & Engels 2012).

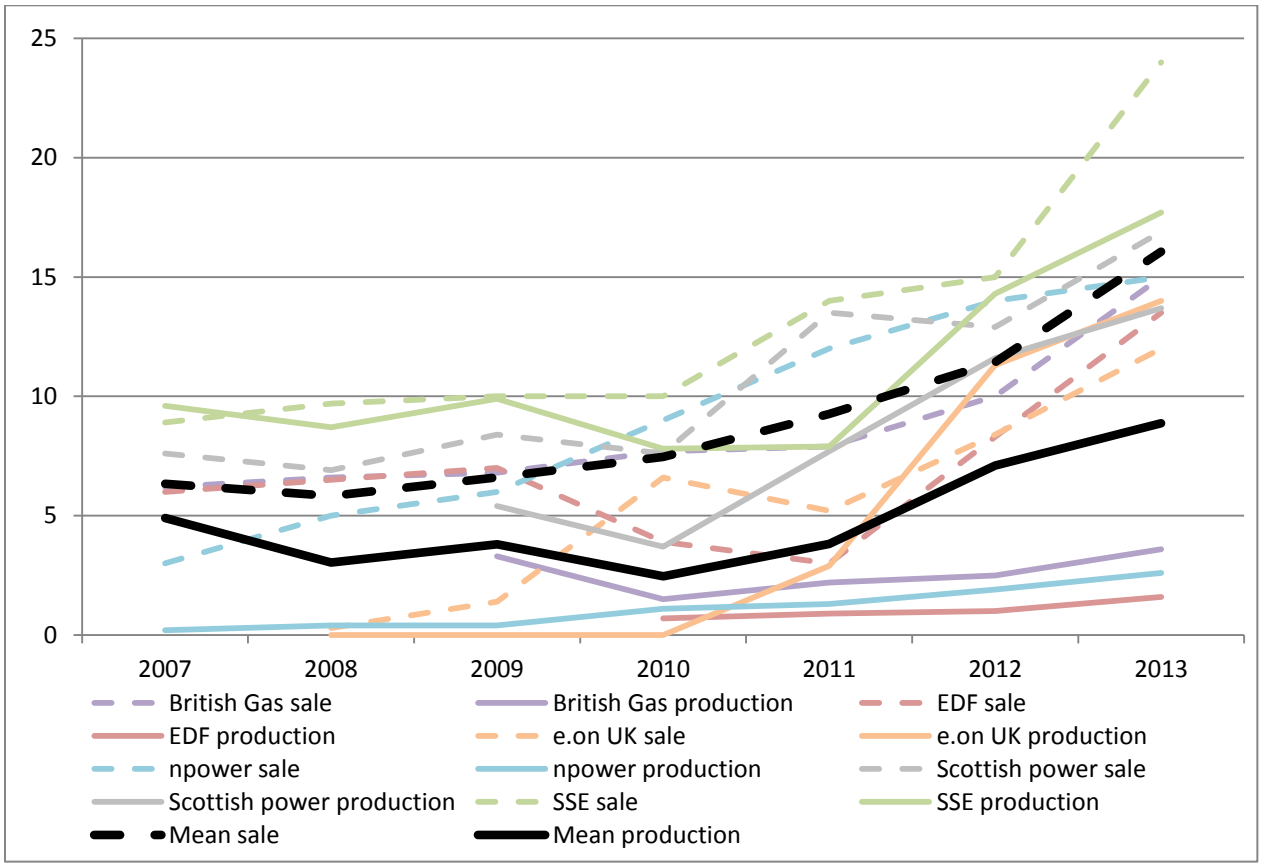
This being said, the big German firms do invest heavily in measures to decrease their overall carbon footprint. Innovations in Clean Coal Technologies and research and development towards Carbon Capture and Storage (CCS) and Pressurised, Pulverised Coal Combustion (PPCC) are being done. Especially RWE invests strongly in the low-carbon use of coal (RWE 2007, 2008, 2009, 2010, 2011, 2012, 2013). However, as Rennings, Markewitz and Vögele (2013a) show, those innovations which could be classified as radical, such as CCS and PPCC remain stuck in the development phase. Despite some small experimental projects, German board members as well as outside investors still seem to shy away from big steps towards a more radical type of innovation. This translates into the sector of non-technical innovations as well. Big changes in firm structures such as the discontinuation of coal or lignite power plants could also be seen as radical innovations. Again, this is very rarely done in Germany. Generally speaking, it seems that Hall and Soskice's theory does apply to the German power sector, as innovation among the German 'Big Four' is dominated by incremental changes (Rennings et al. 2012; Rennings, Markewitz, & Vögele 2013; Rogge et al. 2011; Winterhagen 2012).[27]

The preservation of coal and lignite as a main energy provider is also fostered by policies such as the discontinuation of nuclear energy in Germany as well as the still on-going support of the German lignite mining industry (Rubner 2009; T. S. Schmidt, Schneider, Rogge, Schuetz, & Hoffmann 2012). The prospect of reduced profits from technological innovations through a subsidised coal industry does influence board members of some power suppliers deeply. This was shown by Knoll and Engels (2012) as well as Martin, Muûls, and Wagner (2011) through small surveys and extended interviews with managers of the sector. RWE seems most affected by these preservation efforts as it owns the most coal lignite plants of all German energy providers. The company even reopened a lignite plant in 2012 and built a new coal plant in 2014. Vattenfall seems to be the least innovative firm in the German comparison for only building one new facility for renewable energy (see Appendix 9). However, it has to be mentioned, that all German firms, including Vattenfall, currently have a portfolio of planned facilities, especially in the more profitable offshore-sector (4C offshore 2014; EnBW 2013; RWE 2013; Vattenfall 2013).

Turning to the British market, graph 6 shows the differences in sale and production of energy from renewable sources by the 'Big Six' British energy suppliers (see Appendix 8 for the exact

percentages). The first apparent difference to their German counterparts is the overall lower percentage of renewable energy which is being sold. The difference between the amount of renewable energy sold and produced is also considerably smaller. In 2007, the difference was only 1,44%, during the seven years it developed into a solid 7,5% difference. Since 2010, there is a clear division right through the middle of the six big UK suppliers. Overall, the transition to renewable energies seems more dynamic and erratic than in Germany. A clear pattern between the firms strategies cannot be identified. It is clear to see that E.ON, Scottish Power and especially SSE significantly increased their share of renewables. E.ON UK even managed to generate more electricity from renewable sources as it sold to actual customers and made additional profit by selling some of its eco-electricity to other vendors (EON 2011, 2012, 2013).

**Graph 6: % of renewable energies in sale and production of the 'Big Six' UK energy suppliers**




For exact percentages and sources see Appendix 8

The three firms at the top of the spectrum all invested heavily in hydro- and wind energy. SSE and Scottish power had a very good base-position, since they already owned an array of hydroelectric power plants in Scotland. Scotland is also a very big supporter of hydro- and

wind-energy because it aims to surpass the 2020 goal by 11%, aiming at 31% renewable energies instead of 20%, which is the UK goal. Because of this, Scotland largely supports new wind- and hydroelectric power plants through tax abatements and fast approvals of planned facilities. This supportive atmosphere attracts all power companies. However, since SSE and Scottish Power are very well situated in the area they have a natural advantage in that region. This can be seen by having a closer look at the numerous new facilities for wind- and hydro-energy that were built in the last years (see Appendix 9). The vast majority of all wind- and hydroelectric investments are in Scotland and SSE and Scottish Power were either able to use land already in their possession or extend their grids for many projects at a lower cost than competitors. A prime example for this is the Spurness wind farm, built by SSE in 2012 on Sanday, the most northern island of the Orkneys. SSE is the main energy provider for all the Orkney Islands, using small Diesel plants at the most important positions. By promising to connect some more islands to the already existing grid, SSE was able to acquire the necessary land for Spurness cheaper and faster (SSE 2009, 2011, 2012).

In addition to the increase of renewable energy capacity, E.ON UK, SSE and Scottish Power all discontinued some coal or oil plants in the last few years. E.ON UK closed two coal plants in 2011 and 2012 (EON 2011, 2012). SSE is currently in the process of building a combined gas and biomass plant as a substitute for its last oil plant in South England (SSE 2013). Scottish Power closed its last oil plant in 2013 and is currently planning the details and exact date of the discontinuation of the Longannet coal plant, the most polluting plant of the UK according to the World Wide Fund for Nature (WWF) (Scottish Power 2012, 2013; WWF 2007). Furthermore, all three are active in research and development for new technologies such as tidal wave power, which is in the test stage of Scottish power right now (Scottish Power 2012).

British Gas and EDF are the least innovative firms in this comparison. British Gas still relies, as the name indicates, mainly on gas and has only recently invested in three windfarms. British Gas does however invest heavily in clean coal technologies and closed down most of its coal and lignite plants (Centrica 2009, 2013). EDF as an offshoot from the French energy giant of the same name relies mainly on nuclear power. Next to its eight nuclear plants (with two new ones in planning) the firm also operates coal, gas and oil plants. Although EDF did invest in windfarms, all except for Fallago remain comparably small in size and capacity. At

the same time, EDF, as well as British Gas, actually build and plan additional gas power plants (Centrica 2013; EDF 2010, 2012, 2013). This also applies to npower. The firm relies on gas and oil and has built six new hydroelectric plants and 15 new windfarms in the last few years (see Appendix 9). However, due to the small capacity of these new facilities, the output remains barely significant to the overall energy output of npower. A new gas plant in 2012 also increased the overall capacity by 2180 MW, which is more than 4 ½ times the overall output of npowers renewable sources of 466MW (RWE 2012; see also appendix 9). For these reasons, the modest increase in renewable electricity generation also does not translate into an increase of percentage.

Overall, the British firms in this comparison do seem to be more willing to invest in new facilities and technologies. Between 2007 and 2014, the German 'Big Four' invested in 24 new facilities for renewable energies, which is an average six facilities per firm. If Vattenfall is calculated out due to its nearly complete inactivity in that matter, the remaining three German firms invested in 7.6 facilities per firm. In the UK in the same time, 79 new facilities were opened by the 'Big Six' which equals 13.2 facilities per firm or even 15.4 facilities per firm when the most inactive member here, British Gas, is excluded from the analysis (see Appendix 9). Generally speaking, one can say that the British firms are more willing to include renewable energy generation in their business model, while the German firms rely on contracts and cooperation with other, smaller energy producers.

### 5.2.3. Conclusion

This chapter aimed to test the hypothesis that innovation towards fewer emissions would be more likely to be radical in nature in LMEs, here the UK, and incremental in CMEs such as Germany. Some studies show that overall eco-innovation based on patents is higher in Germany than in the UK. However, these studies rarely expound whether these patents are radical new ideas or modifications on existing structures. Furthermore, such a quantitative superiority in patent data does not always translate into the actual implementation of innovations (Cecere et al. 2012; Fankhauser et al. 2013; T. S. Schmidt et al. 2012). In the case of the electricity sector, there certainly seems to be a difference between the willingness of German and British firms to invest into new technologies. The dynamic approach to renewable energies in the three highly innovative firms E.ON UK, SSE and Scottish Power

seems to confirm the hypothesis that British firms do innovate more radically rather than incrementally.

The overall picture, however, does not seem as clear. British Gas, npower and EDF are very comparable to their German counterparts in their unwillingness for radical changes as they also avoid high-risk investments in new technologies. At this point, it is also important to keep in mind the origin of npower, a part of the German RWE group, EON UK as the name suggests belonging to the German EON group and EDF, with its headquarter in France. According to Hall and Soskice, this 'cultural aspect' of a company should not influence its behaviour significantly. Regarding the theory, every firm should react to its specific market economy. In this case that would be the LME of the UK. This clear cut assumption seems increasingly precarious when from the three firms with the least radical innovations, two, npower and EDF, could be said to have a 'CME heritage'. Meanwhile EON UK, sharing a similar heritage, performs very well concerning radical innovations. This finding, although contradictory as it is, suggests that other aspects such as ownership structures and cultural implications in Hall and Soskice's theory might indeed be too underrated and strengthens the criticism by Callaghan (2012).

In both countries, incremental innovation such as the further development of existing hydroelectric plants is the most common one (Fankhauser et al. 2013). Generally there seems to be a high degree of market uncertainty in the energy sector which in turn discourages high-risk investments in new technologies. The reliance on contractors to raise their share of renewables in the energy mix in the case of the German power suppliers could also be interpreted as a proof for the higher willingness of firms in CMEs to cooperate with each other rather than focus on competitiveness. Additionally, as already mentioned in part 5.1., the similar strategies of the German firms could be an expression of their syndicatesque ways to ensure their monopoly over the German market.

Regarding the most innovative firms in both groups, a difference certainly can be observed. While this case study can only cast a spotlight on the situation and cannot be an indicator for the whole economy or even the whole sector for that matter, the highly innovative British firms in this study do seem to innovate more radical and faster than the most innovative firms of the German 'Big Four'.

As shown above, differences in government support or supportive funds are not the cause of this difference as governmental support is roughly similar with a slight lean towards more support in Germany. To conclude, it can be stated, that there is no clear distinction in subsidies and incentives for radical or incremental innovations in either the UK or Germany. Still, the British firms do lean slightly more towards radical solutions than the German firms do in this comparison. This disparity can be explained through the different characteristics of the market economies. The hypothesis can therefore be seen as largely confirmed.

## 5.3. Trading of Certificates

The last analysis in this thesis will concentrate on the trading of EUAs. According to theory, trading of ETS allowances should be more volatile in LMEs such as the UK and more likely to be based on cooperation and direct trades between emitters in CMEs such as Germany.

To test this hypothesis, the work of Engels et al. (2008) will be evaluated along other, smaller studies on trading behaviour in Germany or the UK. The results of the surveys conducted will be reviewed for the characteristics of importance for this hypothesis. These are specifically the rate and type of trading as well as the trading channels. Finally, a conclusion will be drawn (5.3.2.).

### 5.3.1. The Annual Survey Results

Engels and her team of scholars from Hamburg University annually conduct a survey on company behaviour in the EU ETS. The survey was sent to all firms participating in the first stage of the EU ETS in Germany, the UK, the Netherlands and Denmark. From 2005 to 2007, the response rate lay between 26.1% and 11.6%. To eliminate size and industry effects, the different sectors were weighted and divided into two categories, depending on whether the firms deal with “heat and power generation” or “production of other goods” (Engels et al. 2008, p.279). Because of the difficulties to get the auctioning of EUAs going in the first ETS phase as well as the nature of this thesis, the following analysis will concentrate again on the former group of the two.

The survey consisted of a series of questions about the firms trading behaviour. Among other aspects, Engels et al. (2008) asked the firms "whether or not they had traded at all, and if so whether they acted as sellers and/ or buyers." Furthermore, "the channels used for trading, […] the frequency and timing of their trading decisions and […] the volumes that were typically traded" were inquired (Engels et al. 2008, p.278). Finally, the EUA cost awareness, the sources of possible advice on trading as well as the structure and strategy of the trading department of each firm was of interest (Engels et al. 2008).

The first aspect relevant to this analysis is the rate of trading. As graph 7 shows, the overall rate of trading began exceptionally low in Germany in 2005. This rate increased in the following years to 47 to 48.8% in 2006 and 2007 respectively. Initially, the overall trading rate of German firms remained far behind the firms from the UK, which in 2005 could already show a trading rate of 47.8%. In 2006, the British rate was slightly lower with 46.2% but the UK regained its leading role in 2007 through a 52.2% trading rate. This shows that British firms were faster in accepting the new scheme in 2005 (Engels 2009). Furthermore, one could argue that British firms have a higher trading rate on average, but the data available is not extensive enough to make such clear statements with ultimate certainty. This data also has to be seen in the context of over-allocation of EUAs which in the sample of this survey was significantly higher in Germany than in the UK. The German firms in this dataset therefore had a much lower market incentive to trade at all (Rotfuß 2009; see also Appendix 10).

**Graph 7: Rate of Trading in German, British, Danish and Dutch Firms 2005-2007**

Rate of trading

| | 2005 | 2006 | 2007 |
|---|---|---|---|
| Germany | 27.3 | 47.0 | 48.8 |
| UK | 47.8 | 46.2 | 52.2 |
| DK | 50.0 | 52.4 | 38.9 |
| NL | 37.9 | 76.9 | 77.8 |
| **EU4** | **34.1** | **49.6** | **49.8** |

% of companies with trading activities N: 2005 = 387, 2006 = 367, 2007 = 315.

Source: Engels (2009, p.491)

Just looking at firms in the heat and power generation segment, the results for the trading rate seem even more distinct. In 2005 and 2006, this sector lacked behind strongly in Germany, while the British firms excelled in use of the new scheme (see Graph 8). It is also noticeable that firms from the UK seem to use the trading possibilities in a more dynamic way than their German counterparts. The fact that 15% and 20.8% of firms engaged in sales and purchases of EUAs in the UK in 2005 and 2006 illustrates this. In Germany only 5.5% and 8.6% of firms engaged in both activities during the same period (Engels et al. 2008, see Graph 7). This difference shows that British firms in the heat and power generation sector did indeed trade more volatile than German ones of that sector.

**Graph 8: Rate and Type of Trading in German, British, Danish and Dutch Firms 2005-2006**

| Year | Country | Rate of trading | Type of trading activity | | | | | Total |
|---|---|---|---|---|---|---|---|---|
| | | | Only selling | Predominantly selling | Selling and buying | Predominantly buying | Only buying | |
| 2005 | Germany | 18.3 | 32.7 | 32.7 | 5.5 | 12.7 | 16.4 | 100.0 |
| | United Kingdom | 40.0 | 55.0 | 15.0 | 15.0 | 0.0 | 15.0 | 100.0 |
| | Denmark | 40.5 | 56.2 | 18.8 | 0.0 | 12.5 | 12.5 | 100.0 |
| | Netherlands* | | | | | | | |
| 2006 | Germany | 43.0 | 44.5 | 17.3 | 8.6 | 8.6 | 21.0 | 100.0 |
| | United Kingdom | 74.2 | 62.5 | 4.2 | 20.8 | 8.3 | 4.2 | 100.0 |
| | Denmark | 60.0 | 90.9 | 0.0 | 0.0 | 0.0 | 9.1 | 100.0 |
| | Netherlands | 71.4 | 27.3 | 36.3 | 18.2 | 0.0 | 18.2 | 100.0 |

***Table 3.*** Observed trading behaviour in % of companies by country and year; results are matched and weighted for the subgroup 'traders'
*Due to the weighting process only two units in 2005.

Source: Engels et al. (2008, p.281)

Finally, a look at the trading channels has to follow. As Graph 9 shows, again a significant difference between the firms of the two countries can be observed. The trading channels used by firms in the survey were categorised into six channels, namely traders, outsourcing, other emitters via brokers, directly between emitters, within the company and exchanges. While traders are the most common channels in both countries, German firms use this way about 20% less than the British ones in this survey. Instead, German firms outsource the trading part in nearly 30% of the cases, a strategy that no British firm follows. In the UK instead more emphasis is set on trades within the company. This reflects the more volatile nature of British firms which in turn highlights their focus on competitiveness in the sense of Hall and Soskice. This becomes even clearer, when compared to the rate of direct trades between emitters.

Although British firms began with 18.2% direct trades between emitters in 2005, this rate decreased to zero in 2006. In Germany, the rate decreased as well, but a solid 12.6% of trades was still conducted directly between emitters in 2006 (see Graph 9). This difference remained stable up until at least 2009 as Benz, Löschel, and Sturm (2010) show. Through survey data and interviews, the scholars uncovered that German firms tried to avoid auctioning when possible and prefer direct trades, often accompanied by service contracts instead of direct money transfers (Benz et al. 2010).

**Graph 9: Trading Channels in German, British, Danish and Dutch Firms 2005-2006**

| Year | Trading channel | Country | | | | |
|---|---|---|---|---|---|---|
| | | Germany | United Kingdom | Netherlands* | Denmark | Total |
| 2005 | Traders | 41.8 | 63.6 | | 11.8 | 41.1 |
| | Outsourcing | 29.1 | 0.0 | | 12.5 | 18.9 |
| | Other emitters via brokers | 7.3 | 36.4 | | 29.4 | 17.9 |
| | Directly between emitters | 25.0 | 18.2 | | 41.2 | 26.0 |
| | Within the company | 1.8 | 27.3 | | 0.0 | 7.2 |
| | Exchanges | 23.6 | 4.5 | | 5.9 | 16.8 |
| 2006 | Traders | 43.4 | 76.0 | 27.3 | 8.3 | 40.0 |
| | Outsourcing | 28.9 | 0.0 | 18.2 | 24.0 | 21.1 |
| | Other emitters via brokers | 12.0 | 12.0 | 18.2 | 16.0 | 12.5 |
| | Directly between emitters | 12.6 | 0.0 | 30.0 | 44.0 | 16.6 |
| | Within the company | 4.8 | 16.0 | 18.2 | 0.0 | 16.7 |
| | Exchanges | 19.5 | 4.3 | 20.0 | 8.3 | 4.9 |

***Table 7.*** Usage of trading channels in % of companies by country and year; multiple answers set; results are matched and weighted for the subgroup 'traders'
*Only one case in 2005.

