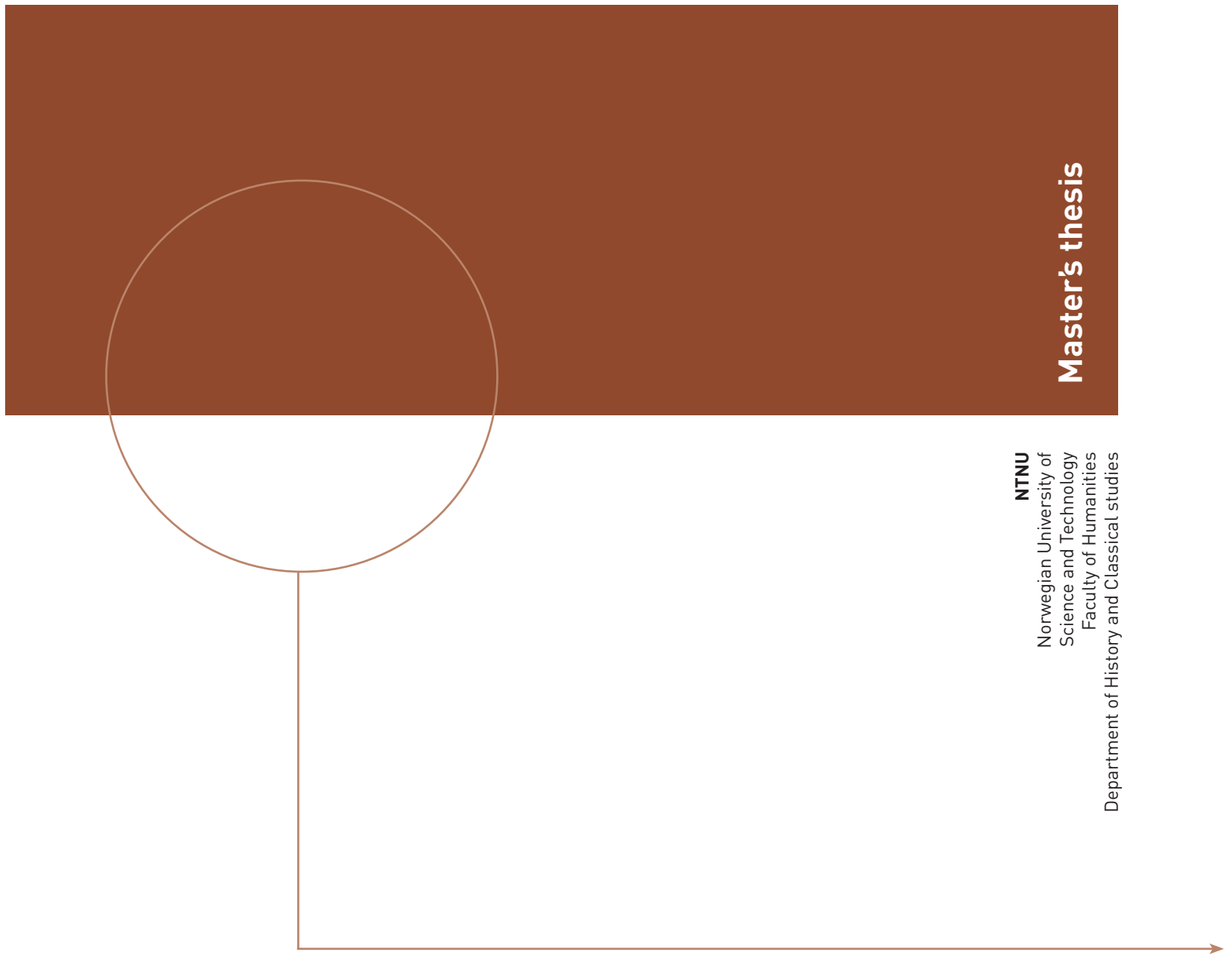

Aleksander Sørmo

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Why has it developed into an inefficient mechanism to lower greenhouse gases?

Master's thesis in European Studies

Trondheim, spring 2013

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Department of History and Classical studies

Academic supervisor: Hans Otto Frøland

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Aleksander Sørmo

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Contents

List of acronyms

AA:	Assigned amount
AR4:	IPCC Fourth Assessment Report: Climate Change 2007
BAU:	Business as usual
CDM:	Clean Development Mechanism
CER:	Certified Emission Reduction unit
CITL:	Community Independent Transaction Log
CO_2 :	Carbon dioxide
CO_2e:	Carbon dioxide equivalent
DG:	Directorate General
EC:	European Community
EEX:	The European Energy Exchange
ERU:	Emission Reduction Unit
EU:	European Union
EUA:	EU Allowance
EUTL:	European Union Transaction Log
EEA:	European Environment Agency
EFTA:	European Free Trade Association
ET:	Emissions trading
ETS:	ET System
GHG:	Greenhouse gas
GWP:	Global Warming Potential
HFCs:	Hydrofluorocarbons
ICAO:	International Civil Aviation Organisation
ICE:	ICE Futures Europe

IPCC:	Intergovernmental Panel on Climate Change
JI:	Joint Implementation
LULUCF:	Land use, land use change, and forestry
NAP:	National Allocation Plan
NGO:	Non-governmental organisation
NIMs:	National implementation measures
NOU:	Official Norwegian Report
OECD:	Organization for Economic Cooperation and Development
PFCs:	Perfluorocarbons
QELRCs:	Quantified emission limitation or reduction commitments
SAR:	IPCC Second Assessment Report: Climate Change 1995
tCO_2:	Tonnes of carbon dioxide
tCO_2e:	Tonnes of carbon dioxide equivalent
UK:	United Kingdom
UN:	United Nations
UNFCCC:	UN Framework Convention on Climate Change
US:	United States of America
WWF:	World Wide Fund for Nature

List of chemical symbols

CO_2	Carbon dioxide
CH_4	Methane
N_2O	Nitrous Oxide
SF_6	Sulphur Hexafluoride
CHF_3	Trifluoromethane

Introduction[1]

In 2003 the European Union (EU) adopted the Emissions Trading (ET) Directive, which provided the legal framework for the establishment of the EU Emissions Trading System (ETS) in January 2005. The EU Emissions Trading System (ETS) was created to curb emissions of greenhouse gases (GHGs) and materialised as the EU's main policy mechanism designed to mitigate global warming. The EU ETS comprises 31 countries, 28 of which are EU Member States—Croatia entered the scheme by its accession to the EU on 1 July 2013[2]. In addition, the three European Free Trade Association (EFTA) members Norway, Iceland, and Lichtenstein are also participants.

The EU ETS sets a cap on emissions of major GHGs and currently covers more than 11,000 power stations and industrial plants as well as aviation; in total it covers around 45% of EU GHG emissions. The central mechanism on which the system relies is that allowances to release GHG emissions carry a cost which incentivises emitters to cut emissions. However, throughout the lifetime of the EU ETS allowance prices have been chronically low, and this has rendered the system inefficient, because low prices have implied weak incentives to cut emissions.

In Phase 1 (2005-2007) and in Phase 2 (2008-2012), nearly all allowances were allocated for free, and national authorities were responsible for setting national allocation caps, which determined the stringency of the scheme. In Phase 1, this lead to over-allocation and a surplus of allowances. In Phase 2, the Commission was able to restrict allocations to prevent over-allocation, but the financial crisis that escalated in 2008 caused emissions to decrease and thus created a surplus of allowances.

The EU ETS was revised ahead of Phase 3 (2013-2020). Free allocation to the power generating sector was abolished and replaced by auctioning to eliminate the very large windfall profits the sector had raked in during Phases 1 and 2. The share of allowances auctioned in 2013 was about 40%, and this number is set to increase gradually throughout Phase 3. The goal is to auction all allowances by 2027.

The EU ETS reform prior to Phase 3 did make significant steps toward enhancing the efficiency of the system. Nonetheless, there was a large surplus of allowances in the beginning of Phase 3 which

1 This section is largely based on information from the European Commission available at ec.europa.eu/clima/policies/ets.

2 73 big emitters were however selected by the Croatian government to enter the EU ETS six months earlier, on 1 January 2013 (2012).

critically undermined the allowance price, and hence the efficiency of the EU ETS. The surplus is projected to persist throughout Phase 3 and spill over into Phase 4, unless measures are taken. The surplus was largely created by the financial crisis; but also the ability to transfer allowances from Phase 2 to Phase 3; and the oversupply of international emissions allowances.

Despite the general picture that the EU ETS has created relatively weak incentives to cut emissions, there is a general consensus in the scientific literature that the EU ETS has caused a modest amount of abatement of GHG emissions (Anderson & Di Maria, 2011; Convery, 2009; Delarue, Voorspools, & D'haeseleer, 2008; Ellerman & Buchner, 2008; Ellerman & Buchner, 2007). Most estimates agree that in Phase 1, most of the abatement happened in 2005-2006, and reduced emissions in Phase 1 by between 2,5 and 5% (Venmans, 2012). Much less research has been conducted on Phase 2 abatement, but some research indicate that the EU ETS induced more abatement in 2008-2009 than in 2005-2006 (Abrell, Ndoye-Faye, & Zachmann, 2011; Egenhofer, Alessi, Georgiev, & Fujiwara, 2011).

The aim of this paper is to explain why the EU ETS was set up and how it has developed into an inefficient mechanism to lower GHG emissions in the member countries[3]. This paper is more concerned with flaws that has undermined the scheme's potential to reduce GHGs efficiently than GHG reduction targets in Phases 1, 2, and 3. This is firstly because these targets turned out to place a relatively low abatement burden on the EU ETS, which appears to be the case also for the Phase 3 target. Secondly, the targets in these phases are not aligned with the much more demanding targets of the 2050 Roadmap that are set out to keep climate change under 2ºC.

The general approach of this paper is historical. In addition, a political-economy perspective which centres on rent-seeking is used to explain certain central aspects of the EU ETS. According to the American Economic Association (2012), rent-seeking pertains to microeconomics, and to the sub-field of analysis of collective decision-making. Rent-seeking involves investment of resources towards creating monopolies. The result of rent-seeking is characterised by a social cost, because it produces unproductive, yet politically feasible outcomes. In other words, whereas the special interests benefit from rent-seeking, the society as a whole suffers a loss (Tullock, 2008). This perspective is useful to understand certain central aspects of the EU ETS design, since special interests, as this paper will argue, have had a heavy influence on the design of the system and its

3 In the EU's own words, the EU ETS was established «in order to promote reductions of greenhouse gas emissions in a cost-effective and economically efficient manner» (European Parliament and the Council, 2003, p. 32).

distributional impacts. Thus the political economy initially shaped the EU ETS in a manner that made it perform inefficiently; and indeed in a manner that can appear *prima facie* counter-intuitive. The extensive use of free allocation is a notable example.

This paper makes use of both primary and secondary sources. Official EU documents and publications were the principal sources of technical information about the EU ETS, but also upon which part of the narration of historical developments was based. Secondary sources were consulted throughout the process of writing this paper, and the academic literature on ET was the main source for the discussion about allocation, as well as being important for the discussion on the functioning of the EU ETS.

In order to explain why the EU ETS was set up and how it has developed into an inefficient mechanism to lower GHG emissions in the EU ETS member countries[4], chapter 1 provides part of the historical and political context of ET as a concept, and attempts to explain how and why it emerged as a policy mechanism of choice for the EU. Chapter 2 focuses on the principal structural flaws of the EU ETS by discussing the origins and implications of its allocation regime. Chapter 3 is concerned with the structure of the EU ETS, and provides key information about what the EU ETS is and how it works, including the scheme's connections to the wider international framework of the Kyoto Protocol. Chapter 4 sheds light on the functioning of the EU ETS, and identifies important factors that contributed toward making the system ineffective. Chapter 5 summarises the anteceding chapters by highlighting central facts and arguments, and thereby presents a short answer to the research question this paper set out to answer.

4 Henceforth this paper will for practical purposes refer to «EU ETS member countries» were EU ETS legal provisions that use the term «Member States» apply to EFTA countries as well.

Chapter 1: Towards emissions trading

This chapter attempts to answer why and how the EU ETS materialised. The origins of the EU ETS are traced back to the emerging consensus in the 1980s and early 1990s that a concerted effort by the international community was needed to prevent dangerous human interference with the climate system. This realisation led to the Earth Summit in 1992, and later to the signing of the Kyoto Protocol in 1997. This chapter also describes the political developments which concluded in agreement that the EU should establish an ET scheme in order to comply with its commitments under the Kyoto Protocol.

1.1 From United Nations Framework Convention on Climate Change to Kyoto

During the 1980s governments across the world became increasingly aware of the growing risk of climate change and the undesirable consequences thereof. This prompted 166 nations to sign the United Nations Framework Convention on Climate Change (UNFCCC) at the 1992 Earth Summit in Rio de Janeiro. The 1992 Earth Summit also oversaw the signing of two sister Rio Conventions which are closely linked to the UNFCCC and the concern about climate change: the UN Convention on Biological Diversity and the Convention to Combat Desertification. The UNFCCC articulated an agreement about the need to limit the growing amount of GHGs in the atmosphere so as to prevent dangerous human impact on global climate. In the words of the UNFCCC, its ultimate goal is

"...stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system..." (Chapter 2).

The scientific evidence concerning human impact on the climate system was at the time quite uncertain. Nevertheless, and in line with the principles of the Montreal Protocol on Substances that Deplete the Ozone Layer of 1987, countries agreed that due to the potentially disastrous consequences of climate change, it was incumbent upon them to commit considerable resources towards minimising the risk thereof. The Earth Summit resulted in an acknowledgement that the developed countries that constituted the membership of the Organization for Economic Cooperation and Development (OECD) were responsible for the vast majority of GHG emissions since the industrial revolution, and that these countries therefore bear the main responsibility to mitigate climate change that could occur as a consequence of the aforementioned emissions.

The UNFCCC created the target that encouraged so-called Annex 1 countries to the convention to cut their carbon dioxide emissions to 1990 level by the year 2000. The Annex 1 countries[5] comprised the members of the OECD at the time, and a number of economies in transition, including the Russian Federation, the Baltic States, and Central and Eastern European states. In addition to assuming a historic responsibility for the recent elevation of GHG concentrations in the atmosphere, the Annex 1 countries moreover conceded that non-developed countries had a right to increase emissions as they developed and expanded their economies.

The adaptation of the Kyoto Protocol in 1997 was an important breakthrough for the UNFCCC. Whereas the UNFCCC *encouraged* its parties to emission cuts and other measures, the Kyoto Protocol legally *commits* its signatories to adhere to it. And the Kyoto Protocol was based on the principles of the UNFCCC, and included the provision that obliged OECD countries to cut carbon dioxide emissions to 1990 level, or base year or period levels[6] (hereafter referred to as base year levels), by the year 2000.

1.2 Early emissions trading

In the intervening years between Rio and Kyoto it had been dawning on decision makers that not enough was being done to address the threat climate change posed. The question was how to achieve emissions cuts in the most effective manner. The Montreal Protocol had enjoyed great success with phasing out ozone-depleting substances. As early as in 2003, former United Nations (UN) Secretary-General Kofi Annan observed that the Montreal Protocol was "perhaps the single most successful international agreement to date"[7].

The Montreal Protocol stipulated targets and timetables for emissions cuts for its signatories, and it also established an ET regime, albeit on a small scale. ET broke the surface in the economic science discourse in the 1960s, and it was put in practice in the United States of America (US) in the 1980s (Voss, 2007). Policy makers consequently looked to that success story as well as other relatively small ET regimes as models for tackling GHG emissions. Domestically the US had experienced success with ET in the area of pollution control and was the most enthusiastic supporter of ET, and

5 A list of Annex 1 Parties to the Convention can be accessed at http://unfccc.int/parties_and_observers/parties/annex_i/items/2774.php

6 Most parties to the Kyoto Protocol use 1990 as their base year, but a few countries have been allowed to use an alternative base year, or average emissions for a period of several years (UNFCCC COP 2, 1996, p. 16).

7 un.org. International Day for the Preservation of the Ozone Layer. 16 September. Background. Retrieved 17 April, 2013, from http://www.un.org/en/events/ozoneday/background.shtml

promoted it during the UNFCCC Treaty negotiations in 1992 (Newell, Pizer, & Raimi, 2012).

Whereas the US sat down at the negotiations table at the Kyoto Conference an avid supporter of ET, in the EU most EU institutions, Member States, environmental organisations and business federations were either opposed or highly sceptical of ET (Grubb et al., 1999, p. 94, as cited by Skjærseth & Wettestad, 2010). When the US demanded ET be part of the Kyoto Protocol, the cleavage appeared to potentially torpedo an agreement. A compromise allowed a final text to be agreed upon, which stated that the parties could utilise ET should they so desire (Article 17). It was nonetheless a watershed in climate policy history that the Kyoto Protocol became the first international vehicle for ET in GHGs by establishing the necessary mechanisms (Newell et al., 2012).

1.3 Towards emissions trading

In spite of differing views across the Atlantic, the Europeans were perhaps not as antagonistic towards ET as the Kyoto negotiations would indicate (Ellerman & Buchner, 2007). Some of the European resistance to ET have been ascribed to negotiations tactics (Skjærseth & Wettestad, 2010). Since the Earth Summit in 1992, carbon tax had been on the agenda in the EU but had disappeared again after failing to be deemed within the realm of the politically possible (Sterner, 2007, p. 3194). From the perspective of the Commission, and leaving aside the question of political viability, taxation was not within EU competences. Therefore, confronted with a lack of alternative policy instruments and a perception that action needed to be taken against climate change, less than a year after the Kyoto Conference a European Commission (1998) communication observed that the EU could set up its own ET regime by 2005.

Presumably, European politicians were gradually swayed by the same arguments that had made ET popular among US policy-makers. Stavins (1998) provided explanations why this happened in the US in relation to the establishment of the sulphur dioxide (SO_2) allowance trading program in 1990, as well as outlined why command-and-control environmental regulation historically had been the norm. One factor which enhanced interest for more cost-effective environmental regulation in the US was the steadily increasing pollution control costs. Some improvement in the understanding of market-based mechanisms at the political level contributed to increased political support for ET. Because SO_2 emissions were to be reduced significantly, not merely controlled, ET emerged as the by far most cost-effective alternative, and therefore the only politically viable option. One

additional point Stavins made, and which arguably is applicable to the introduction of the EU ETS, the opportunity costs for politicians associated with introducing a market-based instrument are least when the intention is to address a «new» problem, for which there is no policy instrument in place.

In the wake of the Commission's declaration of intent emerged several policy papers, until the Green Paper on GHG Emissions Trading argued unrestrained for the establishment of an EU ETS (European Commission, 1999, 2000a). The policy papers and the Green Paper argued for an EU cap-and-trade system with auctioning of emission allowances and national emission caps determined at EU level.