Source: Engels et al. (2008, p.283)

The higher use of other companies (outsourcing) and exchanges by German firms can also be interpreted as a higher willingness to cooperate with other market protagonists. However, this aspect remains open to debate, since British firms in turn use traders more frequently (Engels 2009; Engels, Hisschemöller, & von Moltke 2006; Smith & Swierzbinski 2007).

### 5.3.2. Conclusion

The data from the annual survey by Engels et al. does seem to confirm the hypothesis of this section. Although the difference between German and British firms is not as wide as one could expect from the theory, the strategies of EUA-trading do differ significantly. As predicted by the theory, British firms do tend to trade more and are more volatile in doing so. While German firms are preferring direct trades and outsourcing additional to traders, British firms rely very heavily on traders. Additionally, British firms tend to shy away from outsourcing, direct trades or exchanges.

Relying on the data presented above, one can conclude that the fifth hypothesis of this thesis, stating that trading of ETS allowances should be likely to be more volatile in LMEs and more likely to be based on cooperation and direct trades between emitters in CMEs, can be mostly confirmed. This holds up although the differences between the countries are somewhat less explicit as the theory would initially suggest.

## 6. Conclusion

At the beginning of this paper the question was whether the ETS mechanism faced differences in introduction and use in Germany and the UK and whether these differences follow the expectations derived from Hall and Soskice's theory of Varieties of Capitalism. From this theory, five hypotheses were derived, which predicted how the EU ETS would behave in an LME and a CME context. These hypotheses were tested in an exemplary nature for Germany and the UK. Two hypotheses concerned the introduction of the scheme to the markets and three related to the use of the EU ETS by firms in their respective market economies.

The first hypothesis stated that the more coordinated a market economy is by its nature, the more adjustment of the legal framework in form of direct and surrounding regulation would be needed for the implementation of the ETS. The analysis showed, that the legal integration in both countries did not present any major difficulties. Most notably, the UK had a very smooth transition from its previous legislation, the UK Greenhouse Gas Emissions Trading Scheme. In Germany, the EEG was adjusted slightly and some litigations from German sources indicate opposition in legal terms. The first hypothesis was therefore mildly confirmed.

The second hypothesis in this thesis was that the more liberal a market economy is by its nature, the faster the ETS will be accepted and the less debate around it will be created. The more coordinated the market economy is, the more prominent the participation of unions and NGOs will be in the debate. The analysis of the political debate and the newspaper coverage revealed a clear pattern. In both cases the discussion and debate was far more intense in Germany than in the UK. While the German governing coalition came close to a break-up over the introduction of the EU ETS and its NAP, British politicians partook in a mostly very objective debate which did not stand out between normal political discussions. The participants of the debate and the acceptance of the scheme by firms and companies further confirms the hypothesis, as German unions were involved much stronger in the debate and German firms resisted to the new mechanism more than their British counterparts did. The second hypothesis can therefore be seen as confirmed.

The third hypothesis concerned the cost pass-through rate. The theory states that additional prices through the ETS are more likely to be passed on to the customers in the liberal market

economy and more likely to be internalised within the companies in coordinated economies. Due to the price crash of EUAs and the subsequent lack of significant additional costs for firms as well as signs of cartel building, this hypothesis could not be tested completely. The data which is available points towards the hypothesis being unconfirmed. However, as already mentioned, these results are not scientifically significant due to the lack of data.

The fourth hypothesis, that innovation towards fewer emissions is more likely to be radical in nature in LMEs and incremental in CMEs, was tested through the example of renewable energies in the power generation sector. Differences in institutional support for innovation could be excluded as a variable because governmental support is about equal in both the UK and Germany. The differences in investments into power generation through renewable sources by the German 'Big Four' and the British 'Big Six' showed a clear difference. The results show that the British firms did generally innovate more radically in this matter than their German counterparts. The analysis further raised interesting questions, how far the ownership structures and 'cultural differences' of a firm may influence its innovation behaviour. The results as yet far remain inconclusive. The hypothesis itself, which stood at the beginning of this section, though can be considered confirmed.

The fifth and last hypothesis stated that trading of ETS allowances is likely to be more volatile in LMEs and more likely to be based on cooperation and direct trades between emitters in CMEs. This hypothesis was tested largely through the survey results of Engels et al. (2008). The results, although not very explicit, showed that British firms tend to trade in a more volatile manner than German firms. Furthermore, direct trades and exchanges were more popular in German firms than in British ones. The last hypothesis can therefore be mildly confirmed.

As these results show, four out of the five hypotheses presented can be considered as confirmed. The third hypothesis, which points at a contradiction, unfortunately is not based on enough data to be significant and therefore has to be excluded from the overall outcome. From the four remaining hypotheses which do seem to confirm the theory, the first and the last one (section 4.1. and 5.3.) are only mildly confirming the hypothesis. The differences between the two countries are not too explicit but still present. The second and fourth hypotheses though are clearly confirmed.

Considering these results, the question that stood in the beginning of this thesis can therefore be answered on a solid basis. First of all, there were clear differences in the introduction and use of the EU ETS. Second, many of these differences can be explained through the Varieties of Capitalism theory of Hall and Soskice.

This study is explorative in most parts. As such, it is only a starting point for further research in this matter. Therefore, this study suffers from severe limitations mainly due to a lack of available data and supportive studies. This lack of data is most apparent in the case of the third hypothesis concerning the cost pass-through. Additionally, the analyses conducted in this thesis in many cases stay exemplary in nature. This can be seen especially in section 4.2., where one economic sector was chosen as an example. Therefore, the outcome and scope of this thesis remains limited.

Other limitations mostly stem from the common problem in political studies which relates to the imperfect starting position of the two cases of comparison. Because of the high involvement of the UK in the design process of the EU ETS as well as its own preceding emission trading scheme, firms in the UK had a different starting point when the mechanism was formally introduced in 2005. As such it is difficult to pin down all differences in use and introduction of the mechanism solely on the types of market economy. To achieve a more solid outcome, the results of this study will have to be cross-examined with other variables.

Nevertheless, although the comparison between the two countries might be highly influenced by these independent variables, this analysis did succeed in illuminating some important aspects and produced first results as a basis for further research. Since this thesis is the first study of the EU ETS as a test subject for the Varieties of Capitalism, there are several connecting factors for future research. Especially the use of the EU ETS by firms in different countries calls for more studies and comparisons to achieve a coherent picture of the situation. Furthermore, a test of Hall and Soskice's theory through other harmonised EU policies might also produce additional insights on the matter. The Varieties of Capitalism approach remains a relatively new theory with the potential to change the way people think about market economies. As such, it deserves further research and testing.

# Appendices

## Appendix 1: FAZ-Analysis

| Date | Author | Title | Content |
|---|---|---|---|
| 25.11.2003 | Nico Fickinger | Enge Terminvorgabe für Emissionshandel | Economy says Trittins threatens ETS introduction through tight schedule<br>How will ETS work - explained<br>ETS excludes important questions concerning energy |
| 10.12.2003 | Raimund Körner & Sebastian von Schweinitz | Zeit für Datenerhebung zum Emissionshandel wird knapp | Informative: what is ETS & how will it work<br>Gathering of information difficult but essential for mechanism |
| 15.12.2003 | Ingrid Hielle | Unternehmen bereiten sich auf Geschäfte mit dicker Luft vor | Details of ETS in Germany too unclear<br>Industry tries to prepare for scheme but difficult to anticipate |
| 24.12.2003 | Nico Fickinger | Emissionshandelsgeset z möglicherweise verfassungswidrig | Lawyers see TEHG as possibly unconstitutional<br>Ministry denies and litigation is expected |
| 26.01.2004 | Gabriele Hermani | Wehe dem Weltuntergang | ETS only works if everybody joins in serious way<br>German "Selbstverpflichtung" can work but unpopular<br>Biggest problem is detachedness from public |
| 30.01.2004 | Werner Sturbeck | Stahlindustrie für mehr Verschmutzungsrechte | 1 paragraph article<br>Steel industry fears too high increase in electricity costs through ETS, threaten with emigration |
| 31.01.2004 | Nico Fickinger | Clement und Trittin im offenen streit über Emissionshandel | Clement and Trittin in open dispute<br>Industry (BDI) finds Trittins proposal for NAP "out of question"<br>Conferences so far without result |
| 02.02.2004 | Manfred Schäfers | Gefährlicher Alleingang | Is ETS sensible if rest of world does not oin? |
| 02.02.2004 | Manfred Schäfers | Konflikt um Emissionshandel eskaliert | Industry attacks Trittin fiercely<br>Politicians accuse industry of not fulfilling emission reduction promises |
| 03.02.2004 | Nico Fickinger & Brigitte Koch | Schröder will Streit nicht schlichten | Schröder does not want to interfere with ETS discussion<br>Trittin wants to work together with industry<br>Industry opposes Trittins NAP-proposal but does not agree internally on one counterproposal |
| 09.02.2004 | Nico Fickinger | Industrie bemängelt Trittins Vorgaben | BDI sees Trittins vision of ETS as dangerous market distortion that will hurt German economy harshly |
| 10.02.2004 | Nico Fickinger | Umweltausschuß rügt Trittin | Environment-committee of Bundestag sees time-schedule to tight for NAP<br>Vattenfall and Thyssen-Krupp criticise Trittins allocation |
| 12.02.2004 | Nico Fickinger | Zwist über Emissionshandel | 1-column article<br>BDI boycotts ETS-discussions |
| 13.02.2004 | Nico Fickinger | Streit über Emissionshandel dauert an | Trittin accuses industry of not keeping promises<br>Industry boycotts Trittins proposal |

| | | | |
|---|---|---|---|
| | | | BUND urges Trittin to decide upon his NAP anyways without industry |
| 20.02.2004 | Andreas Mihm | Schröder soll Energiestreit lösen | 1 column article<br>BDI urges Schröder to mediate the ETS dispute between Trittin and Clement |
| 21.02.2004 | ? | Kanzleramt vermittelt beim Emissionshandel | 1 column article<br>Steinmeier to talk with Trittin and Clement<br>Schedule for NAP very tight |
| 24.02.2004 | Nico Fickinger | Umweltrat stärkt Trittin den Rücken | Environment council supports Trittin: no further concessions for industry<br>ETS effective way to secure emission reduction |
| 24.02.2004 | Georg Küffner | Vom Handeln mit Emissionen wird der Klimagasausstoß nicht weniger | ETS will not lead to emission reduction in Germany<br>Energy prices and steel production will become significantly higher<br>Many companies will leave Germany and emit probably more outside ETS zone<br>ETS will lead to over-regulated daily life of citizens |
| 25.02.2004 | Nico Fickinger | Clement und Trittin uneins über Emissionshandel | Clash of secretaries continue<br>DIHK, unions and BDI fight for more emission-certificates<br>FDP (Homburger) criticises Trittin sharply, ETS is made into an instrument for command-economy |
| 25.02.2004 | Nico Fickinger | Im Streit um den Emissionshandel bilden sich ungewöhnliche Koalitionen | Industry protests together with unions and Clement against Trittin<br>ETS searches for most cost-efficiency to reduce emissions, that can be abroad<br>Fear, that Trittin tries to introduce command-economy through the backdoor |
| 25.02.2004 | Holger Schmidt | "Trittin muss hart bleiben" | Environmental economists support Trittin<br>If too many certificates are allocated to big emitters, private emitters (households) have to step in which would hurt economy more<br>ETS can be very effective in Germany if implemented correctly<br>Purchasing certificates abroad is more sensible than allocating more |
| 27.02.2004 | Nico Fickinger | BDI warnt Regierung vor Crash-Test im Emissionshandel | BDI contacts Schröder against Trittin<br>Schedule too tight<br>Trittin trying to deceive on purpose for more economic regulation |
| 28.02.2004 | Holger Appel | Mehr Emissionsrechte für Industrie | 1column article<br>Government raises number of certificates in first phase |
| 28.02.2004 | Holger Schmidt | Vernunft statt Lobby | Trittin and environmental groups vs industry, unions and Clement<br>If too much allocated to industry, households have to suffer<br>If Trittin "wins" and ETS is not carried through properly big loss for German economy |
| 28.02.2004 | Holger Appel, Holger Schmidt & Andreas Mihm | Kompromiß für den Handel mit Emissionsrechten | Government agrees on 500mt$Co_2$ allocation<br>Industry welcomes decision<br>Energy producers welcome decision to in later phases reduce allocations for everybody |

| | | | |
|---|---|---|---|
| | | | not only biggest emitters |
| 01.03.2004 | ? | "Trittin muss sich bewegen" | Axel Horstmann demands corrections for Northrhine-Westphalian industry<br>RWE claims it will suffer too much despite clean-coal technologies |
| 02.03.2004 | Nico Fickinger | Keine Einigung über Emissionshandel | 1-column article<br>After all no agreement on ETS |
| 04.03.2004 | Holger Schmidt | Deutschland erhöht $CO_2$-Emission | $CO_2$ emissions increased in Germany<br>Scientists: ETS good mechanism to reduce emissions |
| 04.03.2004 | Michaela Seiser, Christian Schubert, Michael Stabenow & Leo Wieland | In ganz Europa wird um den Handel mit Emissionsrechten gerungen | All over EU, NAPs are being discussed, not only Germany has problems<br>AU: very late and no agreement between economy and environment-secretary so far<br>UK: government very ambitious in reductions but industry not that enthousiastic<br>NL: began too late with NAP-discussions, no proposal yet<br>ES: high nervosity in industry and politics, NAP not yet decided but probably very generous |
| 13.03.2004 | Nico Fickinger | Ein Rahmen für den Emissionshandel | TEHG decided in Bundestag<br>Opposition criticise too tight schedule<br>NAP-discussions show coalition problems |
| 18.03.2004 | Nico Fickinger | Keine Einigung über Emissionshandel | NAP discussions again without result<br>Green party members fear break-up of coalition<br>Scientists urge government to include better promotion of energy efficiency and renewable sources |
| 19.03.2004 | Johannes Leithäuser | "Sie wollen nicht die Bremser sein" | ETS-clash is economy vs. ecology<br>ETS dispute reflects main problems of coalition<br>Green Party does not want to be seen as economy-hinderer<br>Reform policies as constant poker game between two parties |
| 19.03.2004 | Andreas Mihm & Nico Fickinger | Clement und Trittin kämpfen um Energiepolitik – und ihren Ruf | Clement and Trittin in constant battle<br>Trittin often seen as overregulator<br>Clement always on side of industry against ambitious green policies<br>Clement in SPD also discussed but chancellor needs him<br>Trittin mainly backed by own party |
| 20.03.2004 | Christoph Böhringer, Andreas Lange & Ulf Moslener | Am Emissionshandel führt kein Weg vorbei | ETS is only possible way to reduce emissions without overregulation<br>Scientific evidence that ETS most productive<br>Giving industry as much certificates as it wants would burden other sectors<br>ETS will only work if all of Europe is ambitious |
| 20.03.2004 | Nico Fickinger | Clement und Trittin ringen um Einigung im Emissionshandel | Secretaries again at conference table<br>Bundestag pressures for speedy decision<br>Points of discussion did not change and BDI supports Clement |
| 20.03.2004 | Werner Sturbeck | "Wir werden eher die Produktion zurückfahren, als | Interview with Ekkehard Schulz (Thyssen-Krupp)<br>ETS will increase energy- and production |

| | | | |
|---|---|---|---|
| | | Emissionsrechte kaufen” | costs so much that steel producers will have to leave Germany<br>Scaling down production is more cost-effective than buying emission certificates<br>Trittins plans will hurt German economy tremendously |
| 20.03.2004 | Werner Sturbeck | Deutsche Hüttenbetreiber befürchten den Emissionshandel | Steel producers fear end of business through ETS<br>ETS believed to seriously harm German heavy industry<br>Steel industry hopes that Clement can keep ambitious plans of Trittin at bay |
| 20.03.2004 | Werner Sturbeck | Die Briten als Vorbild | UK most ambitious in emission reduction through ETS<br>German conflict about a few thousand tons is insignificant in world-wide consideration |
| 21.03.2004 | Carsten Germis | Der Einsame | Portrait article of Clement<br>Clement very important for Schröders reform-policy but discussed in SPD<br>ETS just last example of Clements conflict-course<br>Clement fierce defender of German heavy industry<br>Clement as reliable, sticking to his beliefs and stubborn<br>Clement threatens to abdicate and some SPD-members would welcome that |
| 22.03.2004 | Andreas Mihm | Clement fordert Überprüfung der Ökosteuer nach 2006 | Clement sees ETs as a replacement for environmental taxes<br>Greens and many in SPD do not see necessity for reforming environmental taxes<br>SPD in Northrhine Westphalia grows tired of Clements pro-industry course<br>Industry and unions welcome Clements suggestion |
| 23.03.2004 | Günter Bannas | Müntefering kündigt Dialog mit Gewerkschaften an | Müntefering avoids criticising Clement openly in front of SPD-assembly<br>Clements ideas interesting note that industry should be considered in environmental decisions |
| 23.03.2004 | Johannes Leithäuser | Grüne sehen keinen Koalitionsstreit | Die Grünen stress criticism is on Clement personally, not on the SPD<br>Clement as source of the conflict<br>Trittins NAP proposal embodies promises, the industry made and should not be changed<br>Green party opposes strongly Clements industry-defending style |
| 23.03.2004 | Andreas Mihm | Rogowski: Trittins Politik kostet Arbeitsplätze | 1-column article<br>ETS will lead to emigration of businesses and rise of unemployment in Germany |
| 23.03.2004 | Andreas Mihm | Krach zwischen Regierung und Industrie | BDI and DIHK: the colour of unemployment is green!<br>Trittins policies will lead to emigration of business and unemployment<br>Schröder stresses, that every company that leaves is not patriotic |
| 24.03.2004 | Wulf Bernotat | Für zusätzliche | Guest-writer (CEO of E.on) |

| | | | |
|---|---|---|---|
| | | Belastungen ist kein Raum | Conflict of ecology vs economy is not new<br>Overambitious allocation will harm German economy more than it could help climate<br>Germany already achieved a great deal of emission reduction<br>Other countries fill out ETS also in economic perspective, Germany can lose to comparative competition |
| 24.03.2004 | Elke Bohl | Im Emissionshandel zeigen sich Schlupflöcher | Loophole in TEHG could enable companies to not register new installations<br>Lawyers announce that they will sue before the constitutional court in case problem not dealed with<br>Governmental spokesperson announces that misinterpretable phrasing will be changed |
| 24.03.2004 | Christian Geinitz | Klagen gegen Emissionshandel geplant | East German Länder announce that they will sue NAP before the constitutional court<br>NAP does not take into account the great developmental leap from 1990 to 2005 in East Germany<br>Governmental spokesperson signals compromise possible |
| 24.03.2004 | Andreas Mihm | Ruf nach dem Kanzler | Politicians see intervention of Schröder as only possibility to end dispute<br>Trittin sees Clements proposal as too friendly for industry<br>Clement sees no need for overambitious allocation<br>Tight schedule<br>Trittin sees economic possibility in ETS together with promotion of renewable energy<br>CDU-politicians auggest abdication for Clement |
| 24.03.2004 | Stefan Dietrich | Versteckspiel | ETS conflict far too late, NAP has to be sent to Brussels in few days<br>Clement rather than abdicate becomes more convinced on his way<br>Trittins policies of ETS and EEG hinder each other and will cost Germany billions<br>Trittin hides real costs of his policy and Clement should be supported |
| 25.03.2004 | Andreas Mihm | Gutachter stärken Clement im Streit mit Trittin den Rücken | Scientists find that EEG will be superfluous once ETS has been introduced<br>Scientific and economic studies support Clements view of reforming EEG and environmental taxes after ETS introduction |
| 27.03.2004 | Nico Fickinger & Andreas Mihm | "Wir belohnen diejenigen, die Innovationen vorziehen und in Deutschland investieren" | Interview with Trittin<br>Biggest weakness of Germany is structural conservatism<br>ETS will be cheaper than "Selbstverpflichtung" therefore company emigration is empty threat<br>Trittin not willing to step down for Clement<br>No coalition crisis, only problem between Trittin and Clement<br>ETS is new mechanism and therefore introduction is more difficult |