It should be noted that, after the Kyoto Protocol to the UNFCCC was signed in 1997, the Directorate General (DG) Environment was subject to a change in staff—including the majority of the personnel of the climate change unit—which brought about a change in policy direction in favour of ET (Lefevere, 2005, p 96 as cited by Skjærseth & Wettestad, 2010). Henceforward the Commission, spurred on by DG Environment, played an important role in the realisation of the EU ETS by 2005. Apart from the Green Paper, the European Commission procured guidance documents and research reports and created Working Group 3, which educated the actors about ET and facilitated discussion between them. In addition to the official record, numerous informal contacts were integral to the Commission's effort—in line with customary EU policy-making on any policy of relevance. An authoritative paper on the early stages of the ETS states

«In all, the Commission’s exercise of this role showed a technical competence and political astuteness that contributed significantly to the success of the EU ETS» (Ellerman & Buchner, 2007, p. 71).

At the time the Green Paper on GHG Emissions Trading appeared, there was considerable divergence in opinion between national governments across the EU on the subject. This is evident from the governmental submissions to the Green Paper (European Commission, 2000b), which moreover showed that several countries were negative or sceptical toward centralised decision-making, Ireland perhaps most decidedly so.

When the US withdrew from the Kyoto Protocol in 2001, its entry into force became shrouded in doubt as people pondered on whether a minimum of 55 signatories responsible for at least 55% of 1990 carbon dioxide [CO_2] emissions[8] eventually would ratify the treaty. Confronted with a lack of

8 The entry into force of the Kyoto Protocol required the signing of a minimum of 55 signatories responsible for at

US leadership, EU leaders soon considered it requisite that Europe lead the way in mitigating climate change on the global stage, demonstrating for other countries that the Kyoto targets could be met. In that context, the EU ETS emerged as the vehicle for doing such (Skjærseth & Wettestad, 2010).

At this point, small-scale experiments with ET provided valuable experience. British Petroleum's (BP) internal ET regime[9] was established in 1997, and was considered very successful (Victor & House, 2006). The Danish CO_2 trading program started in 1999, and the perhaps most important, the UK Emissions Trading Scheme, ran from 2002. These programs helped familiarise all the relevant actors with ET. Positive experiences with ET were further bolstered by recommendations to set up ET regimes by high-level commissions in Norway and Sweden, which were charged with examining the feasibility of ET (Ellerman & Buchner, 2007).

While the European elite was gradually convinced that ET was the way forward, DG Environment would not have its will about the design of the ET scheme. The informal consultations between the Commission and industry and national governments prior to the Commissions proposal for the ET Directive, served as a reality check for the Commission about the political economy of ET. The Member States' desire for allocation of emissions permits on a national level, free of charge, was imposed on the Commission, which subsequently included these central elements in its proposal for the ET Directive in October 2001 (Skjærseth & Wettestad, 2010). In 2003, the ET Directive became EU law (European Parliament and the Council, 2003), and it stipulated that the EU ETS would be up and running by 2005.

The majority of Member States pushed through a mandatory ETS, but both Germany and the UK originally preferred a system based on voluntary participation. Germany considered that the existing German regime of voluntary agreements with industry had lower abatement costs. However Germany ultimately went along with the majority, having seen its negotiation position undermined by internal divisions, and fearing that it might be outvoted by a qualified majority (Skjærseth & Wettestad, 2010).

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least 55% of 1990 CO_2 emissions.

9 BP met its goal of reducing company emissions by 10 percent in 2002, seven years ahead of its original target. The program was widely considered successful and provided important lessons for future emissions trading programs. Nonetheless, BP's emissions trading program differed significantly from the EU ETS that later materialised. Victor and House (2006, p. 2112) described it as a management device, given that it did not have many of the hallmarks of a typical trading system.

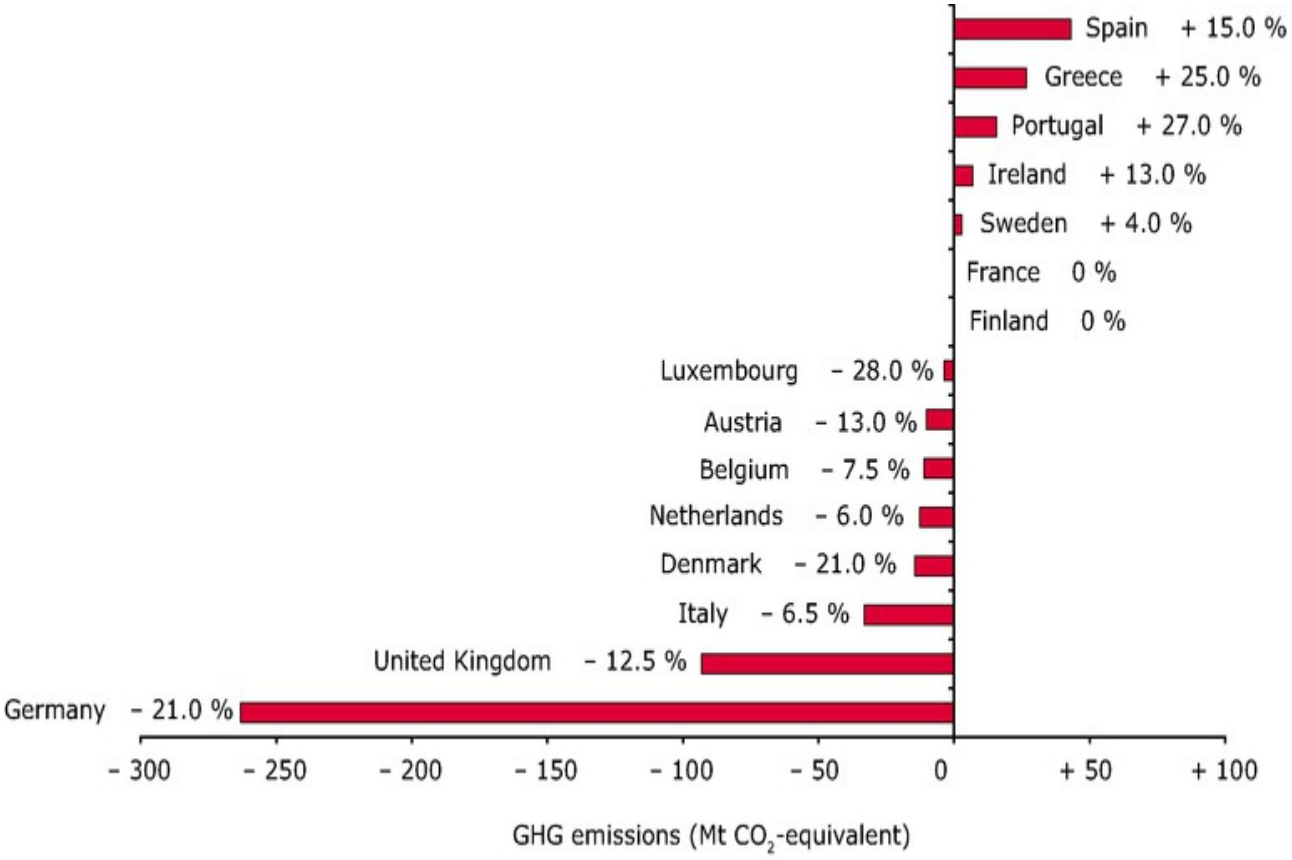
1.4 The Kyoto Protocol and EU burden-sharing

At the 7th Conference of the Parties to the UNFCCC in 2001 which produced the Marrakesh Accords, details around the implementation of the Kyoto Protocol were agreed on. In anticipation of the entry into force of the Kyoto Protocol—which happened in 2005—the parties established national emission reduction targets for the First Commitment Period of the Kyoto Protocol, from 2008-2012. These targets are referred to as assigned amounts (AAs), or quantified emission limitation or reduction commitments (QELRCs). The EU-15 agreed to an 8% reduction of relevant GHGs compared to the base year levels.

The Kyoto Protocol allows countries to fulfil their emissions reductions jointly, if they wish to do so (Article 3). When the EU, which in 2002 was the European Community (EC), adapted the Kyoto protocol, it signalled the intention of its Member States to fulfil the Kyoto commitments jointly (European Council, 2002). At the time the EU comprised 15 countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Portugal, Spain, Sweden and the United Kingdom (the EU-15). Thus the EU-15 were responsible for ensuring a collective 8 percent reduction in GHG emissions below 1990 levels in the 2008-2012 period. The so-called EU-15 burden-sharing agreement[10] redistributed the Kyoto QELRCs so as to reflect the wealth of the EU-15 countries at the time of the agreement. Hence rich EU-15 countries such as Germany, Denmark, and Luxembourg were committed to make big cuts in their GHG emissions compared to other parties to the Kyoto Protocol. And these QELRCs would be the basis for distributing emission caps in the EU ETS. Officially, QELRCs are expressed in terms of percentages of Kyoto base year levels, as displayed in figure 1.

10 The burden-sharing agreement appears in Annex 2 of the European Council document (2002) which ratified the Kyoto Protocol on behalf of the EC.

Figure 1. Kyoto burden-sharing targets for EU-15 countries[11]



Source: European Environment Agency (EEA) 2002

1.5 Conclusions

The signing of the UNFCCC in 1992 declared that the signatories would endeavour to stabilise atmospheric GHG concentrations at a level that would prevent dangerous human interference with the climate system. Developed countries acknowledged main responsibility to act. This served as a basis for the Kyoto Protocol, which legally committed signatories to adhere to its provisions.

The US had pioneered emissions trading and had achieved good results with the mechanism, and succeeded with incorporating it into the Kyoto framework. Having deemed a carbon tax not politically viable, and lacking an alternative policy instrument to cut GHG emissions, European politicians gradually moved from a negative to a positive stance toward ET. The US withdrawal from the Kyoto Protocol in 2001 made clear that there was a global leadership vacuum in the fight against climate change. This helped convince European politicians that the EU had to demonstrate that the Kyoto targets could be met, and, incited by the Commission, ET became the vehicle for

11 The figure displays the reduction commitments undertaken for each of the EU-15 Member States by 2008-2012 with 1990 as the base year, in percentages and metric tonnes of carbon dioxide equivalents.

doing so.

Thus the EU ETS was created by the ET Directive of 2003 and stipulated to be up and running by 2005. Although the Commission advised otherwise, it had to give in to Member States' insistence that emission allowances should be allocated on the national level, free of charge. The Marrakesh Accords of 2001 codified EU-15 QELRCs for 2008-2012. The EU-15 burden-sharing agreement of 2002 revised these by redistributing the sum of the commitments according to the wealth of the respective Member States, thus establishing the basis for calculating EU ETS national emissions caps.

Chapter 2: The allocation debate

This chapter explores why the EU ETS allocation regime which was created involved almost exclusively free allocation of allowances and national determination of allocation caps. These questions are interesting because, as this paper will argue, both features have contributed significantly to the inefficiency of the EU ETS. This particularly applies to free allocation, of which there are several facets that can be related to the systemic inefficiencies which have been evident during the lifetime of the EU ETS. They will be highlighted in chapter 4. This chapter is concerned with why this allocation regime came into place in spite of weighty arguments in favour of auctioning and centralised decision-making.

The reasons why Member States and private sector interests imposed their will to have free allocation in the EU ETS and national setting of allocation caps are found in the political economy of ET. The central dynamic consists on the one hand of business interests that predictably were engaged in rent-seeking. On the other hand, national authorities were susceptible to lobbying and concerns that auctioning might damage the competitiveness of national industries.
This chapter will also analyse why free allowances were given to the power sector as well, and suggest incompetence was probably an important reason.

The 2009 reform ahead of Phase 3 introduced about 40% auctioning and established a common allowance cap. Without the occurrence of the financial crisis in 2008, the reform would have set out rules for more extensive auctioning, as policy-makers not only had realised that free allocation had given windfall profits, but that the threat to EU ETS competitiveness had been overstated.

2.1 Pre-EU ETS literature on emissions trading[12]

Since ET emerged in policy discussions, a question of considerable controversy has been how the initial allocation of allowances in an ETS should be done. The debate has centred on whether to allocate emission allowances for free, frequently called «grandfathering», or put the allowances up for auction. Convery's (2009) review of excellence in the EU ETS literature concluded that the *ex ante* literature on the subject tends to prefer auctioning to free allocation[13].

12 This section merely provides a glance at central pro-auctioning arguments from the *ex ante* literature at the time which initially convinced the Commission that auctioning was the best method of allocation.
13 Also according to Cramton and Kerr (2002, p. 3), most researchers at the time favoured auctioning.

In the prelude to the passing of the ET Directive in 2003, the Commission thus reflected the view of the majority of the scientific community by proposing that auctioning was the best method of allocation (European Commission, 1999, 2000a). The Green Paper on GHG Emissions Trading highlighted a few reasons for which the Commission considered auctioning to be a superior method of allocation to free allocation (2000a, pp. 18-19). These arguments were available in the mainstream *ex ante* literature[14]. Firstly, the principle that polluter pays was presented as reasonable by the Commission. Secondly, auctioning would give all companies an equal and fair chance to acquire the allowances they wanted, and the Commission noted that governments thereby would avoid the need to take difficult and politically delicate decisions about how much to give each company covered by the trading scheme. Thirdly, it argued that auctioning would cause less distortion of the market than free allocation would. Fourthly, auctioning would be fair for new entrants. And fifthly, auctioning would create revenues that authorities could use toward promoting energy efficiency.

The argument that auctioning would create revenues which could be put to good use resonates with a concept which occupied a prominent place in the early *ex ante* literature, called «revenue-recycling». Carbon taxation or emission allowance auctioning can have virtuous effects in combination with revenue-recycling, according to this literature. By using a suite of models of the US economy to examine the effects of recycling revenues from the imposition of a carbon tax in several different ways, Shackleton et al. (1993) concluded that the costs associated with a carbon tax can largely be offset by using the revenues it produces toward cutting other taxes that discourage capital formation or labour supply. Goulder, Parry, and Burtraw (1997) cautioned that combined with pre-existing taxes, pollution taxes and quotas create a «tax-interaction effect» that elevates the cost of new pollution taxes and quotas. However, this negative effect can be offset by recycling the revenues from the latter by cutting marginal factor tax rates. Numerical simulations by Jensen and Rasmussen (2000) further strengthened the argument in favour of recycling revenues from putting a price on pollution. They showed that, albeit at the cost of a large reduction in employment in energy-intensive sectors and substantial stranded costs, revenue-recycling by way of cutting existing taxes incurs far lower welfare costs than free allocation of emission permits.

By the choice of free allocation of the vast majority of allowances in the EU ETS, the arguments outlined against free allocation above were ignored, including the threat of detrimental tax-interaction effects without the benefit of revenue-recycling effects, which apply to all emission

14 For instance, see Stavins (1998), and Cramton and Kerr (2002)

trading systems based on free allocation (Hepburn, Grubb, Neuhoff, Matthes, & Tse, 2006, pp. 139-140). National political decision-makers thereby resolved—instead of letting all emitters pay for emissions in an equal manner—to take it upon themselves to explicitly select a group of companies to whom a shortage of allowances were to be given, thus discriminating them from other companies to whom sufficient allowances were to be given. The discussion below will attempt to explain the reasons why politicians discarded the alternative that scholars considered both most economically efficient and socially just.

2.2 Political-economy determinants of allocation method

The US experiences with emission trading provide interesting insight when the different facets of the EU ETS are scrutinised. Stavins (1998) analysed why tradable emission permit schemes in the US virtually always had included initial free allocation of emission permits (74-76). He pointed out that the firms under such prospective regulation had wanted free allocation because of rent-seeking motives. Environmentalists had favoured ET over environmental taxes since whereas the former sets specific reduction targets, the latter promises no specific reduction yet makes the cost of environmental protection significantly more visible to the public. As regards politicians, Stavins argued that free allocation was politically more attractive than auctioning since it offered less recalcitrant industry[15] and greater control over the distributional effects of the ET.

Cramton and Kerr (2002) severely criticised free allocation as opposed to auctioning, but predicted that, when the US eventually would introduce ET to curb GHG emissions, contrary to expert opinion, «the political power and persuasiveness of energy sector interests» would ensure that allowances would be given for free «to electric utilities and large industrial users» (p. 3). So Stavins (1998) and Cramton and Kerr (2002) all argued that, in theory, the political economy of the US favoured free allocation of emissions permits, and the empirical evidence supported the theory.

As the following discussion suggests, what the aforementioned papers say about the US political economy and ET seems in essence to have been the case with the formation of the EU ETS. It has already been briefly mentioned that ET was considered more politically feasible than a carbon tax by EU politicians. Two interacting aspects of the policy-making process behind the EU ETS that appear to have been the nucleus of the political economy of the design of the EU ETS, were political concerns that the distributional effects of the system would include adverse effects on the

15 Stavins clearly assumed that the regulated industries had wielded considerable influence on the design of the emissions trading schemes in question.

competitiveness of affected community industry vis-à-vis extra-community industry, and the desire of prospective EU ETS industries to have free allocation as allocation method.

The Green Paper on GHG Emissions Trading mentioned six industrial groups, five of which expressed a strong preference for free allocation[16]. The muscular lobbying in favour of free allocation by industry is generally acknowledged in the academic literature[17]. Brandt and Svendsen (2004) noted that the empirical evidence, in addition to theoretical predictions, showed that free allocation was the allocation method by which industry profited most from. The main reason for this is the wealth transfer that is free allocation of allowances which are saleable, but free allocation also supposes a subsidy to existing industry. Hence, rent-seeking made these industries agree that they wanted free allocation.

2.3 Lobbyism at the EU level

Brandt and Svendsen argued that the industries' preference for free allocation is a plausible explanation for why decision-makers finally opted for free allocation. Markussen and Svendsen (2005) examined to what extent the interests of European interest organisations are reflected in the ET Directive by comparing the Green Paper on Emissions Trading with the final ET Directive, thereby comparing the policy proposal before lobbying, and the outcome after lobbying. They argued that powerful industrial interests played a part in influencing the allocation rules toward free allocation and determination of national allowance caps on the national level through lobbying.

The degree of lobbying influence is obviously impossible to quantify, but the lobbying as such at least evidences that the interests in question believed it was possible that they could influence proceedings. The same applies to the policy-making process of the US acid rain program, where power sector lobby groups lobbied—successfully—for free allocation (Hanoteau, 2003).