| | | | |
|---|---|---|---|
| 27.03.2004 | Andreas Mihm & Nico Fickinger | Spitzengespräch am Wochenende? | Trittin positive about possible compromise with Clement<br>Advisory opinion supports BDI critic of Trittin<br>Voices for end of EEG after ETS introduction grow<br>Secretaries of the Länder of economy support Clement in high allocation, competitiveness is paramount |
| 28.03.2004 | Rainer Hank | Industrie: Trittin eine Katastrophe | BASF-CEO accuses Trittin of following ideology instead of reality<br>Clement threatens with abdication if forced to give in<br>Industry agree that Trittins plan will harm Germanys economy irresponsibly<br>If steel production will leave Germany, soon other industries will follow such as automobile industry |
| 28.03.2004 | Winand von Petersdorff | Emissionshandel – Darum geht es | Explanation of mechanism<br>ETS introduction difficult nearly everywhere in Europe<br>Emission trading can only work if whole world joins |
| 29.03.2004 | Manfred Schäfers | Clement gegen deutsche "Alleingänge" beim Klimaschutz | Clement opposes overambitious plans of Trittin and threatens with abdication<br>Industry threatens business emigration<br>Trittin holds against that ETS is cheaper than "Sebstverpflichtung"<br>Loske accuses Clement of following industry-policy |
| 29.03.2004 | Manfred Schäfers | Clements Kampf | Trittin tries to push through ETS no matter what<br>ETS dangerous for Germany as long as not introduced in whole world<br>Clement fighter for economic success in Germany, should be supported |
| 30.03.2004 | Christian Geinitz | Bayer AG: Industrie flüchtet vor Trittin | 1-column article<br>Bayer sees Trittins NAP plans as chasing industry away from Germany |
| 30.03.2004 | Johannes Leithäuser | Union stützt Clement | CDU/CSU supports Clement in the ETS conflict with Trittin<br>The opposition wants a completely new approach to climate- and energy-policy |
| 30.03.2004 | Andreas Mihm & Johannes Leithäuser | Kanzlergespräch über Klimaschutz | 1-column article<br>Schröder plans to interfere in Clement-Trittin conflict to ensure deadline for Brussels met |
| 31.03.2004 | Johannes Leithäuser | Angriff der "Anti-Ökologen" | Fierce opposition from right-wing SPD against Grünen<br>Hard compromise for Greens<br>Schröder demonstrates that Clement more important<br>Green Party lost against SPD-blockade<br>Opposition sees Trittin as loser but Clement did not achieve everything either → mixed picture |
| 31.03.2004 | Günter Bannas | Ein Eckpfeiler der Koalition | Clement used threats of abdication to get his way<br>Decision less expression of compromise than |

| | | | |
|---|---|---|---|
| | | | Clements ability to stand his ground<br>Higher amount of certificates agreed<br>Clement follows path to protect economic policy against green advances |
| 31.03.2004 | Andreas Mihm | So weit so sauber | Commentary<br>Clement maintained position and saved industry<br>ETS decision reflects German economic needs<br>German ETS not very effective but situation is worse in China |
| 31.03.2004 | Andreas Mihm, Günter Bannas & Peter Schilder | Koalitionsstreit um Emissionshandel beigelegt | Trittin had to give in to Clements demands, loser of compromise<br>Clement "saves competitiveness of German industry"<br>Higher amount of certificates agreed |
| 31.03.2004 | Werner Sturbeck & Helmut Bünder | Unternehmen danken Clement | Industry and unions both welcome compromise<br>IG BCE, Thyssen Krupp, RWE all voice their contempt<br>Commission will need more time than planned to process because most MS are late |
| 01.04.2004 | Kerstin Schwenn | Trittin verspricht Schonung für Autofahrer und Hausbesitzer | Domestic emitters shall not pay for weak ETS implementation<br>Trittin promises no higher ecological taxes or car-taxes for climate |
| 02.04.2004 | Helmut Bünder | Viele Emissionspläne zu spät eingereicht | After fierce discussions only few MS sent NAP on time<br>Secretaries for Germany , UK, AU, NL and Sweden plan to sue late states |
| 04.04.2004 | Eckart Lohse & Konrad Schuller | Wieviel Umwelt darf's denn sein? | Coalition dominated by SPD, few green aspects<br>Clement won the ETS-battle and left the green party under shock<br>Most SPD members seem to support Clement silently<br>SPD does not want progress built on emissions but sees no choice in current economic situation<br>No break-up of coalition but increasing doubt in green party whether green progress/economy is possible (not likely in current economic situation) |
| 10.04.2004 | Werner Sturbeck | "Warum macht Europas Umweltschutz an den Grenzen halt?" | Dollé (CEO of Arcelor) sees steel industry under too much European pressure<br>Biggest problem = certificates are bound to one state<br>Steel cannot technically be produced with less emissions therefore it should be exempt from ETS |
| 05.05.2004 | Andreas Mihm | Neue Konfrontation um Klimaschutz | Bundesrat criticises Trittins NAP plan<br>Also supervision must be duty of Länder |
| 06.05.2004 | Nico Fickinger | Kompromiss über Emissionshandel | SPD-led Länder push for compromise on ETS task-sharing between federal and national level<br>Weaker penalising also enforced<br>Environment council of Bundestag criticises weakening of ETS |

| | | | |
|---|---|---|---|
| 11.05.2004 | Nico Fickinger | EU soll Allokationspläne prüfen | Clement demands commission to test NAPs for uniformity among MS<br>Clement sees German NAP as too ambitious in comparison<br>ETS should promote economic progress and be supervised by smallest agency as possible |
| 18.05.2004 | Helmut Bünder | Neuer Streit über den Klimaschutz | Trittin criticises Commission for concentrating on German NAP instead of on late MS<br>Commission criticises coal power plants would even have advantage in current German NAP<br>Trittin argues to first broaden ETS to chemical industry before changing it for power sector |
| 25.05.2004 | Nico Fickinger | Klima-Rechnung | Commentary<br>German NAP is too strict in European comparison<br>Commission should goad late MS instead |
| 25.05.2004 | Nico Fickinger | EU-Länder drohen Klimaziel zu verfehlen | Most EU MS will fail to achieve climate-goals with current NAPs<br>Scientists see the main purpose in ETS phase I in building structures<br>Trittin and other green politicians still hope for turn in international Kyoto-acceptance |
| 26.05.2004 | Nico Fickinger | Koalition ändert Allokationsplan | Coalition agreed to weaken German NAP<br>Power stations that introduced energy efficiency measures recently will be rewarded as well |
| 29.05.2004 | Werner Sturbeck | RWI: Arbeitsplätze vom Winde verweht | EEG and ETS will only temporarily produce employment, effect will soon wear of |
| 01.06.2004 | Nico Fickinger | Im Namen des Klimas | Commentary<br>Industrial countries need to reduce emissions in developing countries as well through investment<br>Renewable energies are good cornerstone, also reduce energy dependencies<br>Policies like EEG and ETS are all stll in testing phase and currently have limited effect |
| 08.06.2004 | Helmut Bünder | Das unterschätzte Parlament | European Parliament often underrated<br>Parl. Decides upon more and more national laws<br>NGOs more power in Europ. Parl. Therefore climate and environmental issues more looked at |
| 12.06.2004 | Nico Fickinger | Handel reagiert mit Unverständnis auf Bundesrats-Ent-scheidung | Bundesrat accepted TEHG but sent NAP back to the Bundestag |
| 30.06.2004 | Werner Sturbeck | Energiepolitik sorgt für Diskussionen | Mathes (scient.) sees economic sacrifices as necessary for development of new technologies<br>Wolf (politician, greens) sees ETS as first real step for climate policy<br>Industry criticises over-ambitiousness of German NAP |
| 18.09.2004 | Holger Schmidt | Viele Unternehmen sind schlecht auf den Emissionshandel | Firms are very later with certificate-requests<br>ETS explained<br>Many requests are excessive and are being |

| | | | |
|---|---|---|---|
| | | vorbereitet | sent back<br>Most firms try to trick as much as possible to increase certificate-amount |
| 23.09.2004 | Nico Fickinger & Hendrik Kafsack | Deutschland klagt gegen EU Auflagen | Germany will litigate against commission changes of NAP-regulation<br>Meanwhile international support for Kyoto diminishes rapidly |
| 28.09.2004 | ? | Klage gegen Emissionshandel | 1-column article<br>EnBW litigates against ETS in ECJ<br>According to EnBW, German NAP gives advantages to RWE |
| 30.12.2004 | Nico Fickinger | Handel mit Emissionsrechten startet | ETS will be launched as planned in Jan.<br>DEHSt is late but processed all certificate requests<br>Trittin proud to introduce market mechanism for climate<br>In total more certificates than expected were allocated and firms used all possibilities to request more<br>Early actions for energy efficiency has added certificate allocation mostly in East Germany |

## Appendix 2: Die Zeit Analysis

| Date | Author | Title | Content |
|---|---|---|---|
| 15.01.2004 | Reinhard Loske | Das Märchen von den staatsfixierten Umweltschützern | Guest-writer from Grünen<br>Economy and ecology don't have to be contrary → ETS can work |
| 22.01.2004 | Cerstin Gammelin | Der letzte Grüne | Trittins ETS plans explained<br>Concessions for industry (energy-producers) |
| 05.02.2004 | Cerstin Gammelin | Kultivierte Zwietracht | Clash Trittin vs. Clement<br>Opposition from industry<br>ETS necessary and will be signal for world |
| 09.02.2004 | Joachim Fritz-Vannahme | Die Kommission, das ungeliebte Wesen | Wallström also against Clements interpretation of command-economy |
| 28.02.2004 | Matthias Geis | Schwarz-Grüne Fantasien | SPD and Grüne distance each other through eg. The ETS-dispute |
| 04.03.2004 | Fritz Vorholz | Rauchzeichen | ETS has to be introduced; Trittin sees chance, Clement remains unwilling<br>In reality distribution-fight in industry |
| 11.03.2004 | Fritz Vorholz | Geballte Ladung | Grüne and SPD in constant clash concerning energy policy<br>SPD (esp. Clement) close ties to energy providers and coal unions<br>ETS and EEG battlefield between parties and industry (industry against Greens) |
| 25.03.2004 | Matthias Geis | Der Hochtemperatur-reaktor | Clement close ties with energy and coal producers<br>Clement obsessed with his understanding of good economy and constantly clashes with Greens<br>Clement not afraid to be stubborn |
| 25.03.2004 | Fritz Vorholz | Vergiftetes Klima | Dispute about ETS reaches next level by questioning basic assumptions of environmental policy |

| | | | |
|---|---|---|---|
| | | | When ETS introduced, reform of environmental taxes needed<br>ETS only works in theory because everybody in world would have to join |
| 01.04.2003 | Fritz Vorholz & Matthias Geis | Grüner wird's nicht | Clement won battle, defeat for climate policy<br>Clement won for RWE and Northrhine-Westphalian economy as such<br>Clear policy of economy before ecology through Clement |
| 22.04.2004 | Martin Jänicke | Abschied von Kohle, Öl und Atom | ETS-compromise privileges coal energy<br>ETS without energy efficiency campaign useless |
| 06.05.2004 | Utz Claassen | Energie: Grüne gespalten | Agreed upon ETS-allocation is perceived as free market distortion by EnBW (RWE better stand) |
| 19.05.2004 | Toralf Staud | Wie Hochseetanker und Schlauchboot | In ETS-dispute, unions were on side of industry; NGOs on Green Party side |
| 27.05.2004 | ? | Geschäftsrisiko Kohle | RWE has saving-possibilities through ETS allocation if they switch to natural gas |
| 03.06.2004 | Fritz Vorholz | "Wolfgang Clement bremst" | Interview with Reinhard Loske<br>Too many emission certificates allocated<br>UK took pole-position in climate protection (from Germany) |
| 05.08.2004 | Fritz Vorholz | "Öl wird teuer bleiben" | Interview with Johannes Theyssen (CEO of E.on)<br>Teyssen: NAP often too slack but in Germany good<br>Vorholz: Industry softened German NAP too much<br>UK energy and climate policy is superior to German |
| 05.08.2004 | Fritz Vorholz | Secretary für das Monopol | Clement follows merciless reform-agenda protecting energy-producers |
| 09.09.2004 | John F. Jungclaussen | Das englische Rezept | UK better in conforming with European liberalisation policy<br>Successful ETS was avoided by Schröders lobbying against it (through German industry) |
| 07.10.2004 | Fritz Vorholz | Die Klimaschützer freuen sich zu früh | Questionable if ETS can work when most of the world does not start own emission scheme |
| 21.10.2004 | Fritz Vorholz | Braunkohle: Neuer Zoff | Clement wants to promote better coal-energy techniques through favourable allocation, Trittin blocks |
| 16.12.2004 | Fritz Vorholz | "Fleißkärtchen mag ich nicht" | Interview with Trittin<br>Trittin: ETS NAP not to easy, that's why industry fights with each other<br>Normal for economy and environment secretaries to stand on controversial grounds<br>Current world situation: ETS not enough! |

## Appendix 3: The Daily Telegraph Analysis

| Date | Author | Title | Content |
|---|---|---|---|
| 25.02.2003 | Charles Clover | Energy policy puts climate before consumers | White paper on climate policy in discussion between pro- and anti-nuclear politicians<br>Ms. Hewitt: Energy efficiency is cheapest way to save emissions<br>Emission trading will raise household electricity and gas prices |
| 09.03.2003 | Christopher Booker | Christopher Booker's Notebook | Artisan soap producer will have to pay 40000 for certificates to continue her business<br>Thousands of smaller businesses threatened through emission trading |
| 13.04.2003 | Jim Gray | Booker's Error | Bookers article on emission certificates wrong representation<br>40000 estimate for large installation, small businesses only fracture of that<br>Agency in contact with trade associations to find good way to protect especially small businesses |
| 10.06.2003 | James Moore | Bearish utilities analyst is Britain's top stock-picker | Energy producers can profit from ETS introduction<br>Stock-market advisor recommends Scottish energy company |
| 19.07.2003 | James Moore | For sale: one summer, unusually hot | Weather insurance schemes and derivatives take off due to unpredictable weather situations<br>CO2 derivatives are expected as soon as ETS is introduced<br>CO2 as stock-market commodity of high importance in future |
| 12.01.2004 | Graham Tibbetts | Deadly heatwaves 'likely to become common in Europe' | Greenhouse gasses increase<br>Politics needs to answer strongly<br>ETS will help to lower greenhouse gas emission<br>UK biggest GHG emitter in EU after Germany |
| 23.02.2004 | Tessa Thorniley | UK industry braced for carbon fallout damage | ETS will attack profitability of all major industries<br>ETS explained<br>Different industries have to cut different percentages<br>Wholesale prices could rise by 63% in Britain<br>Britain might lose competitive edge if reduces GHGs more than other EU Members |
| 21.03.2004 | Sylvia Pfeifer | Emission cuts 'are risking British jobs' | ETS will lead to unemployment, higher prices and loss of competitiveness<br>CBI opposes governments plan to over-achieve Brussels plans<br>Other EU member states do not save emissions as ambitious, are not following<br>Especially oil and steel production will suffer under loss of competitiveness |
| 13.04.2004 | Charles Clover | Planes and cars boom can't go on, says Blair's green team | UKs economic growth does not contribute to life quality increase or climate protection<br>Concentration on 'smart growth' or sustainable development<br>Blair wants to increase social and |

| | | | |
|---|---|---|---|
| | | | environmental well-being |
| 07.05.2004 | Tessa Thorniley | Hewitt cuts limits on carbon emissions | NAP sent to Brussels aiming for 15,2% cut in emissions (1990-2010)<br>CBI worried that other MS will not present as ambitious plans<br>EEF criticises government for setting goals too high and reducing competitiveness<br>Concern, that laxness of MS NAPs will harm UKs economy |
| 23.05.2004 | Andrew Murray-Watson | Electricity suppliers fail to meet their 'green' targets | Electricity producers fail to cut agreed amount of emissions<br>Companies that failed to meet their reduction targets will have to pay into 'buyout fund'<br>Unclear, how emissions can be cut without increasing electricity price substantially |
| 22.06.2004 | ? | City briefs | First trade of derivative linked to emission trading by investment banks |
| 14.09.2004 | Charles Clover | Howard takes stand for the environment | Michael Howard wants to establish the conservatives as the environment party<br>Howard criticises Blairs climate policy as ineffective $CO_2$ emissions rose during his office |
| 15.09.2004 | Tessa Thorniley | EU emissions plan is 'weak and costly' | Industry criticises ETS as too weak to reduce emissions and cutting competitive edge of UK<br>Economist Bower: price per tom CO2 too low to work<br>Nicholson (director of energy intensive users group): other EU MS use taxpayer-money to buy emissions<br>Bower recommends emissions tax system instead |
| 16.09.2004 | Roland Gribben | Industry puts energy into price rise fight | Energy prices increase rapidly in the UK<br>One reason among others is said to be the EU ETS<br>Experts point out, that prices rise less quick than in other EU MS<br>Peters (Engineering Employers Federation) urges government to freeze ETS decision until other EU MS are as ambitious |
| 10.10.2004 | Andrew Murray-Watson | Power stations can pollute more | Government wants to allocate more certificates to power producers and less to heavy industry<br>Decision infuriates environmentalists and industrialists<br>Power producers receive more than 80% of all certificates |
| 21.10.2004 | Adrian Cadbury & Roger Adams | How to count the cost of being a good citizen | Introduction of ETS will oblige companies to issue more detailed reports on efforts concerning sustainability<br>Report obligation could be used to secure social standards as well |
| 03.11.2004 | Charles Moore | A green land may not turn out to be so pleasant and will cost us all | Recycling and climate policies will be very inconvenient<br>Wind energy only profits government and energy producers, not climate<br>ETS and other emission reduction strategies so far are camouflaged 'state industrial |

| | | | |
|---|---|---|---|
| | | | planning'<br>Waste is part of nature and therefore should not be demonised |
| 05.11.2004 | Tessa Thorniley | Energy group issues price warning | Scottish & Southern Energy announced that household energy will become more expensive<br>ETS badly handled by the government, the sectors still don't know their individual emission ceiling<br>Uncertainty very hard to deal with for energy producers |

## Appendix 4: The Guardian Analysis

| Date | Author | Title | Content |
|---|---|---|---|
| 04.01.2004 | Juliette Jowit | New Labour's contrail | Emission through air transport growing<br>ETS not extensive enough because air travel is excluded<br>ETS will not succeed because air travel gets expanded increasingly |
| 11.01.2004 | Mark Townsend | Giant space shield plan to save planet | Many scientists perceive ETS unlikely to succeed<br>Biggest problems of ETS are laggard-states and restriction to EU member states (global problem)<br>More extreme, technological solutions for climate change are discussed (block parts of suns rays) |
| 14.01.2004 | Terry Macalister | Oil body distances itself from Shell figures | UKOOA (oil association): oil industry is pressuring government for generous quotas |
| 19.01.2004 | Mark Tran | Emission cuts to raise energy prices | Cutting CO2 emissions beyond EU target could result in higher electricity prices for households<br>ETS explained<br>Industry agrees with principle of emission trading but criticises UKs overambitiousness<br>FoE welcome UK strategy and point out, that UK NAP is not toughest in Europe |
| 20.01.2004 | ? | Notebook – More haste… | Draft allocation plan very welcome but questionable if able to achieve its goal<br>Many details of NAP are based on outdated data<br>Unclear, which sectors will be included in other EU MS<br>Industry criticises over-ambitiousness<br>Only Germany seen as maybe following suit, secretaries expect Brussels to force laggards |
| 20.01.2004 | David Gow | CO2 limits suicidal for competitiveness, says industry | Industry urges for revision of draft NAP<br>motor industry fears investment in continental Europe instead of UK<br>power sector and FoE on opposite ends of spectrum on how NAP should be changed for coal-electricity<br>CBI: government "is risking the sacrifice of UK |

| | | | |
|---|---|---|---|
| | | | obs on the altar of green credentials"<br>Morley and Timms reassure to maintain both, UKs ambitious CO2 targets and competitive edge, laggard MS will be forced to catch up |
| 22.02.2004 | Simon Caulkin | Why brain still beats brawn | ETS one factor that makes business in UK more expensive<br>Business structures and models have not changed significantly in last 30 years<br>ETS is good example of market-friendly regulation<br>Most successful firms are also biggest innovators, regulation can force businesses to innovate |
| 07.03.2004 | Terry Macalister | Selby closure costs UK Coal £56m | EU ETS will encourage energy generators to use gas instead of coal |
| 21.03.2004 | Conal Walsh | Emissions impossible for CBI to Stomach | Digby Jones (CBI): government risks UK jobs "on the altar of green credentials"<br>ETS very welcomed by FoE but CBI rejects the extra-cuts, pushed by Margaret Beckett<br>Engineering Employers Federation criticises that the burden only industry<br>Oil, coal and motor industry fears closings and emigration<br>Industry lobbyists threat with an increase in household electricity cost<br>Some businesses openly embrace ETS: Unilever, GlaxoSmithKline, Asda…<br>Tom Delay (Carbon Trust): ETS will solve issues and companies will abide to stay competitive |
| 31.03.2004 | David Gow | Generators warn of power shortages from CO2 targets | NAP deadline missed<br>Power generators warn that country will suffer 10% shortfall in electricity<br>Drax power station announces that it will only produce the same amount of electricity if additional costs of certificates are covered by higher electricity prices<br>Government announces changes of NAP but without details |
| 25.04.2004 | Mark Townsend & Paul Harris | Oil giants join climate group | New British climate group of big polluter-businesses<br>Climate activists fear that new group will only be lip-service of businesses |
| 27.04.2004 | Matthew Tempest | Green groups dismiss climate change 'tokenism' | New climate group including big businesses (e.g. shell) founded<br>Blair calls greenhouse emission reduction very critical<br>Opposition calls Blairs involvement 'tokenism' because on same day NAP targets were reduced<br>Only 1/5$^{th}$ reduction in greenhouse gasses since Labour started office and increasingly NAP is macerated |
| 29.04.2004 | Richard Starkey & Kevin Anderson | That'll be £17 and 10 carbon points | Tradable quotas best way to reduce domestic emissions<br>Idea of personal carbon cards for every citizen, could be realised |