Markussen and Svendsen (2005) highlighted the interests of the institutions which had ready access to the late part of the policy-making process of the ET Directive, and could influence it[18]: the (other) General Directorates; the European Parliament; and national governments. Markussen and Svendsen noted that the Council—which represents the Member States—and the Commission,

16 The sixth was the chemical sector which successfully escaped inclusion in the EU ETS due to the administrative challanges an inclusion would suppose.

17 For instance, see Egenhofer (2007) and Convery, Ellerman, and De Perthuis (2008).

18 Late in the policy-making process, lobby representatives are increasingly obliged to try to influence proceedings indirectly, either through national parliaments and governments, or members of the European Parliament (Varming et al., 2001, as cited by Markussen & Svendsen, 2005, p. 246).

supported free allocation of allowances (247). But as mentioned, the Commission only supported free allocation after it effectively was compelled to do so by the national governments—certainly contrary to the will of DG Environment. As far as the European Parliament opposition to free allocation is concerned, it was in the end immaterial because it failed to garner necessary support from the general public and stakeholders (Convery et al., 2008)

As regards the role of non-governmental organisations (NGOs), those that had been very critical of ET beforehand did not participate in a meaningful way in the discussions early on in the policy-making process (Michaelowa & Butzengeiger, 2005). The NGOs that were given opportunity to voice their opinion at the stakeholder meeting in 2001 along with business interests did not have strong views about which method should be used provided that the method, or methods, were transparent and did not undermine the stringency of allocation caps (European Commission, p. 3). In other words, the NGOs in question did not mind the use of free allocation per se, and this arguably facilitated the realisation of the agenda of business interests to ensure that emitters would not have to pay for emission permits in auctions.

2.4 Lobbyism at the national level

Returning to the discussion of the influence of institutions and other actors on the process of drawing up the ET Directive, the question of how the preferences of these institutions were influenced by the national and European interest organisations in question at earlier stages, remains to be illuminated. In demand of particular interest is the Council, and the Member States. An ET system with auctioning of allowances could arguably not have materialised without the consent of national governments. And national governments appear to have been the key to the decision to opt for free allocation. Thus without analysing the influence of the mentioned interest organisations on national governments, it is not possible to assess with any accuracy the degree of influence of interest organisations on the EU-level policy-making process as regards the decision to use free allocation.

While undertaking an analysis of the degree of influence of interest organisations on the respective Member State governments is beyond the scope of this paper, a couple of studies from Germany provide some understanding of the influence of lobbying at the national level in the EU. By using the German Ecological Tax Reform to conduct a combined theoretical and empirical analysis of the role of interest groups in the making of environmental tax differentiation, Anger, Böhringer, and Lange (2006) showed that environmental tax differentiation is consistent with political economy

reasoning, and found that industries with more powerful lobbies were subjects of preferential treatment by the authorities.

Anger, Böhringer, and Oberndorfer (2008) conducted an analysis of the influence of interest groups on the German EU ETS allowance allocation using a cross-section of German firms. They did not find evidence that lobbying alone affected the allocation process. However, they found that very large emitters were able to influence their allocation upwards through the combination of strong lobbying and the political argument that they were more severely affected by the regulation than other groups. Consequently they did achieve preferential treatment, and they also undermined the impact of EU ETS as a whole in the process by lowering the overall abatement burden. These studies give credence to the argument that national governments were influenced by lobbying and were susceptible to concerns expressed by private sector stakeholders in relation to their decision to back free allocation as method of allocation instead of auctioning.

2.5 Competitiveness and carbon leakage

One reason why national governments are highly susceptible to warnings from national industry that environmental regulation can have negative effects on their competitiveness is that a loss of competitiveness can lead to a decline in exports, a resulting lower gross domestic product, and a rise in unemployment as industrial sectors that have high exposure to international competition are forced to cut production as foreign competitors take over their market share.

A second reason why government officials and environmentalists alike worry about competitiveness loss when planning environmental regulation is related to the concern about carbon leakage. IPCC (2007b) has defined carbon leakage as «the increase in CO_2 emissions outside the countries taking domestic mitigation action divided by the reduction in the emissions of these countries.» Frequently when business leaders find that they cannot cope with international competition due to high production costs, they see an opportunity to relocate production capacity to countries where lower salaries, lower corporate tax rates, and less demanding regulation create an environment that enables considerably lower production costs[19]. For the country from which production capacity is relocated, this implies lost tax revenues and job losses. But it also implies reduced emissions, because factories have been closed down. However, this is generally not considered as abatement

19 Currently, it is common to distinguish between two types of carbon leakage: «Investment leakage» refers to investment in emissions-intensive activities outside a zone in which it is relatively expensive to generate emissions, whereas «product leakage» refers to a decrease in EU producer's market share in both the internal and the external markets (Laing, Sato, Grubb, & Comberti, 2013, p. 16)

neither by environmentalists nor by EU authorities, since emissions will increase where production has relocated to, and, more importantly, since a lack of environmental regulation is one of the factors which are conducive to low production costs, global net emissions often increase as a consequence of relocation of production from the EU, to countries with lower production costs.

Nonetheless, according to the definition, even if global net emissions decrease as a result of such relocation, it is still called «carbon leakage» (Wråke, 2009, p. 24). But it should be emphasised that environmental regulation that is predicted to induce a leakage rate that is quite small can still be viewed as poor policy by policy-makers, both because the implications of leakage for the regulated economy can be significant, and importantly, because such policies are deeply undesirable in the context of the political economy.

The different sectors of an economy have different levels of exposure to international competition. As regards EU sectors that are included in the EU ETS, their different levels of exposure to international competition render some of them more vulnerable to costs incurred by participating in the EU ETS in terms of their profitability. Studying the competitiveness impacts from the EU ETS, Carbon Trust (2004) outlined three key determinants of competitiveness exposure which Hourcade, Demailly, Neuhoff, and Sato (2007) reiterated:

- CO_2 intensity of production
- Ability to pass cost increases through to prices
- Opportunity to abate carbon

CO_2-intensive production is particularly vulnerable to elevated electricity prices since energy producers are able to pass through a substantial amount of the EU Allowance (EUA) cost to consumers, thus increasing manufacturing costs across the board. Sectors which have the largest potentials for abating GHG emissions are naturally less exposed to higher costs that the EU ETS produces. As for the ability to pass cost increases through to prices, producers of internationally mobile products generally have less opportunity to do this, depending on the level of international competition they face. Pass-through of costs for these producers is partly prevented by increased electricity prices, and the potential loss of exports and reduced intra-community market share as a result of competition from imported products with a lower price (p. 16).

The implication of the above factors is that CO_2-intensive industry that moreover was exposed to

international competition had the strongest incentives to be outspoken about the potential detrimental competitiveness effects of the EU ETS—which it was. Some energy-intensive producers argued specifically for free allocation early in the policy-making process (European Commission, 2001). A sample of the concerns of such industries surfaced in interviews by Carbon Trust (2004). The steel sector, by virtue of being highly energy-intensive and exposed to international competition, expressed its worries about its inability to pass through costs, the severe negative impact on prices a potential Chinese economic cool-down would have, as well as what was seen as limited abatement potential with contemporary technology.

Prior to the ET Directive being proposed in October 2001 (and adapted in October 2003), few studies of the competitiveness implications of EU ET had been conducted. One of these was commissioned by the OECD in 2001 and prepared by Mæstad (2003), who used a partial equilibrium model to explore short to medium term competitiveness impacts on the steel sector by simulating a carbon tax on emissions of 25 US dollars per tonne CO_2 (tCO_2). In the scenario of this tax being levied on the EU-13, a substantial carbon leakage rate of 60% on average was predicted. A similar scenario was predicted by Gielen and Moriguchi (2002), who estimated the effects on the steel sector of a CO_2 tax on Japan and the EU-15 of 10 US dollars per tCO_2, and of 42 US dollars per tCO_2, which predicted leakage rates of 35% and 70%, respectively.

So these predictions suggested to EU politicians that the EU steel sector might suffer significant damage to its competitiveness if it were to pay for emissions under the new emissions trading regime. Whichever level of attention EU politicians generally devoted to the scientific literature on this subject at the time, the probability that these reports made politicians more inclined to favour free allocation are increased by the circumstances highlighted thus far in the discussion about lobbyism and competitiveness; and they centre around the crucial dynamic at the heart of the policy-making process, namely the resourcefulness of industry to lobby to further their agenda, and the susceptibility of politicians to legitimate concerns about the competitiveness of major industrial sectors.

2.6 The restricted time frame

Since the Commission planned to give itself and the Community scarce time to establish all the mechanisms necessary to make the ETS work by 2005, there was no time for filibuster or prolonged negotiations. While it was still uncertain if and when the ET Directive would be adopted, Christiansen and Wettestad (2003) noted that

«The reason why the Commission proposed the use of grandfathering owes largely to the perception that the chances of getting a system in place by 2005 could be undermined by opposition from key Member States and lobby groups representing incumbents that would have to pay for allowances» (p. 11).

Considering the arguments presented thus far, it seems highly unlikely that the Commission might have been able to persuade its opponents into changing opinion on the question of allocation method in the short term. Some researchers (Egenhofer et al., 2011) have indeed qualified both free allocation and decentralised setting of caps as political inevitabilities. However, within a longer time frame, and through a process of political deliberation—and a large portion of horse-trading—in addition to scientific exploration of the subject, this might have happened. Consequently the time frame should be acknowledged as an underlying factor which affected the policy-making process by dictating that an agreement on the design of the system needed to be reached fairly quickly.