| | | | |
|---|---|---|---|
| | | | ETS only based on industry is not effective enough to reach goal of 2050 |
| 29.04.2004 | Tim Radford & Paul Brown | This is what we know about global warming ... so why haven't we done anything about it yet? | Government has been influenced strongly by industry to allocate generously<br>Scientific aspect of climate change no longer debated, but way, how to deal with it and slow it down<br>Examples of effect of climate change on glaciers, gulf stream, weather… |
| 01.05.2004 | ? | Notebook – Blair steps on the gas | NAP submitted to Brussels with 15% cut of emissions in January 2005<br>Industry still lobbying against planned cut of 20% instead of agreed upon 12,5% in emissions<br>Blair, backed by BP remains strong on his plans of introduction |
| 07.05.2004 | John Vidal | An ill wind? | Wind power receives growing criticism<br>Unclear, if wind power is solution to carbon reduction problem<br>ETS will change playing field after that wind-power must be reconsidered in new light |
| 05.06.2004 | Heather Stewart | Where there's muck, There's brass | First businesses plan to profit from ETS by capturing methane for biofuel<br>Market for emissions credits expected to be very lucrative, companies try to step in to use this opportunity |
| 08.06.2004 | Caroline Lucas | Thursday is about more than the war | European Elections should focus on climate change<br>European Parliament have more decisive role than ever<br>Important parts of UK legislation from EU, especially ETS will shape country |
| 17.06.2004 | David Adam | Oil chief: my fears for planet | Ron Oxburgh (Shell CEO) worried of climate change and supports sequestration<br>Comments enrage oil companies other than BP and Shell<br>Wants more sustainable technologies and renewable energy<br>'biggest threat is possible use of coal reserves in developing countries because most polluting' |
| 24.06.2004 | David Gow | Flare-up over Shell's 'double standards' | FoE accuse Shell of exaggerating efforts against climate change<br>Shell reportedly only installs clean technologies in its European 'flagship refineries'<br>Company spokesman assures continuing efforts and pioneering in carbon trade of the company |
| 28.06.2004 | Roisin Woolnough | Green light | ETS will have consequences for nearly all businesses but possibilities to reduce emissions not only in production<br>Good communication and activities to save electricity and fuel in offices and communication patterns help as well<br>firms like Future Forests help businesses to reduce emissions in office environments |

| | | | |
|---|---|---|---|
| 04.07.2004 | Nick Mathiason | 'We need results, not more red tape' | Carrot is mightier than the stick<br>C+C regulation will not reduce emissions, ETS better but still not perfet mechanism |
| 08.07.2004 | ? | Yesterday in Parliament | Colin Challen entered a bill for domestic tradable emission quotas in parliament but has little to no chance to succeed |
| 01.08.2004 | Juliette Jowit | North Sea burial for greenhouse gases | New technology for carbon storage in the North Sea tested but expensive<br>Renewable energy not as lucrative as expected<br>Currently ETS seems most feasible way to combat Climate change |
| 02.08.2004 | Kirsty Scott | Scotland catches the wave of funds for clean energy | Scotland plans installation of tidal power generators along coastlines<br>Currently still expensive but with expected rise of power costs through ETS profit is expected<br>Scotland could lead renewable energy production |
| 18.08.2004 | Mark Milner | Oil costs hurt UK recovery | Oil prices in UK will continue to rise and threaten heavy industry<br>Especially steel industry is loosing business to especially Chinese sompetitors<br>ETS will intensify the struggle of British industry to keep up with global market |
| 21.08.2004 | Oliver Morgan | Can coal clean up its act and keep the home fires burning? | ETS and EU pollution legislation will restrict UK coal plants severely<br>Coal will become more expensive but clean coal technologies could be able to stay competitive to renewable<br>Reliance on gas has limits (becomes more expensive as well) |
| 26.08.2004 | Madeleine Bunting | Put us all on rations | Climate policy has to hurt to be effective<br>Slow price increases will not yield the wanted effect, shock therapy is needed<br>Saving emissions must start in every household all over the globe<br>ETS is only beginning and still too weak |
| 13.09.2004 | Tom Happold | Tories 'would lead on climate change' | Michael Howard gave speech to stress importance of fighting climate change rigorously<br>Tony Juniper (FoE) welcomes Howards speech, while Norman Baker (Liberal Democrats) accuses Howard of jumping onto green bandwagon<br>Howard: Blairs failure can be seen by increase of emissions<br>Tories would ensure that emission trading will find the most cost-effective way to reduce emissions and will not burden businesses for not yet savable emissions<br>Juniper called on Howard to commit to emission reductions goal of 60% by 2050 |
| 15.09.2004 | ? | Blair's global warning | Blair's speech at dinner party by Prince of Wales<br>Climate change most urgent problem and has to be solved in his childrens lifetime |

| | | | |
|---|---|---|---|
| | | | UK on line with emission reduction, mostly due to coal reduction<br>To be really effective, ETS must be broadened to whole world |
| 18.10.2004 | Mark Milner | CBI and Amicus warn of energy crisis | ETS and reduction of nuclear power will lead to a shortened life expectancy of UKs generating capacity<br>CBI and Amicus warn of Energy price hikes and routine blackouts<br>DTI remains confident of UKs generating power |
| 27.10.2004 | ? | Blair attacked over higher CO2 emissions | Blair and Beckett issued new rules on industrial pollution permits in the ETS<br>ETS in UK is thereby adjusted to the recent increase of emissions up to 2004<br>Beckett stresses that UK is still up to reduction target but government wants to make ETS a success without damaging industrial competitiveness<br>Sticking with original NAP would have been devastating for UK industry<br>Industry supports Blairs decision while NGOs criticise it as step back and defend Becketts original plans |
| 28.10.2004 | Mark Milner | Kyoto sacrificed to competitiveness | Government decided to increase the total amount of emissions that power plants and factories can emit under ETS<br>At the same time, emission reduction targets were set more strictly<br>Beckett: balance need to reach target while protecting UK competitiveness<br>All over EU, more emissions are allowed<br>Change quite small and UK still ambitious in European comparison |
| 03.11.2004 | Louise Tickle | Emissions impossible? | Becketts decision to raise emission allowance for industry effectively stops all possible improvement due to ETS<br>NGOs and activists accuse government of giving into lobbyists<br>Industry replies that price is only one part of ETS and the scheme still rewards energy efficiency and procurement<br>Companies will suffer from climate change effects as well, therefore they will take action to prevent it<br>NGOs criticise that so far only plans to change wasteful habits are made, no real innovation<br>Climate change levy also unfair towards small businesses since they cannot negotiate better rates |
| 08.12.2004 | Patrick Wintour | Climate change policy review reflects failure on emissions | Climate policy changed from concentration on innovation and renewable towards energy efficiency to reduce greenhouse gases<br>British business has done more than most other countries to reduce emissions, now domestic emissions must be tackled<br>Improving energy efficiency will benefit |

| | | | |
|---|---|---|---|
| | | | emissions reduction as well as decrease poverty rates and energy poverty |
| 09.12.2004 | Tim Radford | Beckett admits defeat on climate change target | Government will fail to cut emissions by 20% by 2010<br>Beckett admits disappointment but still sees UK good on track<br>Hopes rely on international consultations to increase the worlds commitment<br>Greenpeace and FoE announce heightened involvement and pressure<br>CBI urged government not to increase emission reduction target without international agreement |
| 09.12.2004 | ? | Environmental scorecard | Facts and figures on Kyoto protocol, ETS, renewable energies and other environmental indicators in the UK<br>Overview of government vs industry and activist views<br>Government admits failure of most ambitious plan but still sees significant progress and set hope in ETS<br>Tony Grayling (Institute of Policy Research) sees changes in policy necessary and still in time for 'real' introduction of ETS |
| 16.12.2004 | Oliver Balch | 'Time is running out' | Climate change is becoming more and more threatening also for business<br>Some big firms started to set their own carbon reduction goals but it is discussed, how effective that is<br>ETS is middle ground between business-based and regulative models of tackling climate change<br>Environmentalists accuse government of being too influenced by private sector and industry lobbying<br>With the current NAPs in place, the ETS is unlikely to succeed<br>Fate of ETS will be decided in the second phase and whether it will push boundaries then |

## Appendix 5: Corporate Views on Energy Taxes in Germany and the UK

**Table 4.** Corporate views on energy taxes (percentages)

| Variable | Score | Strongly disagree −2 | Disagree −1 | No opinion 0 | Agree +1 | Strongly agree +2 | Mean | Mann Whitney sig. and mean rank |
|---|---|---|---|---|---|---|---|---|
| Energy taxes promote relative energy efficiency | | | | | | | | 0.000 |
| U.K. | | 3.2 | 10.2 | 11.1 | **59.8** | 15.8 | 0.76 | 502.58 |
| Germany | | 6.8 | 24.8 | **35.0** | 32.0 | 1.4 | −0.04 | 304.08 |
| Energy taxes encourage overall reductions in energy requirements | | | | | | | | 0.000 |
| U.K. | | 3.7 | 16.1 | 17.0 | **51.4** | 11.8 | 0.51 | 463.98 |
| Germany | | 4.0 | 26.1 | 18.4 | **47.8** | 3.7 | 0.21 | 389.33 |
| Energy taxes cause price inflation | | | | | | | | 0.000 |
| U.K. | | 5.1 | 21.9 | 23.7 | **33.9** | 15.4 | 0.32 | 404.03 |
| Germany | | 1.0 | 15.0 | 13.6 | **45.5** | 24.9 | 0.78 | 507.50 |
| Energy taxes make companies more competitive | | | | | | | | 0.000 |
| U.K. | | 11.4 | 27.9 | 28.6 | **29.3** | 2.8 | −0.16 | 487.98 |
| Germany | | 16.0 | **49.0** | 29.0 | 5.0 | 1.0 | −0.78 | 344.80 |
| Energy taxes are justified by the environmental benefits | | | | | | | | 0.369 |
| U.K. | | 18.1 | **32.3** | 23.4 | 24.1 | 2.1 | −0.40 | 430.72 |
| Germany | | 11.2 | **40.3** | 19.7 | 26.4 | 2.4 | −0.32 | 446.31 |
| Increased use of tax revenue to promote investment | | | | | | | | 0.001 |
| U.K. | | 0.9 | 4.2 | 7.4 | **45.7** | 41.8 | 1.23 | 417.60 |
| Germany | | 0.7 | 2.0 | 5.7 | 38.1 | **53.5** | 1.42 | 474.25 |
| Energy production should be taxed rather than manufacturing | | | | | | | | 0.404 |
| U.K. | | 6.0 | 32.9 | **35.2** | 15.6 | 10.3 | −0.09 | 439.39 |
| Germany | | 8.8 | 32.1 | **34.8** | 15.2 | 9.1 | −0.16 | 425.04 |
| Consumer energy use should be taxed at a higher rate | | | | | | | | 0.000 |
| U.K. | | 8.7 | 29.0 | **35.9** | 20.8 | 5.7 | −0.14 | 466.38 |
| Germany | | 8.5 | **51.7** | 25.5 | 10.5 | 3.8 | −0.51 | 370.89 |
| Company is satisfied overall with national climate-tax policy | | | | | | | | 0.926 |
| U.K. | | 26.1 | **36.7** | 25.1 | 11.6 | 0.5 | −0.76 | 435.96 |
| Germany | | 25.8 | **38.3** | 20.0 | 15.3 | 0.6 | −0.73 | 437.55 |

*Note:* Highest responses are shown in bold.

Source: Bailey (2007, p.541)

## Appendix 6: Industry Assessment of Negotiated Agreements in Germany and the UK

**Table 5.** Industry assessment of negotiated agreements (percentages)

| Variable | Score | Strongly disagree −2 | Disagree −1 | No opinion 0 | Agree +1 | Strongly agree +2 | Mean | Mann Whitney sig. and mean rank |
|---|---|---|---|---|---|---|---|---|
| Negotiated agreements are effective instruments for improving energy efficiency | | | | | | | | 0.000 |
| U.K. | | 8.7 | 23.4 | 24.3 | **41.5** | 2.1 | 0.05 | 408.19 |
| Germany | | 4.2 | 19.1 | 22.6 | **47.7** | 6.4 | 0.33 | 469.63 |
| Negotiated agreements promote innovation | | | | | | | | 0.000 |
| U.K. | | 4.7 | 23.1 | 29.9 | **39.5** | 2.8 | 0.13 | 404.65 |
| Germany | | 4.5 | 17.0 | 16.6 | **54.0** | 8.0 | 0.44 | 487.92 |
| Free riding is a major problem with negotiated agreements | | | | | | | | 0.027 |
| U.K. | | 4.5 | 30.2 | 22.7 | **37.0** | 5.6 | 0.09 | 446.15 |
| Germany | | 3.1 | **46.9** | 11.0 | 31.0 | 7.9 | −0.06 | 408.38 |
| Negotiated agreements will be a major contributor to achieving emissions targets | | | | | | | | 0.000 |
| U.K. | | 5.9 | 30.9 | **33.9** | 27.3 | 2.1 | −0.11 | 395.48 |
| Germany | | 3.1 | 22.2 | 18.1 | **52.4** | 4.2 | 0.32 | 506.55 |

*Note:* Highest responses are shown in bold.

Source: Bailey (2007, p.542)

## Appendix 7: Sale and Production of Renewable Energy by the German 'Big Four'

| | 2013 | 2012 | 2011 | 2010 | 2009 | 2008 | 2007 |
|---|---|---|---|---|---|---|---|
| **E.ON** | | | | | | | |
| % renewables sale | 30,2 | 33,1 | 29,9 | 26,5 | 21,2 | 17,9 | 14,2 |
| % renewables production | 12,1 | 12,0 | 10,2 | 11,0 | 7,3 | n.a. | n.a. |
| **RWE** | | | | | | | |
| % renewables sale | 30,8 | 28,4 | 24,3 | 21,0 | 18,0 | 14,6 | 10,4 |
| % renewables production | 1,1 | 1,7 | 1,7 | 1,6 | 1,4 | 1,2 | 1,3 |
| **EnBW** | | | | | | | |
| % renewables sale | 30,7 | 27,2 | 22,9 | 20,0 | 24,0 | 21,1 | 17,0 |
| % renewables production | 19,1 | 18,9 | 12,2 | 11,0 | 10,6 | 10,8 | 9,9 |
| **Vattenfall** | | | | | | | |
| % renewables sale | 41,9 | 42,8 | 37,5 | 35,2 | 25,8 | 15,4 | 14,9 |
| % renewables production | 5,9 | 4,7 | 4,5 | 5,5 | 5,2 | 5,9 | 4,4 |

Sources: EnBW (2007, 2008, 2009, 2010, 2011, 2012, 2013); E.ON (2007, 2008, 2009, 2010, 2011, 2012, 2013); RWE (2007, 2008, 2009, 2010, 2011, 2012, 2013); Vattenfall (2007, 2008, 2009, 2010, 2011, 2012, 2013).

## Appendix 8: Sale and Production of Renewable Energy by the UK 'Big Six'

| | 2013 | 2012 | 2011 | 2010 | 2009 | 2008 | 2007 |
|---|---|---|---|---|---|---|---|
| **British Gas (Centrica)** | | | | | | | |
| % renewables sale | 15,0 | 10,0 | 7,9 | 7,7 | 6,8 | 6,6 | 6,2 |
| % renewables production | 3,6 | 2,5 | 2,2 | 1,5 | 3,3 | n.a. | n.a. |
| **EDF Energy** | | | | | | | |
| % renewables sale | 13,5 | 8,3 | 3,0 | 3,9 | 7,0 | 6,5 | 6,0 |
| % renewables production | 1,6 | 1,0 | 0,9 | 0,7 | n.a. | n.a. | n.a. |
| **E.ON UK** | | | | | | | |
| % renewables sale | 12,0 | 8,4 | 5,2 | 6,6 | 1,4 | 0,3 | n.a. |
| % renewables production | 14,0 | 11,3 | 2,9 | 0,0 | 0,0 | 0,0 | n.a. |
| **npower (RWE)** | | | | | | | |
| % renewables sale | 15,0 | 14,0 | 12,0 | 9,0 | 6,0 | 5,0 | 3.0 |
| % renewables production | 2,6 | 1,9 | 1,3 | 1,1 | 0,4 | 0,4 | 0,2 |
| **Scottish Power** | | | | | | | |
| % renewables sale | 16,9 | 12,9 | 13,5 | 7,6 | 8,4 | 6,9 | 7,6 |
| % renewables production | 13,7 | 11,6 | 7,7 | 3,7 | 5,4 | n.a. | n.a. |
| **SSE** | | | | | | | |
| % renewables sale | 24,0 | 15,0 | 14,0 | 10,0 | 10,0 | 9,7 | 8,9 |
| % renewables production | 17,7 | 14,3 | 7,9 | 7,8 | 9,9 | 8,7 | 9,6 |

Sources: Centrica (2007, 2008, 2009, 2010, 2011, 2012, 2013); EDF (2007, 2008, 2009, 2010, 2011, 2012, 2013); E.ON (2007, 2008, 2009, 2010, 2011, 2012, 2013); RWE (2007, 2008, 2009, 2010, 2011, 2012, 2013); ScottishPower (2009, 2010, 2011, 2012, 2013); SSE (2007, 2008, 2009, 2010, 2011, 2012, 2013).

## Appendix 9: New power Generation Facilities by the 'Big Four' and 'Big Six' 2007-2014

| Name | Year | Operator | Type |
|---|---|---|---|
| Ahrensfelde | 2007 | Vattenfall | Gas |
| Schönwalde Südost | 2007 | E.ON | Wind |
| Edersleben-Riethnordhausen | 2007 | E.ON | Wind |
| Breetze | 2007 | RWE | Wind |
| Sintfeld | 2007 | RWE | Wind* |
| Burgar Hill | 2007 | Npower | Wind* |
| Hameldon Hill | 2007 | Npower | Wind* |
| Bin Mountain | 2007 | SSE | Wind* |
| Beinn Tharsuinn | 2007 | Scottish Power | Wind* |
| Wether Hill | 2007 | Scottish Power | Wind |
| Whitelee | 2007 | Scottish Power | Wind° |
| Steven's Croft | 2007 | E.ON UK | Biomass |
| Oberföhring | 2008 | E.ON | Hydro |
| Douglas Water | 2008 | Npower | Hydro* |
| River E | 2008 | Npower | Hydro* |
| Glendoe | 2008 | SSE | Hydro° |
| Bartelsdorf | 2008 | RWE | Wind |
| Bicker Fen | 2008 | EDF | Wind |
| Walkway | 2008 | EDF | Wind |
| Bilbster | 2008 | Npower | Wind* |
| Hollies | 2008 | Npower | Wind* |
| Knabs Ridge | 2008 | Npower | Wind |
| Little Cheyne | 2008 | Npower | Wind |
| Bessy Bell II | 2008 | SSE | Wind* |
| Drumderg | 2008 | SSE | Wind |
| Green Knowes | 2008 | Scottish power | Wind |
| Wolf Bog | 2008 | Scottish Power | Wind |
| Kehl | 2009 | EnBW (+EDF France) | Hydro* |
| Wehrkraftwerk | 2009 | RWE | Hydro |
| Carnoch | 2009 | Npower | Hydro* |
| Inverlael | 2009 | Npower | Hydro* |
| Obereiflingen | 2009 | EnBW | Wind* |
| Gorike-Söllenthin | 2009 | EnBW | Wind |
| Buchholz | 2009 | EnBW | Wind |
| Berghülen | 2009 | EnBW | Wind* |
| Schmarloh | 2009 | RWE | Wind |
| Longpark | 2009 | EDF | Wind |
| Fairburn | 2009 | SSE | Wind |
| Clachan Flats | 2009 | Scottish Power | Wind |
| Dun Law II | 2009 | Scottish Power | Wind |
| Hagshaw Hill II | 2009 | Scottish Power | Wind |
| Inner Dowsing | 2009 | Centrica | Wind (offshore) |
| Lynn | 2009 | Centrica | Wind (offshore) |
| Rhyl Flats | 2009 | EDF | Wind (offshore) |
| Langage | 2010 | Centrica | Gas |
| Grain | 2010 | E.ON UK | Gas |
| Rheinfelden | 2010 | EnBW | Hydro° |
| Windpark Elze | 2010 | EnBW | Wind* |
| Schulenburg | 2010 | EnBW | Wind |
| Haupersweiler | 2010 | EnBW | Wind |
| Hinzert-Pölert | 2010 | RWE | Wind |
| Great Eppleton | 2010 | E.ON UK | Wind* |

| | | | |
|---|---|---|---|
| Haswell Moor | 2010 | E.ON UK | Wind |
| Burnfoot Hill | 2010 | EDF | Wind |
| Rusholme | 2010 | EDF | Wind |
| Lindhurst | 2010 | Npower | Wind* |
| Achany | 2010 | SSE | Wind |
| Carcant | 2010 | SSE | Wind* |
| Toddleburn | 2010 | SSE | Wind |
| Arecleoch | 2010 | Scottish Power | Wind° |
| Robin Rigg | 2010 | E.ON UK | Wind (offshore)° |
| Frieberg | 2011 | EnBW | Wind |
| Titz Nord | 2011 | RWE | Wind |
| Butterwick Moor | 2011 | E.ON UK | Wind |
| Fairfield | 2011 | EDF | Wind* |
| Clyde Central | 2011 | SSE | Wind° |
| Clyde South | 2011 | SSE | Wind° |
| Gordonbush | 2011 | SSE | Wind |
| Griffin | 2011 | SSE | Wind° |
| Slieve Kirk | 2011 | SSE | Wind |
| Mark Hill | 2011 | Scottish Power | Wind |
| Baltic I | 2011 | EnBW | Wind (offshore) |
| Greater Gabbard | 2011 | SSE | Wind (offshore)° |
| Neurath | 2012 | RWE | Lignite |
| West Burton | 2012 | EDF | Gas |
| Pembroke | 2012 | Npower | Gas |
| Black Rock | 2012 | Npower | Hydro* |
| Jüchen | 2012 | RWE | Wind |
| Camster | 2012 | E.ON UK | Wind |
| Rosehall | 2012 | E.ON UK | Wind |
| Tween Bridge | 2012 | E.ON UK | Wind |
| Green Rigg | 2012 | EDF | Wind |
| Hellrigg | 2012 | Npower | Wind* |
| Kiln Pit Hill | 2012 | Npower | Wind |
| Novar 2 | 2012 | Npower | Wind |
| Balmurrie Fell | 2012 | SSE | Wind* |
| Clyde North | 2012 | SSE | Wind |
| Spurness Extension | 2012 | SSE | Wind |
| Beinn an Tuircc 2 | 2012 | Scottish Power | Wind |
| Lynemouth | 2012 | Scottish Power | Wind |
| Whitelee II | 2012 | Scottish Power | Wind° |
| Maldie | 2013 | Npower | Hydro* |
| Boundary Lane | 2013 | EDF | Wind* |
| Fallago | 2013 | EDF | Wind° |
| Glass Moor II | 2013 | EDF | Wind |
| Bradwell | 2012 | NPower | Wind |
| Goole Fields | 2013 | Npower | Wind* |
| Middlemoor | 2013 | Npower | Wind |
| Cathkin Braes | 2013 | SSE | Wind* |
| Keadby | 2013 | SSE | Wind |
| Port of Tilbury | 2013 | SSE | Wind* |
| Carland Cross | 2013 | Scottish Power | Wind |
| Harestanes | 2013 | Scottish Power | Wind° |
| Middleton | 2013 | Scottish Power | Wind |
| Kraftwerk Westfalen | 2014 | RWE | Coal |
| Königshovener Höhe | 2014 | RWE | Wind |
| Roade | 2014 | EDF | Wind* |
| Hameldon Hill ext | 2014 | Npower | Wind* |

| | | | |
|---|---|---|---|
| National Offshore Wind Turbine Test | 2014 | SSE | Wind |
| Dan Tysk | 2014 | Vattenfall | Wind (offshore)° |

* renewable with capacity under 10MW

° renewable with capacity over 100MW

German facilities are highlighted

Sources: 4C offshore (2014); Bundesnetzagentur (2014); DECC (2014).

## Appendix 10: Emission Allowance Positions of German, British, Danish and Dutch Firms 2005-2006

| Year | Country | Emission allowance position | | | |
|---|---|---|---|---|---|
| | | Short | Balanced* | Long | Total |
| 2005 | Germany | 29.2 | 0.0 | 70.8 | 100.0 |
| | United Kingdom | 49.3 | 4.3 | 46.4 | 100.0 |
| | Netherlands | 10.3 | 0.0 | 89.7 | 100.0 |
| | Denmark | 17.2 | 0.0 | 82.8 | 100.0 |
| | EU4 | 30.0 | 0.8 | 69.2 | 100.0 |
| 2006 | Germany | 27.4 | 0.9 | 71.7 | 100.0 |
| | United Kingdom | 41.5 | 7.7 | 50.8 | 100.0 |
| | Netherlands | 26.2 | 0.0 | 73.8 | 100.0 |
| | Denmark | 19.2 | 0.0 | 80.8 | 100.0 |
| | EU4 | 29.2 | 1.9 | 68.9 | 100.0 |

***Table 4.*** Emission allowance position in % of companies by country and year, the position resulting from the difference between allocated allowances and verified emission in tons equivalents
'Short' means additional demand of $CO_2$ certificates, 'balanced' is an equilibrium between allocated allowances and verified emissions, 'long' signifies a surplus of certificates; data are based on the Community Independent Transaction Log (CITL), only companies that participated in the study, results are unmatched and unweighted, 2005 $N = 380$, 2006 $N = 367$.
*Fewer than 10 cases in both years.

Source: Engels et al. (2008, p.282)

## Notes

[1] Hall and Soskice also bring up a loose definition of a ‚Network Market Economy (NME)' and of course, mixed forms and systems in between these more extreme types have to be acknowledged. However, these further definitions are not relevant to this paper (Hall & Soskice 2009; Hancké 2009).

[2] There are different concepts and opinions on employee-protection depending on what aspect is seen as the most important. However, the UK nearly always ranks low in the European context although it is not always seen as the lowest as such (Krumm & Noetzel 2006).

[4] The Kyoto Protocol was supposed to mark the agreement for worldwide emission saving based on the ETS mechanism. However although Clinton signed the treaty, this agreement was later overturned in the senate and the USA therefore did not participate. After the 'loss' of the USA, many other countries did not participate in full scale and the treaty lost its international aspect (Ellerman 2010; Giddens 2009).

[5] Regarding European Integration Theory, the implementation of EU ETS has mostly been described as an act of Multilevel Governance, because supra- and international leadership and decisions were key. However, approaches from Liberal Intergovernmentalism, strengthening the national perspectives, as well as Social Constructivism, setting emphasis on the discourse aspect are also recurring (Braun 2009; Skjærseth & Wettestad 2010). From a Neoclassical Economics perspective, the most desirable mode of integration of such a policy would be on a multilevel basis (Marks & Hooghe 2000), however the EU ETS is mostly seen as a certain hybrid of central and multilevel governance, since the implementation is divided between the Commission and national level (Praetorius et al. 2008).

[6] It is important to note at this point, that the results towards policy-integration and -use do not allow conclusions towards the ultimate success of the policy itself, which would be measured quite differently. There is an ongoing debate about possible measurements of the overall success of the mechanism considering its ultimate goal of emission reduction. See for this purpose: Böhm et al. (2012), Storm (2009) and Wellman (2014). However, this debate does not directly connect with the aim of this paper.

[7] A quantitative comparison is not very meaningful due to the very different legal systems in the two countries (Robinson 2007; Teubner 2001).

[8] This analysis limits itself to the discursive aspect of Hajers debate-analysis because the other aspects are not adequately measurable in this context as well as the most other aspects of Hajers complete analysis would not lead to significant scientific gain for this thesis (as for example the exact power structures during the actual debate and its visual symbols). See for further information Hajer (2002, 2003, 2005).

[9] These late states were repeatedly referred to as "laggard states" by the opposition (HC 2004c).

[10] In consideration of the significant enlargement of the Union in 2004, many in the UK were concerned of a wave of Eastern European immigrants coming to the island. Furthermore, many feared that British businesses will emigrate to the new MS as soon as possible to save production costs (HC 2003a, 2004c; Townsend 11.01.04).

[11] The FOE saw the British NAP as a chance for climate-friendly economic development and an example for other MS to follow rather than a danger to British industry (Blair attacked 27.10.04; Okereke 2007).

[12] It is unclear what exactly made the cabinet decide on this specific number as the negotiations on the NAP were held predominantly in closed meetings and there were no exact records taken as to who was present at which meeting. Margaret Beckett stated later on, that she was the only one present at all meetings except for one-on-one talks of Blair with industry representatives (Lovell et al. 2009; Radford 09.12.04)

[13] Margaret Beckett later on admitted her deep disappointment in the last change of the NAP and considered the last minute change a defeat for her policy. In general perception, the industry and its lobbyists had won the battle about certificate allocation in the UK (Radford 09.12.04).

[14] The 'Agenda 2010' tackled among others policies regarding unemployment institutions and the labour market, pensions, social- and health insurance and education. The most famous reforms are the Hartz IV reforms regarding the unemployment institutions and payments. Generally, the Agenda 2010 remodelled the German economy in a profound way with implications for all policy-areas. These reforms were debated fiercely and sparked a lot of conflict in the German society as well as in the governing coalition. This lengthy programme of reforms occupied a lot of the ministry-capacities at the time and therefore delays in policy-implementation were seen regularly (Meyer 2004; Niejahr 09.06.04).

[15] Clement refused to accept Trittin's view categorically since he viewed the consequences of a decline in big industrial sectors, such as the coal industry, as too expensive in the already difficult labour-market of the time. Additionally he argued, that some fossil energy might be more efficient than renewable and therefore the NAP should be adjusted to avoid distortion of competition towards renewable energies as such (Fickinger 11.05.04). The conflict between the two men fed many speculations about a break-up of the coalition of the Grünen and the SPD. In an interim development, Clement even threatened with his resignation if his demands were not met (Germis 21.03.04).

[16] Schröder initially strongly opposed interfering in the discussions between Clement and Trittin. However, the debate became so intense, that a breakup of the coalition was feared and Schröder was pressured by both parties to speak a „word of power" (Fickinger, Koch 03.02.04, Schäfers 02.02.04b).

[17] It was commonly interpreted that Clement was able to assert himself in his protective policy aims (Sturbeck & Bünder 31.03.04; Mihm, Bannas & Schilder 31.03.04). Generally Trittin was handled as the loser of this battle (Mihm 31.03.04; Vorholz & Geis 01.04.04). In return for his concessions regarding the amount of certificates, however, Trittin was able to prevent an excessive amount of exceptions for the coal industry. Therefore one could argue for a draw in this dispute as well (Fickinger 26.05.04; Fickinger 06.05.04; Leithäuser 31.03.04).

[18] The criticism focused on two major points. First, a number of representatives accused the government of purposely calculating very tight time-frames for its policies to reduce interference from the parliament. This argument led to a discussion of the role of the parliament as such and the feeling of the opposition of being circumvented by the governing coalition (BT 2003, 2004a; Fickinger 10.02.04). The second big discussion point reflects the initial dispute between Clement and Trittin again. Many representatives perceived the amount of allocated certificates too low and therefore a threat to the already struggling German industry (BT 2004a; Leithäuser 30.03.04). Some members of the Green Party also voiced their concern over the amount of certificates being too high and therefore negating the desired effect of the ETS (BT 2004a; Lohse & Schuller 04.04.04; Mihm, Bannas & Schilder 31.03.04; Vorholz 03.06.04).

[19] The opposition even called the intense battle proof for the failure of the coalition in the long term (Fickinger 20.03.04). The FDP called the whole process "a fiasco" ("Ein Trauerspiel", Fickinger 13.03.04). Birgit Homburger from the FDP further accused Trittin of trying to introduce structural policy through the ETS, undermining the free market (Fickinger 02.03.04), a claim that Clement expressed frequently as well (Fritz-Vannahme 09.02.04).

[20] The secretary for energy of North Rhine-Westphalia, Axel Horstmann, strongly opposed the first drafts of the NAP and Trittin's general vision of the ETS introduction. North Rhine-Westphalia is traditionally the headquarter of large energy-suppliers which are also strongly based on coal and lignite as an energy source. As such, the ETS was very controversial in that Land. This dispute never reached the Bundesrat as an institution, because Clement fought for the North Rhine-Westphalian interests in that matter as explained above. However, the general aversion towards Trittin's plans from North Rhine-Westphalia and, to a lesser extent but also noticeable, Lower Saxony, formed the discussion in the Bundesrat later on (BR 2004; Trittin muss… 01.03.04).
Another smaller source of conflict stemmed from the East German Federal states of the former GDR. They threatened to sue the government for their initial NAP, because the amount of emissions that the Federal

states have to decrease were initially based on the 1990-baselines that also Kyoto used. These measurements did not include the considerable improvement made in environmental adjustment and development that had taken place in East Germany after the reunification (Geinitz 24.03.04). This problem was, however, understood by the government and the other Federal states and was therefore solved quickly by adjusting the NAP for the East German Federal states (Kobes 2004).

[21] All articles concerning emission trading as such, the EU ETS or climate change policies directly or as side-notes, reference or the like were included in the analysis. The respective Sunday-issues were included in the analysis.

[22] Both newspapers covered the increasing clinch between the two secretaries and the seemingly insolvable situation. The FAZ stood out more in this phase because it featured quite a few articles, which speculated if the coalition would break up through this dispute (Mihm & Fickinger 27.03.04; Leithäuser 23.03.04; Germis 21.03.03). The intervention of the chancellor was also covered extensively here (Mihm 24.03.04). However, Die Zeit also covered the ETS debate in a very dramatic way and asked the question, if a compromise will ever be found in the current environmental policy at all (Vorholz 25.03.04).

[23] Both newspapers agree that Trittin lost the battle. However, as the FAZ issued more articles on the compromise, that paper also presents a little more variety to it and values Trittin's small successes as well (Mihm 31.03.04). Die Zeit issued one long article, which clearly demoted Trittin's efforts to a nearly complete failure (Vorholz & Geis 01.04.04). In total it has to be stressed though, that Trittin was treated as the loser.

[24] Blair attacked 27.10.04; Blairs global warning 15.09.04; Clover 25.02.04, 13.04.04, 14.09.04; Gray 13.04.04; Happold 13.09.04; Lucas 08.06.04; Milner 28.10.04; Moore 03.11.04; Murray-Watson 10.10.04; Radford 09.12.04; Tempest 27.04.04.

[25] Additionally, from an economic theory perspective, one would also have to include the opportunity costs, because in theory one could sell certificates.

[26] It is debated, what proportion of innovations are actually patented. While Kemp and Pontoglio (2011) mention the majority of environmental innovations are missed when one only looks at the patent data, others like Akkermans et al. (2009) talk of "some". Fankhauser et al. (2013) merely mention an analysis of patent data as incomplete and therefore omit the degree of incompleteness as a whole.

[27] E.ON just recently (30.11.2014) announced that the company will sell all its coal and gas power plants until 2016 (E.ON 2014). However, details of this endeavour have not yet been made public and therefore this development is not yet included in this paper.

## Sources

### Reports, Websites, Official- and Legal Documents


4C offshore databases (2014, November 29). Global offshore wind farms database. Retrieved November 29 2014 from http://www.4coffshore.com/windfarms.

British Business Bank (BBB, n.d.). UK Innovation Investment Fund. Retrieved November 5 2014 from http://british-business-bank.co.uk/market-failures-and-how-we-address-them/uk-innovation-investment-fund/.

Bundessecretaryium für Wirtschaft und Arbeit (BMWA, 2012). Innovation and New Energy Technologies. Retrieved from http://www.bmwi.de/BMWi/Redaktion/PDF/E/energie forschungsprogramm-englisch,property=pdf,bereich=bmwi2012,sprache=en,rwb= true.pdf.

Bundessecretaryium für Wirtschaft und Energie (BMWi, 2011). Research for an environmentally sound, reliable and affordable energy supply. Retrieved from http://www.bmwi.de/English/Redaktion/Pdf/6th-energy-research-programme-of-the -federal-government,property=pdf,bereich=bmwi2012,sprache=en,rwb=true.pdf.

Bundessecretaryium für Wirtschaft und Energie (BMWi, n.d.). Zentrales Innovationsprogramm Mittelstand – ZIM. Retrieved November 4 from http://www. zim-bmwi.de.

Bundesnetzagentur (2014, October 29). Kraftwerksliste. Retrieved October 22 2014 from http://www.bundesnetzagentur.de/DE/Sachgebiete/ElektrizitaetundGas/Unternehm en_Institutionen/Versorgungssicherheit/Erzeugungskapazitaeten/Kraftwerksliste/kra ftwerksliste-node.html.

Bundesrat (BR, 2004). Plenarprotokoll 800 (June 11 2004). Retrieved from http://www.bundesrat.de/SharedDocs/downloads/DE/plenarprotokolle/2004/Plenar protokoll-800.pdf;jsessionid=D5DEE737C0806BD9A66639394B5960A2.2_cid339?__ blob=publicationFile&v=2.

Bundesregierung (n.d.). Leitbild eines innovativen Deutschlands. Retrieved November 5 from http://www.hightech-strategie.de/de/Leitbild-13.php.

Case T-28/07: Fels-Werke GMBH and Others v. Commission [2007] ECR II-00098.

Case T-387/04: ENBW Energy Baden Württemberg AG v. Commission [2007] ECR II-01195.

Case C-503/07: Saint-Gobain v. European Commission [2008] ECR I-02217.

Case T-374/04: Germany v. Commission [2007] ECR II-04431.

Centrica (2007). Annual Report. Retrieved from http://www.centrica.com/files/reports /2007ar/files/2007_annual_report.pdf.

Centrica (2008). Annual Report. Retrieved from http://www.centrica.com/files/reports/ 2008ar/files/Centrica_Annual_Report_2008.pdf.

Centrica (2009). Annual Report. Retrieved from http://www.centrica.com/files/reports/ 2009ar/files/pdf/Centrica_Annual_Report_2009.pdf.

Centrica (2010). Annual Report. Retrieved from http://www.centrica.com/files/reports/ 2010ar/files/pdf/centrica_annual_report_2010.pdf.

Centrica (2011). Annual Report. Retrieved from http://www.centrica.com/files/reports/2011ar/files/pdf/centrica_annual_report_2011.pdf.

Centrica (2012). Annual Report. Retrieved from https://www.centrica.com/files/reports/2012ar/files/pdf/centrica_annual_report_2012.pdf.

Centrica (2013). Annual Report. Retrieved from http://www.centrica.com/files/reports/2013ar/files/pdf/centar13_annualreport.pdf.

Department for Transport (DfT, 2007). Low Carbon Transport Innovation Strategy. Retrieved from http://webarchive.nationalarchives.gov.uk/20081022212629/http:/www.dft.gov.uk/pgr/scienceresearch/technology/lctis/lctisdocpdf.

Department of Energy and Climate Change (DECC, 2014). Digest of United Kingdom Energy Statistics 2014. Retrieved from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/338750/DUKES_2014_printed.pdf.

Department of Energy and Climate Change (DECC, 2008). Climate Change Agreements. Retrieved from http://webarchive.nationalarchives.gov.uk/20121217150421/http://decc.gov.uk/assets/decc/what%20we%20do/global%20climate%20change%20and%20energy/tackling%20climate%20change/ccas/ccas_guidance/cca-b02.pdf.

DEHSt (2014, January 1). Grundlagen des Emissionshandels. Retrieved August 8, 2014 from http://www.dehst.de/DE/Emissionshandel/Grundlagen/grundlagen_node.html.

Deutscher Bundestag (BT, 2003). Kleine Anfrage der Abgeordneten Dr. Peter Paziorek, Marie-Luise Dött, Dr. Klaus W. Lippold (Offenbach), Karl-Josef Laumann, Dagmar Wöhrl, Veronika Bellmann, Dr. Rolf Bietmann, Wolfgang Börnsen (Bönstrup), Cajus Caesar, Albert Deß, Alexander Dobrindt, Dr. Maria Flachsbarth, Dr. Hans-Peter Friedrich (Hof), Dr. Michael Fuchs, Georg Girisch, Dr. Reinhard Göhner, Tanja Gönner, Josef Göppel, Kurt-Dieter Grill, Robert Hochbaum, Ernst Hinsken, Dr. Martina Krogmann, Dr. Hermann Kues, Doris Meyer (Tapfheim), Wolfgang Meckelburg, Friedrich Merz, Laurenz Meyer (Hamm), Franz Obermeier, Dr. Joachim Pfeiffer, Ulrich Petzold, Hans-Peter Repnik, Dr. Heinz Riesenhuber, Franz Romer, Hartmut Schauerte, Johannes Singhammer, Max Straubinger, Werner Wittlich und der Fraktion der CDU/CSU. Drucksache 15/2201. Retrieved from http://dip21.bundestag.de/dip21/btd/15/022/1502201.pdf.

Deutscher Bundestag (BT, 2004a). Plenarprotokoll 15/87 (January 16 2004). Retrieved from http://dip21.bundestag.de/dip21/btp/15/15087.pdf.

Deutscher Bundestag (BT, 2004b). Antwort der Bundesregierung auf die Kleine Anfrage der Abgeordneten Dr. Peter Paziorek, Marie-Luise Dött, Dr. Klaus W. Lippold (Offenbach), weiterer Abgeordneter und der Fraktion der CDU/CSU. Drucksache 15/2459. Retrieved from http://dip21.bundestag.de/dip21/btd/15/024/1502459.pdf.

Deutscher Bundestag (BT, 2004c). Plenarprotokoll 15/98 (March 12 2004). Retrieved from http://dip21.bundestag.de/dip21/btp/15/15098.pdf.

Deutschland – Land der Ideen (n.d.). Retrieved November 5 2014 from https://www.land-der-ideen.de/initiative/entstehung/ein-positives-bild.

E.ON (2007). Geschäftsbericht 2007. Retrieved from http://www.eon.com/content/dam/eon-com/de/downloads/e/EON_Geschaeftsbericht_2007.pdf.