2.7 Windfall profits in the energy generating sector and free allocation

The following discussion is principally concerned with the windfall profits that occurred in the energy generating sector as a consequence of free allocation. However, initially it is necessary to clarify that there are in fact two types of windfall profits that occur in the power generating sector that are related to the EU ETS, of which only one is caused by free allocation. The other type of windfall profits is the one which is generally associated with ET and is called «the ET effect», and occurs regardless of allocation method. This impact on power generators' profit can however be positive or negative, since the effect is different for different types of power generators (e.g. high or low-CO_2 emitting), and also vary according to several market-related factors, such as the marginal cost of production (see J.P.M Sijm, Hers, Lise, & Wetzelaer, 2008, pp. 125-126).

A feature of ET and *deregulated* electricity markets is that a significant share of the market value of allowances is passed through to consumers. Simulations of electricity markets, including the one carried out by Baron, Boemare, and Jakobsen (2002, as cited by Convery, 2009) of the Baltic Sea region, anticipated that this would happen. Carbon Trust (2004) also noted this in a report on competitiveness effects of the EU ETS.

Also according to economic theory, windfall profits was foretold in an ETS based on free allocation. The energy price consumers must pay is not affected by method of allocation. Rather, it is affected by the price of allowances and the amount of GHGs the production of one unit of energy

produces. And the price of allowances is determined by the supply and demand for allowances. Regardless of whether allowances are free or subject to auction, with a high supply of allowances the market will reach a saturation point, and when there are more sellers than buyers, the price falls —and conversely. Therefore, if electricity markets are deregulated, the difference between auctioning and allocation of allowances free of charge is that with auctioning the authorities, or by extension the public, pocket the revenue from the auctioning of allowances, whereas with free allocation, energy producers pocket the revenue from the increase in energy prices the emission trading scheme causes (Cramton & Kerr, 2002).

Since economic theory sometimes fails to take all relevant factors into account and therefore do not predict developments with accuracy, it is worth noting that the evaluation of the EU ETS has produced empirical evidence on power sector costs which supports the above mentioned theoretical prediction that auctioning of EUAs does not have an impact on electricity prices (Cummins, O'Shea, & Lyons, 2010). If policy-makers feared that auctioning of EUAs to energy-producers might trigger increased electricity prices, it is plausible that they refrained from doing so to avoid detrimental effects on the competitiveness of energy-intensive industry. However, since both theory and electricity market simulations predicted otherwise, this seems unlikely.

As indicated in chapter 4, the total windfall profits in the power generating sector as a result of free allocation could possibly exceed 100 billion euros from 2005 to 2012. Whether policy-makers were properly informed about the possibility of windfall profits in deregulated electricity markets, and to what extent they considered the implications if they were informed, is unclear. Ellerman and Joskow (2008) argued that, in retrospect, it seemed evident that this issue had not been widely understood prior to implementation. Convery (2009) also observed that the effect did not feature much in pre-implementation policy-discussions. The remarkable incompetence this attributes to policy-makers does however beg the question of whether the windfall profits were anticipated yet ignored due to more pressing concerns. But since the power generating sector did not face the international competition other sectors worried about, policy-makers could have decided to base allocation to power generators on auctioning, while opting for free allocation in other sectors. That would have invited neither legitimate concerns about competitiveness, nor irresistible lobbying pressure to change the policy. Therefore, the circumstantial evidence indicates that policy-makers at least to some extent were unaware that windfall profits would occur in the power generating sector as a consequence of free allocation.

2.8 Decentralised setting of caps and Phase 1 over-allocation

A pivotal question concerning the decision-making structure of the EU ETS was whether to determine allocation caps centrally or at the national level. As mentioned above, governmental submissions to the Green Paper on Emissions Trading articulated clear opposition to the notion of centralised determination of allocation caps (European Commission, 2000b). The electricity producers and the six industrial groups mentioned in the Green Paper outlined different views on the various aspects of ET, but with respect to determination of caps, nearly all of them expressed a preference for setting caps or targets at a national level (including negotiated agreements and on a voluntary basis) (see Markussen & Svendsen, 2005). In a stakeholder meeting in 2001 industry voiced the same opinion with great clarity (European Commission, 2001).

NGOs were the most critical group regarding the Member States' authority to decide on allocation caps. Despite the Annex 3 provision of the ET Directive which specified that allocations should not exceed what «is likely to be needed», NGOs still felt this gave national authorities excessive discretion (González, 2006). However, with both Member States governments and industry stakeholders lined up against this position, such concerns had no impact. And in the end the Commission was arguably presented with a fait accompli concerning national determination of allocation caps[20].

Both national industries and national authorities were worried about unfair effects on the competitiveness of national industry—and as regards the intra-community effects, they worried that other Member States would be more favoured by the scheme than themselves—if allocation caps were decided on at the EU level (Kruger et al., 2007, p. 117). For national authorities, decentralised decision-making ensured that they were in control to contribute to prevent this from happening.

The major industrial groups' resolve to empower national authorities with setting national allocation caps indicate that they saw it as clearly beneficial to them that caps would be set by national authorities. However, the argument that industry was concerned with competitiveness effects to the extent that they worried about equal treatment across national boundaries in the EU ETS, is questionable. That is because national determination of caps could arguably not guarantee against unfair or unequal treatment any more than centralised setting of caps. This makes it plausible that the major industrial groups had other reasons for their broad agreement to advocate national setting

20 Grubb, Azar, and Persson (2005, pp. 127-128) argue that national determination of allocation caps was an unavoidable prerogative of Member States.

of caps.

A more credible reason for this preference is rent-seeking—a desire to lower the costs associated with being included in the EU ETS. Given the general susceptibility of national governments to concerns about their major national industries' competitiveness, EU ETS industry had reasons to expect that allocations would be more generous when decided on by national authorities—even if they were subject to a final approval by the Commission. Possibly, they also realised that they could influence allocations upwards in the process of presenting the authorities with data in order for them to determine allocations. And generous allocation caps would imply a lower abatement burden on EU ETS industry, which would then face lower costs as a result of ET.

2.9 The 2009 revision changes allocation regime ahead of Phase 3

The 2009 revision of the EU ETS (European Parliament and the Council, 2009a) addressed the two major structural inefficiencies discussed so far in this chapter, decentralised setting of caps and free allocation. The detrimental effects on the overall stringency and hence efficiency of the EU ETS were obvious enough for the EU ETS member countries to agree to a progressively decreasing Community-wide cap, based on Phase 2 National Allocation Plans (NAPs) for Phase 3 and onwards.

As for free allocation, this question was more difficult to address given continued strong opposition to auctioning from the stakeholders. However, the growing body of emerging literature on EU ETS and competitiveness and carbon leakage gave political decision-makers greater insight into the probable consequences of increased use of auctioning. This made them less dependent on and susceptible to stakeholder warnings about carbon leakage effects.

The *ex ante* EU ETS literature on competitiveness loss and carbon leakage has considerable variation in terms of its findings, which is a result of the difference in assumptions which are made. For instance, in any model the assumed carbon price is crucial to the estimation of carbon leakage in the EU ETS. However, as Venmans (2012) indicated in an EU ETS literature review which included a number of *ex ante* estimates of EU ETS-induced carbon leakage, the majority—many of which were published before 2009—concluded with fairly low competitiveness effects, including the ones that assumed high rates of auctioning. For example—but admittedly in the low end—Manders and Veenendaal (2008) estimated an EU economy-wide carbon leakage rate of merely 0.3% under full auctioning.

Ex post studies of carbon leakage did not generate results which could justify a continuation of giving nearly all allowances away for free. Reinaud (2008) found no evidence of carbon leakage in the steel, cement and primary aluminium sectors—sectors which were deemed vulnerable in a Commission report on international competitiveness (2006b). Similarly, Demailly and Quirion (2008) found that the iron and steel industry had suffered only small competitiveness losses due to the EU ETS.

Nevertheless, some sector-specific *ex ante* studies of vulnerable sectors gave worrying estimates of carbon leakage, such as Ponssard & Walker (2008). And as policy-makers contemplated scaling up auctioning of allowances dramatically in Phase 3, the financial crisis started to unravel in 2008 and completely changed the picture. Philippe de Buck, the then director general of Business Europe, acknowledged a comprehensive lobbying effort by all his constituents, who mobilised large numbers of representatives who were able to push on all levers of government simultaneously. Under strong lobbying pressure from industry, politicians reconsidered the allocation policy as the financial crisis worsened in late 2008. Among the key decision-makers who changed sides and became supporters of continued free allocation to industry was German chancellor Angela Merkel. Subsequently the revised allocation regime was softened (Chaffin, 2009), and auctioning was restricted to about 40% of allowances.

2.10 Conclusions

Free allocation was severely criticised in the *ex ante* literature, and the use of free allocation in the EU ETS in Phases 1 and 2 invited a barrage of criticism from academia. For a number of reasons free allocation appeared inferior to auctioning of EUAs. Grandfathering would exclude the possibility to recycle revenues from auctioning to mitigate negative distributional effects of the EU ETS and enhance energy efficiency; it would not implement the «polluter pays» principle; it would cause more distortion of the market; and complicate fair treatment of new entrants.

The political economy nevertheless favoured free allocation and national determination of caps.
The dynamic which favoured free allocation consisted of rent-seeking industrial stakeholders on the one hand, and on the other hand politicians who were concerned about and susceptible to worries expressed by the former about negative competitiveness impacts of the EU ETS.