E.ON (2008). Geschäftsbericht 2008. Retrieved from http://www.eon.com/content/dam/eon-com/de/downloads/u/Unternehmensbericht_E.ON2008_DE.pdf

E.ON (2009). Geschäftsbericht 2009. Retrieved from http://www.eon.com/content/dam/eon-com/de/downloads/e/E.ON_Unternehmensbericht_2009_.pdf.

E.ON (2010). Geschäftsbericht 2010. Retrieved from http://www.eon.com/content/dam/eon-com/de/downloads/2/2010_E.ON_Geschaeftsbericht.pdf.

E.ON (2011). Geschäftsbericht 2011. Retrieved from http://www.eon.com/content/dam/eon-com/de/downloads/e/E.ON_Geschaeftsbericht_2011.pdf.

E.ON (2012). Geschäftsbericht 2012. Retrieved from http://www.eon.com/content/dam/eon-com/ueber-uns/GB_2012_D_eon.pdf.

E.ON (2013). Geschäftsbericht 2013. Retrieved from http://www.eon.com/content/dam/eon-com/ueber-uns/publications/GB_2013_D_eon.pdf.

E.ON (2014). Neue Konzernstrategie. Retrieved December 4 2014 from http://www.eon.com/de/presse/pressemitteilungen/pressemitteilungen/2014/11/30/new-corporate-strategy-eon-to-focus-on-renewables-distribution-networks-and-customer-solutions-and-to-spin-off-the-majority-of-a-new-publicly-listed-company-specializing-in-power-generation-global-energy-trading-and-exploration-and-production.html.

EDF (2007). Annual Report. Retrieved November 3 2014 from http://www.edf.com/html/RA2007/uk/accueil.html.

EDF (2008). Annual Report. Retrieved November 3 2014 from http://www.edf.com/html/RA2008/uk/.

EDF (2009). Annual Report. Retrieved November 3 2014 from http://www.edf.com/html/RA2009/uk/.

EDF (2010). Annual Report. Retrieved November 3 2014 from http://www.edf.com/html/RA2010/en/.

EDF (2011). Annual Report. Retrieved November 3 2014 from http://www.edf.com/html/RA2011/en/.

EDF (2012). Annual Report. Retrieved November 3 2014 from http://www.edf.com/html/ra2012/en/.

EDF (2013). Annual Report. Retrieved November 3 2014 from http://shareholders-and-investors.edf.com/news-and-publications/publications/regulatory-information/annual-reports-42724.html.

EnBW (2007). Geschäftsbericht 2007. Retrieved from https://www.enbw.com/media/downloadcenter-konzern/geschaeftsberichte/enbw-geschaeftsbe richt-2007.pdf.

EnBW (2008). Geschäftsbericht 2008. Retrieved from https://www.enbw.com/media/downloadcenter-konzern/geschaeftsberichte/enbw-geschaeftsbe richt-2008.pdf.

EnBW (2009). Geschäftsbericht 2009. Retrieved from https://www.enbw.com/media/downloadcenter-konzern/geschaeftsberichte/enbw-geschaeftsbe richt-2009.pdf.

EnBW (2010). Geschäftsbericht 2010. Retrieved from https://www.enbw.com/media/downloadcenter-konzern/geschaeftsberichte/enbw-geschaeftsbericht-2010.pdf.

EnBW (2011). Geschäftsbericht 2011. Retrieved from https://www.enbw.com/media/downloadcenter-konzern/geschaeftsberichte/enbw-geschaeftsbe richt-2011.pdf.

EnBW (2012). Jahreabschlussbericht 2012. Retrieved from https://www.enbw.com/media/downloadcenter-konzern/jahresabschluss-der-enbw-ag/jahresab schluss-der-enbw-ag-2012.pdf.

EnBW (2013). Jahreabschlussbericht 2013. Retrieved from https://www.enbw.com/media/investoren/docs/news-und-publikationen/jahresabschluss-enbw-konzern-2013.pdf.

Energy Technologies Institute (ETI, n.d.). About Us. Retrieved November 5 2014 from http://www.eti.co.uk/about-us/.

Energy Saving Trust (n.d.). What we do. Retrieved November 5 2014 from http://www.energysavingtrust.org.uk/corporate/what-we-do.

European Commission (2014, January 1). Energy Economic Developments in Europe (Departement-General for Economic and Financial Affairs). Retrieved August 3 2014 from http://ec.europa.eu/economy_finance/publications/european_economy/2014/energy-economic-developments-in-europe_en.htm.

European Energy Exchange (EEX) (2014, July 23). European Emission Allowances. Retrieved July 23 2014 from http://www.eex.com/en/market-data/emission-allowances/spot-market/European-emission-allowances#!/2014/06/23.

GOV.UK (2013, January 11). Reducing the UK's greenhouse gas emissions by 80% by 2050. Retrieved August 12, 2014 from https://www.gov.uk/government/policies/reducing-the-uk-s-greenhouse-gas-emissions-by-80-by-2050/supporting-pages/eu-emissions-trading-system-EU ETS.

GOV.UK (2014, April 9). Climate change agreements. Retrieved August 8, 2014 from https://www.gov.uk/climate-change-agreements--2.

House of Commons (HC, 2003a).Monday 27 January 2003. Oral Answers to Questions – Electricity Bill. Retrieved August 1 2014 from http://www.publications.parliament.uk/pa/cm200203/cmhansrd/vo030127/debtext/30127-09.htm.

House of Commons (HC, 2003b). Thursday 16 October 2003. Written Answers to Questions – Climate Change. Retrieved August 1 2014 from http://www.publications.parliament.uk/pa/cm200203/cmhansrd/vo031016/text/31016w03.htm#31016w03.html_wqn3.

House of Commons (HC, 2004a). Thursday 22 July 2004. Oral Answers to Questions – Climate Change. Retrieved August 1 2014 from http://www.publications.parliament.uk/pa/cm200304/cmhansrd/vo040722/debtext/40722-01.htm.

House of Commons (HC, 2004b). Thursday 22 July 2004. Oral Answers to Questions – Emissions Trading Scheme. Retrieved August 1 2014 from http://www.publications.parliament.uk/pa/cm200304/cmhansrd/vo040722/debtext/40722-05.htm.

House of Commons (HC, 2004c). Monday 8 November 2004. Oral Answers to Questions – EU Summit. Retrieved August 1 2014 from http://www.publications.parliament.uk/pa/cm200304/cmhansrd/vo041108/debtext/41108-11.htm#41108-11_spmin4.

Innovation Nation (n.d.). Executive Summary. Retrieved from http://webarchive.nationalarchives.gov.uk/20100503135839/http:/dius.gov.uk/assets/biscore/corporate/migratedd/publications/i/innovation_nation_exec_summary.pdf.

Kreditanstalt für Wiederaufbau (KfW, n.d.). Die moderne KfW – Bank aus Verantwortung. Retrieved November 4 from https://www.kfw.de/KfW-Konzern/%C3%9Cber-die-KfW/Identit%C3%A4t/Bank-aus-Verantwortung.

Low Carbon Vehicles Innovation Platform (LCVIP, 2012). Low Carbon Vehicles Innovation Platform. Retrieved November 5 2014 from http://www.lwec.org.uk/activities/low-carbon-vehicles.

RWE (2007). Geschäftsbericht 2007. Retrieved from http://www.rwe.com/web/cms/mediablob/de/114616/data/280350/3/rwe/investor-relations/berichte/2007/de-geschaeftsbericht-2007.pdf.

RWE (2008). Geschäftsbericht 2008. Retrieved from http://www.rwe.com/web/cms/mediablob/de/204578/data/280318/1/rwe/investor-relations/berichte/2008/Geschaeftsbericht-2008-PDF-Download-.pdf.

RWE (2009). Geschäftsbericht 2009. Retrieved from http://www.rwe.com/web/cms/mediablob/de/387726/data/239998/5/rwe/investor-relations/berichte/2009/Geschaeftsbericht-2009-PDF-Download-.pdf.

RWE (2010). Geschäftsbericht 2010. Retrieved from http://www.rwe.com/web/cms/mediablob/de/543514/data/414532/4/rwe/investor-relations/berichte/2010/RWE-Geschaeftsbericht-2010.pdf.

RWE (2011). Geschäftsbericht 2011. Retrieved from http://www.rwe.com/web/cms/mediablob/de/1299142/data/634422/9/rwe/investor-relations/berichte/ 2011/RWE-Geschaeftsbericht-2011.pdf.

RWE (2012). Geschäftsbericht 2012. Retrieved from http://www.rwe.com/web/cms/mediablob/de/1838518/data/1838296/8/rwe/investor-relations/hauptversammlung/hauptversammlung-2013/geschaeftsbericht-2012/RWE-Geschaeftsbericht 2012.pdf.

RWE (2013). Geschäftsbericht 2013. Retrieved from http://www.rwe.com/web/cms/mediablob/de/2320250/data/0/4/RWE-Geschaeftsbericht-2013.pdf.

Scottish Government (2013, September 10). EU Emissions Trading Scheme. Retrieved September 9 2014 from http://www.scotland.gov.uk/topics/environment/climatechange/international-action/eu/euets.

ScottishPower (2009). Segmental Generation and Supply Statements for the Year Ended 31 December 2009. Retrieved from http://www.scottishpower.com/userfiles/file/GenerationSupplyStatement31Dec2009.pdf.

ScottishPower (2010). Segmental Generation and Supply Statements for the Year Ended 31 December 2010. Retrieved from http://www.scottishpower.com/userfiles/file/GenerationSupplyStatement31Dec2010.pdf.

ScottishPower (2011). Segmental Generation and Supply Statements for the Year Ended 31 December 2011. Retrieved from http://www.scottishpower.com/userfiles/file/GenerationSupplyStatement31Dec2011.pdf.

ScottishPower (2012). Annual Reports and accounts for the Year Ended 31 December 2012. Retrieved from http://www.scottishpowerrenewables.com/userfiles/file/Consolidated_Report_%26_Accounts_Scottish_Power_UK_plc_2012.pdf.

ScottishPower (2013). Annual Reports and accounts for the Year Ended 31 December 2013. Retrieved from http://www.scottishpower.com/userfiles/document_library/Consolidated_Report_&_Accounts_Scottish_Power_UK_plc_2013.pdf.

SEPA (n.d.). How does the system work? Retrieved August 12, 2014 from http://www.sepa.org.uk/climate_change/solutions/eu_emissions_trading_system/how_does_the_system_work.aspx.

SSE (2007). Annual Report. Retrieved from http://sse.com/media/108164/2007AnnualReportAndAccounts.pdf.

SSE (2008). Annual Report. Retrieved from http://sse.com/media/108185/2008AnnualReportAndAccounts.pdf.

SSE (2009). Annual Report. Retrieved from http://sse.com/media/108215/2009AnnualReportAndAccounts.pdf.

SSE (2010). Annual Report. Retrieved from http://sse.com/media/108238/2010AnnualReportAndAccounts.pdf.

SSE (2011). Annual Report. Retrieved from http://sse.com/media/108348/SSE_AnnualReport2011.pdf.

SSE (2012). Annual Report. Retrieved from http://sse.com/media/108440/SSE_AnnualReport2012.pdf.

SSE (2013). Annual Report. Retrieved from http://sse.com/media/108594/SSEplcAnnualReport2013_optimised.pdf.

Trade Union Congress (TUC, 2004). Congress 2004 GPC Report and Composite Motions. Retrieved August 15 2014 from http://www.tuc.org.uk/about-tuc/congress/congress-2004/congress-2004-gpc-report-and-composite-motions.

Vattenfall (2007). Geschäftsbericht 2007. Retrieved from http://corporate.vattenfall.de/globalassets/deutschland/finanzberichte/geschaftsbericht_2007.pdf.

Vattenfall (2008). Das Jahr 2008 in Zahlen und Fakten. Retrieved from http://corporate.vattenfall.de/globalassets/deutschland/finanzberichte/zahlen_und_fakten_2008.pdf.

Vattenfall (2009). Das Jahr 2009 in Zahlen und Fakten. Retrieved from http://corporate.vattenfall.de/globalassets/deutschland/finanzberichte/zahlen_und_fakten_2009.pdf.

Vattenfall (2010). Das Jahr 2010 in Zahlen und Fakten. Retrieved from http://corporate.vattenfall.de/globalassets/deutschland/finanzberichte/zahlen_und_fakten_2010.pdf.

Vattenfall (2011). Das Jahr 2011 in Zahlen und Fakten. Retrieved from http://corporate.vattenfall.de/globalassets/deutschland/finanzberichte/zahlen_und_fakten_2011.pdf.

Vattenfall (2012). Geschäftsbericht 2012. Retrieved from http://corporate.vattenfall.de/globalassets/deutschland/finanzberichte/annual_report_deutsch_2012.pdf.

Vattenfall (2013). Geschäftsbericht 2013. Retrieved from http://corporate.vattenfall.de/globalassets/deutschland/corporate_governance/geschaefts_und_nachhaltigkeitsbericht_2013.pdf.

World Wildlife Fund (WWF, 2007). Dirty Thirty - Ranking of the most polluting power stations in Europe. Retrieved from http://d2ouvy59p0dg6k.cloudfront.net/downloads/european_dirty_thirty_may_2007.pdf.

## Literature


Akkermans, D., Castaldi, C., & Los, B. (2009). Do 'liberal market economies' really innovate more radically than 'coordinated market economies'?: Hall and Soskice reconsidered. *Research Policy, 38*(1), 181-191.

Alberola, E., Chevallier, J., & Chèze, B. (2009). Emissions compliances and carbon prices under the EU ETS: a country specific analysis of industrial sectors. *Journal of Policy Modeling, 31*(3), 446-462.

Alexeeva-Talebi, V. (2010). Cost pass-through in strategic oligopoly: sectoral evidence for the EU ETS. *ZEW-Centre for European Economic Research Discussion Paper*(10-056).

Alexeeva-Talebi, V. (2011). Cost pass-through of the EU emissions allowances: Examining the European petroleum markets. *Energy Economics, 33*, 75-S83.

Allen, M. M. (2006). *The Varieties of Capitalism Paradigm: Explaining Germany's Comparative Advantage?* : Palgrave.

Anger, N., & Oberndorfer, U. (2008). Firm performance and employment in the EU emissions trading scheme: An empirical assessment for Germany. *Energy Policy, 36*(1), 12-22.

Armbruster, H., Bikfalvi, A., Kinkel, S., & Lay, G. (2008). Organizational innovation: The challenge of measuring non-technical innovation in large-scale surveys. *Technovation, 28*(10), 644-657.

Azevedo, S. G., Brandenburg, M., Carvalho, H., & Cruz-Machado, V. (2014). Developments and Directions of Eco-innovation *Eco-Innovation and the Development of Business Models* (pp. 1-15): Springer.

Babbie, E. R. (2013). *The practice of social research*. Belmont: Cengage Learning.

Bailey, I. (2007). Market environmentalism, new environmental policy instruments, and climate policy in the United Kingdom and Germany. *Annals of the Association of American Geographers, 97*(3), 530-550.

Bailey, I. (2010). The EU emissions trading scheme. *Wiley Interdisciplinary Reviews: Climate Change, 1*(1), 144-153.

Baldwin, R., Cave, M., & Lodge, M. (2012). *Understanding regulation: theory, strategy, and practice*: Oxford University Press.

Bartlett, D. (2013). Eco-innovation *Encyclopedia of Corporate Social Responsibility* (pp. 865-870): Springer.

Becker, U. (2007). Open systemness and contested reference frames and change. A reformulation of the varieties of capitalism theory*. *Socio-Economic Review, 5*(2), 261-286.

Benz, E., Löschel, A., & Sturm, B. (2010). Auctioning of CO2 emission allowances in Phase 3 of the EU Emissions Trading Scheme. *Climate Policy, 10*(6), 705-718.

Bercusson, B. (2009). *European labour law*: Cambridge University Press.

Bieling, H.-J. (2011). Varieties of Capitalism, Regulationstheorie und neogramscianische IPÖ: Komplementäre oder gegensätzliche Perspektiven des globalisierten Kapitalismus? *Discussion papers, 23*.

Böhm, S., Misoczky, M. C., & Moog, S. (2012). Greening capitalism? A Marxist critique of carbon markets. *Organization Studies, 33*(11), 1617-1638.

Bolton, R., & Foxon, T. J. (2011). Governing infrastructure networks for a low carbon economy: co-evolution of technologies and institutions in UK electricity distribution networks. *Competition & Reg. Network Indus., 12*, 2.

Braun, M. (2009). The evolution of emissions trading in the European Union–The role of policy networks, knowledge and policy entrepreneurs. *Accounting, Organizations and Society, 34*(3), 469-487.

Brunnengräber, A. (2008). Klima-Kapitalismus der Europäischen Union. In E. Altvater & A. Brunnengräber (Eds.), *Ablasshandel gegen Klimawandel* (pp. 133-148). Hamburg: VSA-Verlag.

Callaghan, H. (2012). Reversing the causal arrow: how ownership structure shapes party positions in Britain, Germany and France. In M. Ido (Ed.), *Varieties of capitalism, types of democracy and globalization* (pp. 80-105). Abingdon: Routledge.

Callaghan, H., & Ido, M. (2012). Introduction: Varieties of Capitalism, Types of Democracy, and Globalization *Varieties of Capitalism, Types of Democracy and Globalization* (pp. 3-16): Routledge.

Cames, M. (2010). *Emissions Trading and Innovation - A Theoretical and Empirical Analysis with a Specific Focus on the German Electricity Industry*. Saarbrücken: Südwestdeutscher Verlag für Hochschulschriften.

Carter, N. (2008). Combating Climate Change in the UK: Challenges and Obstacles1. *The Political Quarterly, 79*(2), 194-205.

Carvalho, A., & Burgess, J. (2005). Cultural circuits of climate change in UK broadsheet newspapers, 1985–2003. *Risk analysis, 25*(6), 1457-1469.

Casper, S. (2001). The legal framework for corporate governance: The influence of contract law on company strategies in Germany and the United States. In P. A. Hall & D. Soskice (Eds.), *Varieties of capitalism: The institutional foundations of comparative advantage* (pp. 387-416).

Castagneto-Gissey, G. (2014). How competitive are EU electricity markets? An assessment of ETS Phase II. *Energy Policy, 73*, 278-297.

Catney, P., & Doyle, T. (2011). Callenges to the state. In T. Fitzpatrick (Ed.), *Understanding the Environment and Social Policy* (pp. 91-109). Bristol: The Policy Press.

Cecere, G., Corrocher, N., Gossart, C., & Ozman, M. (2012). Patterns of Innovation in Green ICT: A Patent-Based Analysis. *Available at SSRN 2117831*.

Chen, Y.-S., Chang, C.-H., & Lin, Y.-H. (2014). The Determinants of Green Radical and Incremental Innovation Performance: Green Shared Vision, Green Absorptive Capacity, and Green Organizational Ambidexterity. *Sustainability, 6*(11), 7787-7806.

Coates, D. (2005). Paradigms of explanation. In D. Coates (Ed.), *Varieties of capitalism, varieties of approaches, Palgrave Macmillan, Basingstoke, Hampshire* (pp. 1-26). Hampshire.

Coggan, P. (2009). *The money machine: how the city works*: Penguin UK.

Convery, F. J. (2009). Origins and development of the EU ETS. *Environmental and Resource Economics, 43*(3), 391-412.

Culpepper, P. D. (2001). Employers, public policy, and the politics of decentralized cooperation in Germany and France. In P. A. Hall & D. Soskice (Eds.), *Varieties of Capitalism - The Institutional Foundations of Comparative Advantage* (pp. 275-306). Oxford: Oxford University Press.

Dechezleprêtre, A., & Martin, R. (2010). Low carbon innovation in the UK, evidence from patent data. *Report for the UK Committee on Climate Change, Centre for Climate Change Economics and Policy, Grantham Research Institute on Climate Change and the Environment, 4*.

Demirel, P., & Kesidou, E. (2011). Stimulating different types of eco-innovation in the UK: Government policies and firm motivations. *Ecological Economics, 70*(8), 1546-1557.

Donnelly, S. (2011, 20.10.). The Regimes of European Regulation in Europe. *The European Financial Review*.

Ekins, P., & Etheridge, B. (2006). The environmental and economic impacts of the UK climate change agreements. *Energy Policy, 34*(15), 2071-2086.

Ellerman, D. (2010). 3 The EU emission trading scheme: a prototype global system? *Post-Kyoto international climate policy: Implementing architectures for agreement*, 88.

Ellerman, D., & McGuinness, M. (2008). CO2 abatement in the UK power sector: evidence from the EU ETS trial period.

Engels, A. (2009). The European Emissions Trading Scheme: An exploratory study of how companies learn to account for carbon. *Accounting, Organizations and Society, 34*(3), 488-498.

Engels, A., Hisschemöller, M., & von Moltke, K. (2006). When supply meets demand, yet no market emerges: the contribution of integrated environmental assessment to the rationalisation of EU environmental policy-making. *Science and Public Policy, 33*(7), 519-528.

Engels, A., Knoll, L., & Huth, M. (2008). Preparing for the 'real'market: national patterns of institutional learning and company behaviour in the European emissions trading scheme (EU ETS). *European Environment, 18*(5), 276-297.

Estevez-Abe, M., Iversen, T., & Soskice, D. (2001). Social protection and the formation of skills: a reinterpretation of the welfare state. In P. A. Hall & D. Soskice (Eds.), *Varieties of capitalism. The institutional foundations of comparative advantage, Oxford* (pp. 145-183).

Fankhauser, S., Bowen, A., Calel, R., Dechezleprêtre, A., Grover, D., Rydge, J., & Sato, M. (2013). Who will win the green race? In search of environmental competitiveness and innovation. *Global environmental change, 23*(5), 902-913.

Fischer, C. (2008). Emissions pricing, spillovers, and public investment in environmentally friendly technologies. *Energy Economics, 30*(2), 487-502.

Fitzpatrick, T. (2011). Challenges for social policy. In T. Fitzpatrick (Ed.), *Understanding the Environment and Social Policy* (pp. 61-89). Bristol: The Policy Press.

Gagelmann, F., & Frondel, M. (2005). The impact of emission trading on innovation–science fiction or reality? *European Environment, 15*(4), 203-211.

Giddens, A. (2009). The politics of climate change. *Cambridge, UK*.

Gough, I. (2013). Carbon mitigation policies, distributional dilemmas and social policies. *Journal of social policy*.

Gough, I., & Meadowcroft, J. (2011). Decarbonising the welfare state. *Oxford Handbook of Climate Change and Society. Oxford University Press, Oxford*.

Greenacre, P., Gross, R., & Speirs, J. (2012). Innovation Theory: A review of the literature: London.

Hajer, M. A. (2002). Discourse analysis and the study of policy making. *European Political Science*, 61-65.

Hajer, M. A. (2003). Argumentative Diskursanalyse. Auf der Suche nach Koalitionen, Praktiken und Bedeutung *Handbuch sozialwissenschaftliche diskursanalyse* (pp. 271-298): Springer.

Hajer, M. A. (2005). Setting the Stage A Dramaturgy of Policy Deliberation. *Administration & Society, 36*(6), 624-647.

Hall, P. A., & Gingerich, D. W. (2004). „Spielarten des Kapitalismus "und institutionelle Komplementaritäten in der Makroökonomie—Eine empirische Analyse. *Berliner Journal für Soziologie, 14*(1), 5-31.

Hall, P. A., & Gingerich, D. W. (2009). Varieties of capitalism and institutional complementarities in the political economy: an empirical analysis. *British Journal of Political Science, 39*(03), 449-482.

Hall, P. A., & Soskice, D. (2001). An introduction to varieties of capitalism. *Varieties of capitalism: The institutional foundations of comparative advantage, 1*, 21-27.

Hall, P. A., & Soskice, D. (2009). An Introduction to Varieties of Capitalism. In B. Hancké (Ed.), *Debating varieties of capitalism: A reader* (pp. 21-74). Oxford: Oxford University Press.

Hancké, B. (2009). Introducing the Debate. In B. Hancké (Ed.), *Debating varieties of capitalism: A reader* (pp. 1-17). Oxford: Oxford University Press.

Hancké, B., Rhodes, M., & Thatcher, M. (2008). *Beyond varieties of capitalism: conflict, contradictions, and complementarities in the European economy*: Oxford University Press.

Heinrich, D. (2012). *Varieties of capitalism und Innovationssysteme: nationale Muster institutioneller Strategien im Kontext der Globalisierung*: Springer-Verlag.

Herrmann, A. M., & Peine, A. (2011). When 'national innovation system'meet 'varieties of capitalism'arguments on labour qualifications: On the skill types and scientific knowledge needed for radical and incremental product innovations. *Research Policy, 40*(5), 687-701.

Hodgson, G. M. (1996). Varieties of capitalism and varieties of economic theory. *Review of international political economy, 3*(3), 380-433.

Hoffmann, V. H. (2007). Eu ets and investment decisions:: The case of the german electricity industry. *European Management Journal, 25*(6), 464-474.

Ido, M. (2012). Party system change and the transformation of the varieties of capitalism. In M. Ido (Ed.), *Varieties of capitalism, types of democracy and globalization* (pp. 55-79). Abingdon: Routledge.

Jänicke, M. (2012). Dynamic governance of clean-energy markets: how technical innovation could accelerate climate policies. *Journal of Cleaner Production, 22*(1), 50-59.

Kauffmann, C., & Less, C. T. (2010). Transition to a low-carbon economy: Public goals and corporate practices. *background document to the 2010 Roundtable on Corporate responsibility, 30*.

Kemp, R., & Pontoglio, S. (2011). The innovation effects of environmental policy instruments—A typical case of the blind men and the elephant? *Ecological Economics, 72*, 28-36.

Knoll, L., & Engels, A. (2012). Exploring the linkages between carbon markets and sustainable innovations in the energy sector: lessons from the EU emissions trading scheme *Sustainability Innovations in the Electricity Sector* (pp. 97-115): Springer.

Kobes, S. (2004). Grundzüge des Emissionshandels in Deutschland. *Neue Zeitschrift für Verwaltungsrecht (NVwZ)*, 513.

Koch, M. (2012). *Capitalism and Climate Change: Theoretical Discussion, Historical Development and Policy Responses*: Palgrave Macmillan.

Krumm, T., & Noetzel, T. (2006). *Das Regierungssystem Grossbritanniens: eine Einführung*: Oldenbourg Verlag.

Laes, E., Gorissen, L., & Nevens, F. (2014). A Comparison of Energy Transition Governance in Germany, The Netherlands and the United Kingdom. *Sustainability, 6*(3), 1129-1152.

Lanoie, P., Laurent-Lucchetti, J., Johnstone, N., & Ambec, S. (2011). Environmental policy, innovation and performance: new insights on the Porter hypothesis. *Journal of Economics & Management Strategy, 20*(3), 803-842.

Lay, A. (2012). *Massnahmen zum Ausgleich der Kosten des europäischen Emissionszertifikatehandels: eine europa-und WTO-rechtliche Untersuchung*. Basel: Schulthess Juristische Medien.

Liebmann, D. (2009). *Institutional Change in a Varieties of Capitalism Context: How to Explain Shifts from Coordinated Market Economies towards Liberal Market Economies in the 1990s-An Empirical Analysis of Cross-Country Data* (Vol. 20): Rainer Hampp Verlag.

Lovell, H., Bulkeley, H., & Owens, S. (2009). Converging agendas? Energy and climate change policies in the UK. *Environment and planning. C, Government & policy, 27*(1), 90.

Lutz, B. J., Pigorsch, U., & Rotfuß, W. (2013). Nonlinearity in cap-and-trade systems: The EUA price and its fundamentals. *Energy Economics, 40*, 222-232.

Marks, G., & Hooghe, L. (2000). Optimality and authority: a critique of neoclassical theory. *JCMS: Journal of Common Market Studies, 38*(5), 795-816.

Martin, R., Muûls, M., & Wagner, U. (2011). Climate change, investment and carbon markets and prices–evidence from manager interviews. *Climate Strategies, Carbon Pricing for Low-Carbon Investment Project*.

Massai, L. M. (2011). *European climate and clean energy law and policy*: Earthscan.

Meckling, J. (2011). *Carbon coalitions: Business, climate politics, and the rise of emissions trading*: MIT Press.

Meyer, T. (2004). Die Agenda 2010 und die soziale Gerechtigkeit. *Politische Vierteljahresschrift, 45*(2), 181-190.

Mohammadi, H. (2011). Long-run relations and short-run dynamics among coal, natural gas and oil prices. *Applied Economics, 43*(2), 129-137.

Mokinski, F., & Wölfing, N. M. (2014). The effect of regulatory scrutiny: Asymmetric cost pass-through in power wholesale and its end. *Journal of Regulatory Economics, 45*(2), 175-193.

Nell, E., Semmler, W., & Rezai, A. (2008). Wirtschaftswachstum und Globale Klimaerwärmung. In E. Altvater & A. Brunnengräber (Eds.), *Ablasshandel gegen Klimawandel* (pp. 169-184). Hamburg: VSA-Verlag.

Newell, P., & Paterson, M. (2010). *Climate capitalism: global warming and the transformation of the global economy*: Cambridge University Press.

Oberndorfer, U., Alexeeva-Talebi, V., & Löschel, A. (2010). Understanding the competitiveness implications of future phases of EU ETS on the industrial sectors. *ZEW-Centre for European Economic Research Discussion Paper*(10-044).

Okereke, C. (2007). An Exploration of Motivations, Drivers and Barriers to Carbon Management:: The UK FTSE 100. *European Management Journal, 25*(6), 475-486.

Pauli, G. A. (2010). *The blue economy: 10 years, 100 innovations, 100 million jobs*: Paradigm publications.

Praetorius, B., Bauknecht, D., Cames, M., Fischer, C., Pehnt, M., Schumacher, K., & Voß, J.-P. (2008). *Innovation for sustainable electricity systems: Exploring the dynamics of energy transitions*: Springer.

Rashid, L., Yahya, S., Shamee, S. A., Jabar, J., Sedek, M., & Halim, S. (2014). Eco Product Innovation in Search of Meaning: Incremental and Radical Practice for Sustainability Development. *Asian Social Science, 10*(13), p78.

Rennings, K., Markewitz, P., & Vögele, S. (2012). Why Radical Innovations Fail. In M. Muchie & A. Baskaran (Eds.), *Innovation for Sustainability: African and European Perspectives* (pp. 127-146). Pretoria: Africa Institute of South Africa.

Rennings, K., Markewitz, P., & Vögele, S. (2013). How clean is clean? Incremental versus radical technological change in coal-fired power plants. *Journal of Evolutionary Economics, 23*(2), 331-355.

Robinson, J. (2007). *Climate change law: emissions trading in the EU and the UK*: Cameron May.

Rogge, K. S., & Hoffmann, V. H. (2010). The impact of the EU ETS on the sectoral innovation system for power generation technologies–Findings for Germany. *Energy Policy, 38*(12), 7639-7652.

Rogge, K. S., Schneider, M., & Hoffmann, V. H. (2011). The innovation impact of the EU Emission Trading System—Findings of company case studies in the German power sector. *Ecological Economics, 70*(3), 513-523.

Rotfuß, W. (2009). Intraday price formation and volatility in the European Union emissions trading scheme: an introductory analysis. *ZEW Discussion Papers, 09-018*.

Rubner, J. (2009). *Das Energiedilemma: warum wir über Atomkraft neu nachdenken müssen*: Pantheon Verlag.

Schäfer, R., & Creutzig, F. (2008). Klimaschutz durch globale Steuern oder Emissionshandel? In E. Altvater & A. Brunnengräber (Eds.), *Ablasshandel gegen Klimawandel* (pp. 106-118). Hamburg: VSA-Verlag.

Schiellerup, P., & Atanasiu, B. (2011). *Innovations for a Low-Carbon Economy - An Overview and Assessment of the EU Policy Landscape. A report for WWF Sweden - final report* (Vol. 56pp + Appendices). Brussels.

Schleich, J., & Betz, R. (2005). *Incentives for energy efficiency and innovation in the European Emission Trading System.* Paper presented at the Proceedings of the 2005 eceee Summer Study—What Works & Who Delivers.

Schmidt, T. S., Schneider, M., Rogge, K. S., Schuetz, M. J., & Hoffmann, V. H. (2012). The effects of climate policy on the rate and direction of innovation: A survey of the EU ETS and the electricity sector. *Environmental Innovation and Societal Transitions, 2*, 23-48.

Schmidt, V. (2006). Bringing the state back into the varieties of capitalism and discourse back into the explanation of change. *Annual Meeting of the American Political Science Association, Philadelphia, panel 7-5 "Explaining institutional change in different varieties of capitalism"*, 1-31.

Schmitter, P. C., & Todor, A. (2012). Varieties of Capitalism and Types of Democracy. In M. Ido (Ed.), *Varieties of capitalism, types of democracy and globalization* (pp. 17-51). Abingdon: Routledge.

Siebert, H. (2005). *The German economy: Beyond the social market*: Princeton University Press.

Sijm, J. P., Bakker, S. J., Harmsen, H., Lise, W., & Chen, Y. (2005). CO2 price dynamics. The implications of EU emissions trading for the price of electricity. *Energy research Centre of the Netherlands ECN*. Retrieved from http://www.ecn.nl/docs/library/report/2005/c05081.pdf.

Skjærseth, J. B., & Wettestad, J. (2010). Making the EU emissions trading system: the European commission as an entrepreneurial epistemic leader. *Global environmental change, 20*(2), 314-321.

Smith, S., & Swierzbinski, J. (2007). Assessing the performance of the UK Emissions Trading Scheme. *Environmental and Resource Economics, 37*(1), 131-158. doi: 10.1007/s10640-007-9108-5.

Söderholm, P. (2010). Technological Change and Carbon Markets* *Low Carbon Economy, 1*(2), 80-85. Retrieved from doi:10.4236/lce.2010.12010.

Storm, S. (2009). Capitalism and climate change: Can the invisible hand adjust the natural thermostat? *Development and Change, 40*(6), 1011-1038.

Streeck, W., & Thelen, K. (2005). Introduction: Institutional change in advanced political economies. In W. Streeck & K. Thelen (Eds.), *Beyond continuity: Institutional change in advanced political economies* (pp. 3-39). Oxford: Oxford University Press.

Teubner, G. (2001). Legal Irritants: How Unifying Law Ends Up in New Divergences. In P. A. Hall & D. Soskice (Eds.), *Varieties of Capitalism - The Institutional Foundations of Comparative Advantage* (pp. 417-441). Oxford: Oxford University Press.

Thelen, K. (2001). Varieties of labor politics in the developed democracies. In P. A. Hall & D. Soskice (Eds.), *Varieties of Capitalism - The Institutional Foundations of Comparative Advantage* (pp. 71-103). Oxford: Oxford University Press.

Traber, T., & Kemfert, C. (2011). Gone with the wind?—Electricity market prices and incentives to invest in thermal power plants under increasing wind energy supply. *Energy Economics, 33*(2), 249-256.

Ulreich, S. (2010). CO2-Emissionshandel in der Europäischen Union. In R. Eller, M. Heinrich, R. Perrot & M. Reif (Eds.), *Management von Rohstoffrisiken* (pp. 283-295). Wiesbaden: Gabler Verlag.

Vogler, J. (2005). The European contribution to global environmental governance. *International Affairs, 81*(4), 835-850.

von Hauff, M., & Jörg, A. (2009). Innovationen im Kontext nachhaltiger Entwicklung. *Volkswirtschaftliche Diskussionsbeiträge, 27-09*.

Weigt, H., & Hirschhausen, C. v. (2008). Price formation and market power in the German wholesale electricity market in 2006. *Energy Policy, 36*(11), 4227-4234.

Wellman, J. P. (2014). The Continental Approach to Climate Change: An Analysis of the European Union's Emissions Trading System. *Claremont-UC Undergraduate Research Conference on the European Union, 2013*, 125-142. Retrieved from http:// scholarship.claremont.edu/urceu/vol2013/iss1/10.

Werle, R. (2005). Institutionelle Analyse technischer Innovation. *KZfSS Kölner Zeitschrift für Soziologie und Sozialpsychologie, 57*(2), 308-332.

Wilke, J. (1998). Politikvermittlung durch Printmedien *Politikvermittlung und Demokratie in der Mediengesellschaft* (pp. 146-164): Springer.

Winterhagen, J. (2012). *Abgeschaltet: Was mit der Energiewende auf uns zukommt*. Bonn: Bundeszentrale für Politische Bildung.

Zachmann, G., & Von Hirschhausen, C. (2008). First evidence of asymmetric cost pass-through of EU emissions allowances: Examining wholesale electricity prices in Germany. *Economics Letters, 99*(3), 465-469.

Ziegler, U. (2008). *Emissionshandel: Effiziente Umsetzung im Unternehmen*. Berlin: Logos Verlag Berlin.

## Newspaper Articles


Adam, D. (June 17th 2004). Oil chief: my fears for planet. The Guardian, DOI: http://www.theguardian.com/science/2004/jun/17/sciencenews.research.

Appel, H. (February 28th 2004). Mehr Emissionsrechte für Industrie. FAZ, p.1.

Appel, H.; Schmidt, H.; Mihm, A. (February 28th 2004). Kompromiß für den Handel mit Emissiosnrechten. FAZ, p.13.

Bannas, G. (March 23rd 2004). Müntefering kündigt Dialog mit Gewerkschaften an. FAZ, p.1-2.

Bannas, G. (March 31st 2004). Ein Eckpfeiler der Koalition. FAZ, p.3.

Bernotat, W. (March 24th 2004). Für zusätzliche Belastungen ist kein Raum. FAZ, p.14.

Balch, O. (December 16th 2004). 'Time is running out'. The Guardian, DOI: http://www.theguardian.com/environment/2004/dec/16/business.climatechange.

Blair attacked over higher CO2 emissions (October 27th 2004). The Guardian, DOI: http://www.theguardian.com/environment/2004/oct/27/greenpolitics.climatechange.

Blair's global warning (September 15th 2004). The Guardian, DOI: http://www.theguardian.com/politics/2004/sep/15/environment.greenpolitics.

Bohl, E. (March 24th 2004). Im Emissionshandel zeigen sich Schlupflöcher. FAZ, p.31.

Böhringer, C.; Lange, A.; Moslener, U. (March 20th 2004). Am Emissionshandel führt kein Weg vorbei. FAZ, p.13.

Booker, C. (March 9th 2003). Christopher Booker's Notebook. The Telegraph, DOI: http:// www.telegraph.co.uk/news/uknews/1424081/Christopher-Bookers-Notebook.html.

Bünder, H. (April 2nd 2004). Viele Emissionspläne zu spät eingereicht. FAZ, p.12.

Bünder, H. (May 18th 2004). Neuer Streit über den Klimaschutz. FAZ, p.13.

Bünder, H. (June 8th 2004). Das unterschätzte Parlament. FAZ, p.23.

Buntings, M. (August 26th 2004). Put us all on rations. The Guardian, DOI: http://www.theguardian.com/society/2004/aug/26/environment.comment.

Cadbury, A.; Adams, R. (October 21st 2004). How to count the cost of being a good citizen. The Daily Telegraph, DOI: http://www.telegraph.co.uk/finance/2897663/How-to-count-the-cost-of-being-a-good-citizen.html.

Caulkin, S. (February 22nd 2004). Why brain still beats brawn. The Observer, DOI: http://www.theguardian.com/business/2004/feb/22/madeleinebunting.theobserver.

City briefs (June 22nd 2004). The Daily Telegraph, DOI: http://www.telegraph.co.uk/finance/2888453/City-briefs.html.

Claassen, U. (March 6th 2004). Energie: Grüne gespalten. Die Zeit, DOI: http://www.wiso-net.de/webcgi?START=A60&DOKV_DB=ZEIT&DOKV_NO=0504060101&DOKV_HS=0&PP=1.

Clover, C. (February 25th 2003). Energy policy puts climate before consumers. The Telegraph, DOI: http://www.telegraph.co.uk/education/3308879/Energy-policy-puts-climate-before-consumers.html.

Clover, C. (April 13th 2004). Planes and cars boom can't go on, says Blair's green team. The Daily Telegraph, DOI: http://www.telegraph.co.uk/education/3338546/Planes-and-cars-boom-cant-go-on-says-Blairs-green-team.html.

Clover, C. (September 14th 2004). Howard takes stand for the environment. The Daily Telegraph, DOI: http://www.telegraph.co.uk/news/uknews/1471680/Howard-takes-stand-for-the-environment.html.

Dietrich, S. (March 24th 2004). Versteckspiel. FAZ, p.1.

Fickinger, N. (November 25th 2003). Enge Terminvorgabe für Emissionshandel. FAZ, p.12.

Fickinger, N. (December 24th 2003). Emissionshandelsgesetz möglicherweise verfassungswidrig. FAZ, p.12.

Fickinger, N. (January 31st 2004). Clement und Trittin im offenen streit über Emissionshandel. FAZ, p.9.

Fickinger, N.; Koch, B. (February 3rd 2004). Schröder will Streit nicht schlichten. FAZ, p.12.

Fickinger, N. (February 9th 2004). Industrie bemängelt Trittins Vorgaben. FAZ, p.13.

Fickinger, N. (February 10th 2004). Umweltausschuß rügt Trittin. FAZ, p.11.

Fickinger, N. (February 12th 2004). Zwist über Emissionshandel. FAZ, p.13.

Fickinger, N. (February 13th 2004). Streit über Emissionshandel dauert an. FAZ, p.15.

Fickinger, N. (February 24th 2004). Umweltrat stärkt Trittin den Rücken. FAZ, p.12.

Fickinger, N. (February 25th 2004). Clement und Trittin uneins über Emissionshandel. FAZ, pp. 1-2.

Fickinger, N. (February 25th 2004). Im Streit um den Emissionshandel bilden sich ungewöhnliche Koalitionen. *FAZ*, p.15.

Fickinger, N. (February 27th 2004). BDI warnt Regierung vor Crash-Test im Emissionshandel. *FAZ*, p.15.

Fickinger, N. (March 2nd 2004).Keine Einigung über Emissionshandel. FAZ, p.13.

Fickinger, N. (March 13th 2004). Ein Rahmen für den Emissionshandel. FAZ, p.12.

Fickinger, N. (March 18th 2004). Keine Einigung über Emissionshandel. FAZ, p.13.