Past experiences with emissions trading; the process which concluded in the ET Directive; studies

which have been conducted on the effects of lobbyism on environmental policy in Germany; and the susceptibility of politicians to legitimate competitiveness concerns all point in the direction that stakeholder industry had a crucial influence on the decision to use free allocation. Energy-intensive industry with high exposure to international competition, such as the steel sector, played a key role in convincing policy-makers to use free allocation, as such sectors were considered particularly exposed to carbon leakage. Two studies which simulated the imposition of a carbon tax predicted in excess of 50% carbon leakage in the EU. NGOs which were involved in stakeholder consultations did not object to the use of free allocation per se, and thus facilitated the outcome.

As regards the decision to chose decentralised determination of allocation caps, a political-economy dynamic was at work which was very similar to the dynamic behind the decision to use free allocation: Stakeholder industry was plausibly engaged in rent-seeking as setting of caps at the national level appeared conducive to less stringent allocation caps, because national authorities worried about unfair effects on the competitiveness of national industries, in addition to worrying more generally that centralised setting of caps might produce some kind of economic disadvantage vis-à-vis other Member States.

With the probable exception of windfall profits from free allocation—which however was predicted by the scientific literature—the use of free allocation and national setting of caps was not a faux pas in the sense that the policy-makers involved were oblivious to the negative implications of the design. The Commission articulated arguments from the literature that favoured auctioning and centralised decision-making, but the ET Directive instead reflected a political compromise—some say a political inevitability—which was necessary in order to get the system up and running on short notice.

The negative effects of national setting of caps on the overall stringency of the EU ETS were so obvious that a change to a EU ETS-wide cap was inevitable, which the 2009 revision introduced. Emerging studies on EU ETS competitiveness impacts indicated that large increases in auctioning could be made without significant carbon leakage. A large-scale lobbying effort on behalf of stakeholders combined with the sudden impact of the financial crisis in 2008 mellowed the determination of the political establishment to monumentally increase auctioning, resulting in agreement to auction about 40% of EUAs in Phase 3.

Chapter 3: The structure of the EU ETS

This chapter principally provides information about the legal provisions for the EU ETS; information that is necessary to understand how the system works and how it has developed into an inefficient instrument to curb GHG emissions. The main topics are the scope of the EU ETS as regards GHGs and sectors of the economy covered; provisions for the allocation process; links to the international framework under the Kyoto Protocol; and the structural changes which took effect upon entry into Phase 3 (2013-2020) of the EU ETS.

3.1 Original EU ETS structure: Phases 1 and 2 (2005-2012)

When the EU ETS started operating, it was focused on high-emitting installations in the heat and power generating industry and on energy-intensive industrial sectors[21]. It covered the energy sector; production and processing of metal ore and production of pig iron and steel[22]; mineral industry including cement- and glass production; and pulp and paper production. Beyond the dominant political considerations, administrative considerations also affected which industries were finally included. The chemical sector was not included due to the administrative hurdles presented by the prospect of regulating the numerous and small producers, many of whom emitted all the GHGs that would be regulated by the EU ETS (Brandt & Svendsen, 2004, p. 78). In 2008 around 11 000 installations were covered, and they accounted for about 50% of EU's total CO_2 emissions and about 40% of its GHG emissions (European Commission, 2008).

In Phase I the EU ETS comprised the 25 EU Member States. In Phase 2 the EU and hence the EU ETS, grew to 27 Member States, and in addition EFTA countries Norway, Iceland, and Lichtenstein joined the scheme. Whereas the Commission oversees the implementation of EU ETS regulation in Member States, the EFTA Surveillance Authority has this responsibility for EFTA countries, albeit in close cooperation with the Commission (Julia Reinaud & Philibert, 2007).

21 In Annex 1 to the original ET Directive there are provisions for which installations are covered by the scheme. Only combustion installations with a rated thermal input exceeding 20 megawatt are included, and for other sectors there are minima production capacities for installations covered by the scheme.

22 Primary and secondary fusion

The GHGs mentioned in the ET Directive are the same as those included in the Kyoto Protocol[23]:

Carbon dioxide [CO_2]
Methane [CH_4]
Nitrous Oxide [N_2O]
Hydrofluorocarbons (HFCs)
Perfluorocarbons (PFCs)
Sulphur Hexafluoride [SF_6]

Whereas the ET Directive included the mentioned GHGs as they are covered by the Kyoto Protocol, EU ETS actually only regulated CO_2 emissions in Phase 1. It is by far the most important GHG, and in 2010 it accounted for over 82% of GHG emissions in EU-27 (European Environment Agency, 2012a). In Phase 2 EU ETS was marginally expanded by the inclusion of N_2O emissions from the production of nitric acid by a number of Member States (European Commission, 2013d). The other GHGs mentioned in the ET Directive are however relevant to the generation of the international Kyoto emission permits that are discussed below.

For purposes of measurement, GHGs included in the EU ETS which are not carbon dioxide are translated into carbon dioxide equivalent (CO_2e); usually tonnes of CO_2e (tCO_2e). One tonne of carbon dioxide equivalent is equal to one metric tonne of carbon dioxide. GHGs are translated into CO_2e by multiplying the amount of the GHG in question with its Global Warming Potential (GWP).

GWP describes a GHGs capacity to trap heat in the earth's atmosphere over a given time interval. 100 years is the time interval which is used in the process of calculating GWPs in the EU ETS and in international ET[24]. The GWPs currently in use were published as part of the Intergovernmental Panel on Climate Change (IPCC) Second Assessment Report: Climate Change 1995 (SAR) (IPCC Second Assessment Report, 1996)[25] [26].

23 Certain GHGs, such as hydrochlorofluorocarbons and chlorofluorocarbons, also deplete the ozone layer and are being phased out under the Montreal Protocol, wherefore they are not included in the Kyoto Protocol .

24 Because the various GHGs have vastly different life spans in the atmosphere, during which they absorb different levels of radiation, their GWP will vary greatly assessed over different time intervals. GHG life spans in the atmosphere ranges from 1.5 years for HFC-152a , to 50 000 years for perfluoromethane. For instance, relatively short-lived methane has a GWP of 56 over 20 years, but only 6.5 over 500 years. And long-lived sulphur hexafluoride has a GWP of 16 300 over 20 years, but 34 900 over 500 years.

25 See unfccc.int

26 While environmental policy instruments such as the EU ETS and Kyoto mechanisms continue to be based on the GWPs in the SAR from 1996, GWPs of GHGs have since been reevaluated. In the IPCC Fourth Assessment Report:

Table 1: GHG GWP[27] with a time horizon of 100 years for EU ETS GHGs[28].

GHG	GWP
CO_2	1
CH_4	21
N_2O	310
SF_6	23 900

Source: IPCC Second Assessment Report 1995, The Science of Climate Change: Summary for Policymakers and Technical Summary of the Working Group 1 Report, page 22

In accordance with the Kyoto Protocol, the EU has a total cap on emissions which is the sum of the national caps of all its Member States. The EU ETS covers only some sectors of the EU economy and therefore has a smaller emissions cap. As part of the particular decentralised decision-making structure of the EU ETS[29], national EU ETS caps were determined at the national level. Before each phase, the EU ETS member countries were obliged to submit to the Commission NAPs that proposed in detail how they wished to carry out the allocation of emission permits[30], which are called EUAs. One EUA means an allowance to emit one metric tonne of CO_2e. The amounts of allowances the individual national governments resolved to allocate to EU ETS installations determined the distribution of the respective national emissions reduction commitments undertaken in the EU burden-sharing agreement between the EU ETS sectors and the non-EU ETS sectors; and hence the overall reduction commitment the EU ETS has.

Excepting the first phase, the NAPs were to be submitted at least 18 months prior to the initiation of the next phase. The Commission could reject the plan if any aspect of it contravened with Article 10 or the criteria for NAPs listed in Annex 3 to the ET Directive. During Phase 1 the Commission moreover produced several detailed guidelines and communications about how the provisions for NAPs should be interpreted by EU ETS member countries (European Commission, 2004a, 2004b,

Climate Change 2007 (AR4) (IPCC Fourth Assessment Report, 2007a), GWPs were generally adjusted upwards. Notably, methane, one of the major GHGs, is by AR4 considered to have a GWP of 25, not 21, as according to the SAR.

27 Global Warming Potential referenced to the updated decay response for the Bern carbon cycle model and future CO_2 atmospheric concentrations held constant at current levels.

28 Hydrofluorocarbons and perfluorocarbons are two groups of gases also covered by the EU ETS, but since each have numerous variants with different properties and hence different GWPs, they are not included here.

29 See Kruger, Oates, and Pizer (2007)

30 EFTA NAPs were submitted to the Commission via the EFTA Surveillance Authority.

2004c, 2005, 2006a).

The ET Directive dictated that, for Phase 1, a minimum of 95% of allowances were to be allocated for free, leaving the Member States the option of auctioning a maximum of 5% of the allowances. For Phase 2, at least 90% of the allowances were to be allocated free of charge.

Every operator of an installation which is regulated by the EU ETS is obliged to surrender EUAs by 30 April each year that cover the installation's total emissions of relevant GHGs in the preceding calendar year, and the authorities shall subsequently cancel them. If such emissions from an installation exceeds the number of allowances its operator has surrendered for the installation's emissions, EU ETS member countries shall fine the operator EUR 100[31] for each excess tCO_2e. On the other hand, whereas operators are free to keep EUAs from one year to the next within a phase, EUAs which have not been surrendered and hence not used during a phase, shall be cancelled by the competent authorities at the start of the subsequent phase[32].