Fickinger, N. (March 20th 2004). Clement und Trittin ringen um Einigung im Emissionshandel. FAZ, p.11.

Fickinger, N.; Mihm, A. (March 27th 2004). “Wir belohnen diejenigen, die Innovationen vorziehen und in Deutschland investieren”. FAZ, p.12.

Fickinger, N. (May 6th 2004). Kompromiss über Emissionshandel. FAZ, p.12.

Fickinger, N. (May 11th 2004). EU soll Allokationspläne prüfen. FAZ, p.12.

Fickinger, N. (May 25th 2004a). Klima-Rechnung. FAZ, p.13.

Fickinger, N. (May 25th 2004b). EU-Länder drohen Klimaziel zu verfehlen. FAZ, p.13.

Fickinger, N. (May 26th 2004). Koalition ändert Allokationsplan. FAZ, p.13.

Fickinger, N. (June 1st 2004). Im Namen des Klimas. FAZ, p.1.

Fickinger, N. (June 12th 2004). Handel reagiert mit Unverständnis auf Bundesrats-Entscheidung. FAZ, p.12.

Fickinger, N.; Kafsack, H. (September 23rd 2004). Deutschland klagt gegen EU Auflagen. FAZ, p.14.

Fickinger, N. (December 30th 2004). Handel mit Emissionsrechten startet. FAZ, p.19.

Fritz-Vannahme, J. (February 9th 2004). Die Kommission, das ungeliebte Wesen. Zeit Online, DOI: http://www.zeit.de/2004/09/Vortext.

Gammelin, C. (January 22nd 2004). Der letzte Grüne. Die Zeit, DOI: http://www.wiso-net.de/webcgi?START=A60&DOKV_DB=ZEIT&DOKV_NO=0104220005&DOKV_HS=0&PP=1.

Gammelin, C. (February 5th 2004). Kultivierte Zwietracht. Die Zeit, DOI: http://www.wiso-net.de/webcgi?START=A60&DOKV_DB=ZEIT&DOKV_NO=0204050007&DOKV_HS=0&PP=1.

Geis, M. (February 28th 2004). Schwarz-grüne Fantasien. Zeit Online, DOI: http://www.zeit.de/2004/10/Schwarz-Gr_9fn.

Geis, M. (March 25th 2004). Der Hochtemperaturreaktor. Die Zeit, DOI: http://www.wiso-net.de/webcgi?START=A60&DOKV_DB=ZEIT&DOKV_NO=0304250020&DOKV_HS=0&PP=1.

Geinitz, C. (March 24th 2004). Klagen gegen Emissionshandel geplant. FAZ, p.13.

Geinitz, C. (March 30th 2004). Bayer AG: Industrie flüchtet vor Trittin. FAZ, p.14.

Germis, C. (March21st 2004). Der Einsame. Frankfurter Allgemeine Sonntagszeitung, p.48.

Geschäftsrisiko Kohle (May 27th 2004). Zeit Online, DOI: http://www.zeit.de/2004/23/Geschaeftsrisiko_Kohle.

Gray, J (April 13th 2003). Booker's Error. The Telegraph, DOI: http://www.telegraph.co.uk/comment/letters/3590052/Bookers-error.html.

Gribben, R. (September 16th 2004). Industry puts energy into price rise fight. The Daily Telegraph, DOI: http://www.telegraph.co.uk/finance/2895076/Industry-puts-energy-into-price-rise-fight.html.

Gow, D. (March 31st 2004). Generators warn of power shortages from CO2 targets. The Guardian, DOI: http://www.theguardian.com/business/2004/mar/31/greenpolitics.emissionstrading.

Gow, D. (June 24th 2004). Flare-up over Shell's 'double standards'. The Guardian, DOI: http://www.theguardian.com/business/2004/jun/24/oilandpetrol.pollution.

Hank, R. (March 28th 2004). Industrie: Trittin eine Katastrophe. Frankfurter Allgemeine Sonntagszeitung, p.1.

Hermani, G. (January 26th 2004). Wehe dem Weltuntergang. FAZ, p.30.

Happold, T. (September 13th 2004). Tories 'would lead on climate change'. The Guardian, DOI: http://www.theguardian.com/politics/2004/sep/13/conservatives.uk1.

Hielle, I. (December 15th 2003). Unternehmen bereiten sich auf Geschäfte mit dicker Luft vor. FAZ, p.13.

Jänicke, M. (April 22nd 2004). Abschied von Kohle, Öl und Atom. Die Zeit, DOI: http://www.wiso-net.de/webcgi?START=A60&DOKV_DB=ZEIT&DOKV_NO=0404220055&DOKV_HS=0&PP=1.

Jowit, J. (January 4th 2004). New Labour's contrail. The Observer, DOI: http://www.theguardian.com/politics/2004/jan/04/greenpolitics.uk.

Jowit, J. (August 1st 2004). North Sea burial for greenhouse gases. The Observer, DOI: http://www.theguardian.com/environment/2004/aug/01/energy.environment.

Jungclaussen, J. F. (September 9th 2004). Das englische Rezept. Die Zeit, DOI: http://www.wiso-net.de/webcgi?START=A60&DOKV_DB=ZEIT&DOKV_NO=0904090012&DOKV_HS=0&PP=1.

Kallenbach, M. (March 8th 2002). Yesterday in Parliament. The Telegraph, DOI: http://www.telegraph.co.uk/news/uknews/1387109/Yesterday-in-Parliament.html.

Kanzleramt vermittelt beim Emissionshandel (February 21st 2004). FAZ, p.12.

Klage gegen Emissionshandel (September 28th 2004). FAZ, p.16.

Körner, R.; von Schweinitz, S. (December 10th 2003). Zeit für Datenerhebung zum Emissionshandel wird knapp. FAZ, p.23.

Küffner, G. (February 24th 2004). Vom Handeln mit Emissionen wird der Klimagasausstoß nicht weniger. FAZ, p.T1.

Leithäuser, J. (March 19th 2004). "Sie wollen nicht die Bremser sein". FAZ, p.4.

Leithäuser, J. (March 23rd 2004). Grüne sehen keinen Koalitionsstreit. FAZ, p.4.

Leithäuser, J. (March 30th 2004). Union stützt Clement. FAZ, p.2.

Leithäuser, J. (March 31st 2004). Angriff der "Anti-Ökologen". FAZ, p.3.

Lohse, E.; Schuller, K. (April 4th 2004). Wieviel Umwelt darf's denn sein?. Frankfurter Allgemeine Sonntagszeitung, p.3.

Loske, R. (January 15th 2004). Das Märchen von den staatsfixierten Umweltschützern. Die Zeit, DOI: http://www.wiso-net.de/webcgi?START=A60&DOKV_DB=ZEIT&DOKV_NO=0104150083&DOKV_HS=0&PP=1.

Lucas, C. (June 8th 2004). Thursday is about more than the war. The Guardian, DOI: http://www.theguardian.com/politics/2004/jun/08/elections2004.greenpolitics.

Macalister, T. (January 14th 2004). Oil body distances itself from Shell figures. The Guardian, DOI: http://www.theguardian.com/business/2004/jan/14/oilandpetrol.news.

Macalister, T. (march 7th 2004). Selby closure costs UK Coal £56m. The Guardian, DOI: http://www.theguardian.com/business/2003/mar/07/2.

Mathiason, N. (July 4th 2004). 'We need results, not more red tape'. The Observer, DOI http://www.theguardian.com/business/2004/jul/04/ethicalmoney.politics.

Mihm, A. (February 20th 2004). Schröder soll Energiestreit lösen. FAZ, p.13.

Mihm, A.; Fickinger, N. (March 19th 2004). Clement und Trittin kämpfen um Energiepolitik – und ihren Ruf. FAZ, p.20.

Mihm, A. (March 22nd 2004). Clement fordert Überprüfung der Ökosteuer nach 2006. FAZ, p.11.

Mihm, A. (March 23rd 2004a). Rogowski: Trittins Politik kostet Arbeitsplätze. FAZ, p.1.

Mihm, A. (March 23rd 2004b). Krach zwischen Regierung und Industrie. FAZ, p.13.

Mihm, A. (March 24th 2004). Ruf nach dem Kanzler. FAZ, p.1.

Mihm, A. (March 25th 2004). Gutachter stärken Clement im Streit mit Trittin den Rücken. FAZ, p.13.

Mihm, A.; Fickinger, N. (March 27th 2004). Spitzengespräch am Wochenende?. FAZ, p.1-2.

Mihm, A.; Leithäuser, J. (March 30th 2004). Kanzlergespräch über Klimaschutz. FAZ, p.1.

Mihm, A.; Bannas, G.; Schilder, P. (March 31st 2004). Koalitionsstreit um Emissionshandel beigelegt. FAZ, p.1-2.

Mihm, A. (March 31st 2004). So weit so sauber. FAZ, p.11.

Mihm, A. (May 5th 2004). Neue Konfrontation um Klimaschutz. FAZ, p.15.

Milner, M. (August 18th 2004). Oil costs hurt UK recovery. The Guardian, DOI: http://www.theguardian.com/business/2004/aug/18/oilandpetrol.news.

Milner, M. (October 18th 2004). CBI and Amicus warn of energy crisis. The Guardian, DOI: http://www.theguardian.com/business/2004/oct/18/politics.oilandpetrol.

Milner, M. (October 28th 2004). Kyoto sacrificed to competitiveness. The Guardian, DOI: http://www.theguardian.com/politics/2004/oct/28/greenpolitics.environment.

Moore, J. (June 10th 2003). Bearish utilities analyst is Britain's top stock-picker. The Telegraph, DOI: http://www.telegraph.co.uk/finance/2854400/Bearish-utilities-analyst-is-Britains-top-stock-picker.html.

Moore, J. (July 19th 2003). For sale: one summer, unusually hot. The Daily Telegraph, DOI: http://www.telegraph.co.uk/finance/2858030/For-sale-one-summer-unusually-hot.html.

Moore, C. (November 3rd 2004). A green land may not turn out to be so pleasant and will cost us all. The Daily Telegraph, DOI: http://www.telegraph.co.uk/comment/columnists/charlesmoore/3612836/A-green-land-may-not-turn-out-to-be-so-pleasant-and-will-cost-us-all.html.

Morgan, O. (August 21st 2004). Can coal clean up its act and keep the home fires burning?. The Observer, DOI: http://www.theguardian.com/business/2005/aug/21/theobserver.observerbusiness8.

Murray-Watson, A. (May 23rd 2004). Electricity suppliers fail to meet their 'green' targets. The Sunday Telegraph, DOI: http://www.telegraph.co.uk/finance/2886187/Electricity-suppliers-fail-to-meet-their-green-targets.html.

Murray-Watson, A. (October 10th 2004). Power stations can pollute more. The Sunday Telegraph, DOI: http://www.telegraph.co.uk/finance/2896832/Power-stations-can-pollute-more.html.

Niejahr, E. (June 9th 2004). Handwerk hat doppelten Boden. Die Zeit, DOI: http://www.wiso-net.de/webcgi?START=A60&DOKV_DB=ZEIT&DOKV_NO=0604090094&DOKV_HS=0&PP=1.

Notebook – More haste… (January 20th 2004). The Guardian, DOI: http://www.theguardian.com/business/2004/jan/20/6.

Notebook – Blair steps on the gas (May 1st 2004). The Guardian, DOI: http://www.theguardian.com/business/2004/may/01/8.

Petersdorf, W. von (March 28th 2004). Emissionshandel – Darum geht es. Frankfurter Allgemeine Sonntagszeitung, p.41.

Pfeifer, S. (March 21st 2004). Emission cuts 'are risking British jobs'. The Sunday Telegraph, DOI: http://www.telegraph.co.uk/finance/2880650/Emission-cuts-are-risking-British-jobs.html.

Radford, T.; Brown, P. (April 29th 2004). This is what we know about global warming ... so why haven't we done anything about it yet? The Guardian, DOI: http://www.theguardian.com/science/2004/apr/29/environment.climatechangeenvironment.

Radford, T. (December 9th 2004). Beckett admits defeat on climate change target. The Guardian, DOI: http://www.theguardian.com/environment/2004/dec/09/environment.greenpolitics1.

Schäfers, M. (February 2nd 2004a). Gefährlicher Alleingang. FAZ, p.13.

Schäfers, M. (February 2nd 2004b). Konflikt um Emissionshandel eskaliert. FAZ, p.13.

Schäfers, M. (March 29th 2004a). Clement gegen deutsche “Alleingänge” beim Klimaschutz. FAZ, p.1-2.

Schäfers, M. (March 29th 2004b). Clements Kampf. FAZ, p.1.

Schmid, K.; Hamann, G. (September 16th 2004). „Der Kanzler war bei mir. Die Zeit, DOI: http://www.wiso-net.de/webcgi?START=A60&DOKV_DB=ZEIT&DOKV_NO=0904160135&DOKV_HS=0&PP=1.

Schmidt, H. (February 25th 2004). “Trittin muss hart bleiben”. *FAZ*, p.15.

Schmidt, H. (February 28th 2004). Vernunft statt Lobby. FAZ, p.13.

Schmidt, H. (March 4th 2004). Deutschland erhöht $CO_2$-Emission. FAZ, p.12.

Schmidt, H. (September 18th 2004). Viele Unternehmen sind schlecht auf den Emissionshandel vorbereitet. FAZ, p.11.

Schwenn, K. (April 1st 2004). Trittin verspricht Schonung für Autofahrer und Hausbesitzer. FAZ, p.11.

Scott. K. (August 2nd 2004). Scotland catches the wave of funds for clean energy. The Guardian, DOI: http://www.theguardian.com/uk/2004/aug/02/greenpolitics.renewableenergy.

Seiser, M.; Schubert, C.; Stabenow, M.; Wieland, L. (March 4th 2004). In ganz Europa wird um den Handel mit Emissionsrechten gerungen. FAZ, p.12.

Starkey, R.; Anderson, K. (April 29th 2004). That'll be £17 and 10 carbon points. The Guardian, DOI: http://www.theguardian.com/society/2004/apr/29/environment.comment.

Staud, T. (May 19th 2004). Wie Hochseetanker und Schlauchboot. Die Zeit, DOI: http://www.wiso-net.de/webcgi?START=A60&DOKV_DB=ZEIT&DOKV_NO=0504190008&DOKV_HS=0&PP=1.

Stewart, H. (June 5th 2004). Where there's muck, There's brass. The Guardian, DOI: http://www.theguardian.com/environment/2004/jun/05/business.climatechange.

Sturbeck, W. (January 30th 2004). Stahlindustrie für mehr Verschmutzungsrechte. FAZ, p. 12.

Sturbeck, W. (March 20th 2004a). "Wir werden eher die Produktion zurückfahren, als Emissionsrechte kaufen". FAZ, p.14.

Sturbeck, W. (March 20th 2004b). Deutsche Hüttenbetreiber befürchten den Emissionshandel. FAZ, p.14.

Sturbeck, W. (March 20th 2004c). Die Briten als Vorbild. FAZ, p.18.

Sturbeck, W.; Bünder, H. (March 31st 2004). Unternehmen danken Clement. FAZ, p.13.

Sturbeck, W. (April 10th 2004). "Warum macht Europas Umweltschutz an den Grenzen halt?". FAZ, p.19.

Sturbeck, W. (May 29th 2004). RWI: Arbeitsplätze vom Winde verweht. FAZ, p.12.

Sturbeck, W. (June 30th 2004). Energiepolitik sorgt für Diskussionen. FAZ, p.12.

Tempest, M. (April 27th 2004). Green groups dismiss climate change 'tokenism'. The Guardian, DOI: http://www.theguardian.com/environment/2004/apr/27/environment.greenpolitics.

Thorniley, T. (February 23rd 2004). UK industry braced for carbon fallout damage. The Daily Telegraph, DOI: http://www.telegraph.co.uk/finance/2877809/UK-industry-braced-for-carbon-fallout-damage.html.

Thorniley, T. (May 7th 2004). Hewitt cuts limits on carbon emissions. The Daily Telegraph, DOI: http://www.telegraph.co.uk/finance/2884801/Hewitt-cuts-limits-on-carbon-emissions.html.

Thorniley, T. (September 15th 2004). EU emissions plan is 'weak and costly'. The Daily Telegraph, DOI: http://www.telegraph.co.uk/finance/2894975/EU-emissions-plan-is-weak-and-costly.html.

Thorniley, T. (September 5th 2004). Energy group issues price warning. The Daily Telegraph, DOI: http://www.telegraph.co.uk/finance/2898755/Energy-group-issues-price-warning.html.

Tibbetts, G. (January 12th 2004). Deadly heatwaves 'likely to become common in Europe'. The Daily Telegraph, DOI: http://www.telegraph.co.uk/education/3326006/Deadly-heatwaves-likely-to-become-common-in-Europe.html.

Tickle, L. (November 3rd 2004). Emissions impossible?. The Guardian, DOI: http://www.theguardian.com/society/2004/nov/03/environment.environment2.

Townsend, M. (January 11th 2004). Giant space shield plan to save planet. The Observer, DOI: http://www.theguardian.com/environment/2004/jan/11/research.science.

Townsend, M.; Harris, P. (April 25th 2004). Oil giants join climate group. The Observer, DOI: http://www.theguardian.com/environment/2004/apr/25/greenpolitics.oilandpetrol.

Tran, M. (January 19th 2004). Emission cuts to raise energy prices. The Guardian, DOI: http://www.theguardian.com/money/2004/jan/19/utilities.climatechange.

"Trittin muss sich bewegen" (March 1st 2004). FAZ, p.2.

Vidal, J. (May 7th 2004). An ill wind? The Guardian, DOI: http://www.theguardian.com/money/2004/may/07/utilities.greenpolitics.

Vorholz, F. (September 4th 2003). Sturmwarnung. Die Zeit, DOI: http://www.wiso-net.de/webcgi?START=A60&DOKV_DB=ZEIT&DOKV_NO=0903040130&DOKV_HS=0&PP=1.

Vorholz, F. (March 4th 2004). Rauchzeichen. Die Zeit, DOI: http://www.wiso-net.de/webcgi?START=A60&DOKV_DB=ZEIT&DOKV_NO=0304040076&DOKV_HS=0&PP=1.

Vorholz, F. (March 11th 2004). Geballte Ladung. Die Zeit, DOI: http://www.wiso-net.de/webcgi?START=A60&DOKV_DB=ZEIT&DOKV_NO=0304110025&DOKV_HS=0&PP=1.

Vorholz, F. (March 25th 2004). Vergiftetes Klima. Die Zeit, DOI: http://www.wiso-net.de/webcgi?START=A60&DOKV_DB=ZEIT&DOKV_NO=0304250200&DOKV_HS=0&PP=1.

Vorholz, F.; Geis, M. (April 1st 2004). Grüner wird's nicht. Die Zeit, DOI: http://www.wiso-net.de/webcgi?START=A60&DOKV_DB=ZEIT&DOKV_NO=0404010051&DOKV_HS=0&PP=1.

Vorholz, F. (June 3rd 2004). „Wolfgang Clement bremst". Die Zeit, DOI: http://www.wiso-net.de/webcgi?START=A60&DOKV_DB=ZEIT&DOKV_NO=0604030041&DOKV_HS=0&PP=1.

Vorholz, F. (August 5th 2004a). "Öl wird teuer bleiben". Die Zeit, DOI: http://www.wiso-net.de/webcgi?START=A60&DOKV_DB=ZEIT&DOKV_NO=0804050119&DOKV_HS=0&PP=1.

Vorholz, F. (August 5th 2004b). Secretary für das Monopol. Die Zeit, DOI: http://www.wiso-net.de/webcgi?START=A60&DOKV_DB=ZEIT&DOKV_NO=0804050033&DOKV_HS=0&PP=1.

Vorholz, F. (October 7th 2004). Die Klimaschützer freuen sich zu früh. Zeit Online, DOI: http://www.zeit.de/2004/42/Argument.

Vorholz, F. (October 10th 2004). Braunkohle: Neuer Zoff. Die Zeit, DOI: http://www.wiso-net.de/webcgi?START=A60&DOKV_DB=ZEIT&DOKV_NO=1004210094&DOKV_HS=0&PP=1.

Vorholz, F. (December 16th 2004). „Fleißkärtchen mag ich nicht". Die Zeit, DOI: http://www.wiso-net.de/webcgi?START=A60&DOKV_DB=ZEIT&DOKV_NO=1204160128&DOKV_HS=0&PP=1.

Walsh, C. (March 21st 2004). Emissions impossible for CBI to Stomach. The Observer, DOI: http://www.theguardian.com/business/2004/mar/21/theobserver.observerbusiness10.

Wintour, P. (December 8th 2004). Climate change policy review reflects failure on emissions. The Guardian, DOI: http://www.theguardian.com/politics/2004/dec/08/uk.environment.

Woolnough, R. (June 28th 2004). Green light. The Guardian, DOI: http://www.theguardian.com/money/2004/jun/28/careers.environment.

Worte der Woche (April 1st 2004). Die Zeit, DOI: http://www.wiso-net.de/webcgi?START=A60&DOKV_DB=ZEIT&DOKV_NO=0404010128&DOKV_HS=0&PP=1.

Yesterday in Parliament (July 8th 2004). The Guardian, DOI: http://www.theguardian.com/politics/2004/jul/08/houseofcommons.