EU ETS member countries are responsible for ensuring that adequate monitoring and reporting of emissions takes place. Individual operators are charged with reporting their emissions, and the national authorities shall seek to verify the reports. EU ETS member countries were also obliged to establish a register for proper accounting of the different aspects of the allowance allocation process.

3.2 The Kyoto framework and the Linking Directive

The Parties to the Kyoto Protocol have emission budgets that they must comply with in order to comply with the Kyoto Protocol during the First Commitment Period, from 2008 to 2012. The budgets are based on the assigned amount each Party is allowed to emit, and which is determined according to the Party's base year emissions and its Kyoto target. The assigned amounts are measured in assigned amount units (AAUs), and one AAU is equal to one tCO_2e.

There are so-called «flexible mechanisms» in place which allows the Parties to sell off surplus AAUs, or to increase their assigned amounts in various ways. The Linking Directive which was adopted in 2004 (European Parliament and the Council) opened the door for use in the Community

31 However, in Phase 1 the excess emissions penalty was set at 40 EUR per tCO_2e. And from 2013, the amount increases in accordance with consumer prices (European Parliament and the Council, 2008).

32 In Phase 1 there was initially an opening for discretionary banking of allowances by the Member States. However, in 2006 the Commission made a prohibiting move by indicating that it would be interpreted as state aid (2006a).

scheme of emission permits from two project-based flexible mechanisms created under the Kyoto Protocol. One is the Clean Development Mechanism (CDM) which allows Annex 1 parties to the Kyoto Protocol to invest in projects that reduce GHG emissions in non-Annex 1 countries and obtain carbon credits in return. CDM carbon credits are called Certified Emission Reduction units (CERs) and can be traded internationally between emission trading systems and other parties. The second mechanism is Joint Implementation (JI) by which Annex 1 countries can cooperate to cut GHG emissions, allowing an Annex 1 country to invest in projects that reduce GHG emissions in another Annex 1 country and obtain carbon credits in return. The JI carbon credits are called Emission Reduction Units (ERUs). Like the EUA, one CER or ERU is equal to one tCO_2e.

EU ETS member countries were able to allow operators to surrender CERs purchased through the CDM in addition to EUAs from 2005, and ERUs purchased through the JI mechanism were likewise permitted from 2008. However, some activities generate CERs and ERUs which are not accepted in the EU ETS. Such credits obtained from nuclear projects are among those that are not accepted[33], and projects based on land-use, land use change and forestry (LULUCF) are also excluded from use in the EU ETS. The two mechanisms allows GHG emission cuts to be accomplished more efficiently; the logic behind it is the same as the one underpinning ET within the EU ETS.

Yet, according to the provisions of the Kyoto Protocol and the Marrakesh Accords, the use of carbon credits from the project-based mechanisms should be supplemental to a country's effort to fulfil its Kyoto obligations. The nature of the «supplementarity» of the flexible mechanisms was however not specified in those agreements. The Linking Directive conferred on the EU ETS member countries to specify in their NAPs from 2008 the limit for how many CERs and ERUs operators of each installation can surrender in terms of a percentage of the allocation to each installation, in a manner consistent with the supplementary principle.

3.3 Aviation introduced from 2012

In 2008 a new directive (European Parliament and the Council) was adopted which added aviation to the sectors included in the EU ETS[34]. Starting 1 January 2012, the aviation sector would be allocated EUAs equivalent to 97% of historical emissions during the first year; and EUAs equivalent to 95% of historical emissions during Phase 3, subject to revisions. In both periods, 15%

33 Also, acceptance of credits from hydroelectric projects exceeding 20 MW of installed capacity is subject to certain conditions (see European Commission, 2013f)

34 However, the aviation sector has a separate emissions cap.

of allowances had to be auctioned. And only CO_2 emissions are accounted for.

2012 was also the year in which national EU ETS registries were replaced by a central Union registry, and included accounts for aviators. At the same time the European Union Transaction Log (EUTL) started operating and took over the duties of the Community Independent Transaction Log (CITL), which till then had been charged with checking, recording, and authorising all transactions taking place between accounts in national registries (European Commission, 2013d).

All flights arriving or departing from an aerodrome within the EU ETS were covered by the scheme, thereby including extra-community flights to and from EU ETS member countries. A provision was established whereby incoming flights could be exempt from the scheme if the country of origin were taking measures to limit aviation emissions from departing flights. On 24 April 2013 a proposal by the Commission (European Parliament and the Council) to exempt international flights from enforcement of the ETS Directive with respect to emissions reporting and surrendering of allowances for the year 2012, was accepted in anticipation of the International Civil Aviation Organisation (ICAO) General Assembly in autumn 2013.

3.4 Revision in 2009 ahead of Phase 3 (2013-2020)

In Phase 3 the EU ETS expanded and covered a slightly larger part of the economy. In quantitative terms it also expanded, as Croatia became the 31th EU ETS country in 2013. By the inclusion of aluminium production, all production of metals was covered by the scheme. Also, PFCs emissions from aluminium production were included. A greater share of N_2O emissions were covered as well, as N_2O emissions from the production of adipic, glyoxal and glyoxlic acids were added to the regime.

The 2009 revision of the EU ETS (European Parliament and the Council, 2009a) made significant changes to the structure of the EU ETS. Importantly, it eliminated the use of NAPs and removed the authority of national governments to determine national allowance caps, and hence the overall cap of the EU ETS. Instead it introduces so-called community wide quantities of allowances that are issued yearly, starting in 2013. This cap is determined to decrease by a linear factor of 1.74% yearly compared to the average annual allowances issued by EU ETS member countries in Phase 2. By 2020 the EU ETS will thus deliver 21% cuts in emissions compared to 2005 level.

In Phase 3 the EU ETS is part of a wider framework known as the EU climate and energy package,

which is designed to achieve a 20% reduction of GHG emissions compared to base year levels by 2020. The Effort Sharing Decision (European Parliament and the Council, 2009b) established emissions targets for non-EU ETS sectors for EU Member States and is projected to deliver around 10% reduction compared to 2005 level. By adding that reduction to EU ETS reductions, the overall goal of the climate and energy package will be achieved (European Commission, 2013c).

The 2009 revision also established auctioning as the default method of allocation for Phase 3 and onwards. In 2013 over 40% of allowances will be auctioned, and this number will rise progressively on an annual basis during Phase 3. Electricity producers will as a general rule receive no free allowances in Phase 3[35]. Manufacturing industry will receive 80% of allowances for free in 2013, a number which will decrease in linear fashion to 30% in 2020. The goal is that by 2027, all allowances will be auctioned (European Commission, 2013a).

Currently two auction platforms have been established. The European Energy Exchange (EEX), located in Leipzig, functions as the common auctioning platform for most EU ETS member countries. The second is ICE Futures Europe (ICE), located in London.

Another major change in Phase 3 was the introduction of harmonised EU-wide rules for free allocation and the use of benchmarks, set out in the Benchmarking Decision (European Commission, 2011b). Generally product benchmarks are based on the average of the 10% best performing installations in terms of GHG emissions across the EU ETS. If installations qualified for free allowances meet the benchmarks, they get the allowances they need for free. If they fail to meet them, they will get fewer allowances than they need for free (European Commission, 2013e).

In accordance with the rules in the Benchmarking Decision, Member States have submitted to the Commission preliminary calculations of the amounts of allowances they will allocate for free in 2013, which is currently under consideration by the Commission. The EFTA Surveillance Authority considers whether these so-called national implementation measures (NIMs) are compliant with the relevant legal provisions for the EFTA countries. If NIMs allocations exceed the total allowance cap, the Commission will apply a cross-sectoral correction, after which EU ETS member countries can make final decisions on allocations (ibid.).

35 There are however provisions for free allocation to installations in Member States with poor infrastructure so as to facilitate modernisation (European Parliament and the Council, 2009a, p. 76).

In anticipation of a new global climate change agreement (replacing the Kyoto Protocol), the EU ETS Directive[36] also included provisions for transfer of CERs and ERUs unused in Phase 2 to be transferred to Phase 3. However, the use of such credits from projects involving the destruction of trifluoromethane [CHF_3] and N_2O from adipic acid production has essentially been banned in Phase 3[37] (European Commission, 2011c).

While the continuation of free allocation to certain sectors in Phase 3 was aimed at preventing carbon leakage, the EU state aid rules were also revised ahead of Phase 3 in such a way that Member States could use subsidies

«to prevent a significant risk of carbon leakage due to EUA costs passed on in electricity prices supported by the beneficiary, if its competitors from third countries do not face similar CO 2 costs in their electricity prices and the beneficiary is unable to pass on those costs to product prices without losing significant market share» (European Commission, 2012a, p. 9).

The option of subsidies in these scenarios did not apply to all sectors, but to a relatively broad range of sectors and sub-sectors[38], a few of which are manufacturing of organic based and inorganic chemicals; basic iron and steel production; and production of aluminium, copper, lead, zink and tin. New subsidies given in accordance with these guidelines were designed to be degressive to avoid aid dependency. However, the aid intensity, measured as a percentage of the eligible costs incurred because of increased electricity prices due to EUA cost pass-through, were scheduled to decrease only marginally in the course of Phase 3, from 85% in 2013 through 2015, to 75% in 2019 and 2020.

3.5 Conclusions

The EU ETS grew from including 25 (EU) Member States in Phase I, to 31 member countries in 2013. In 2008 the EU ETS accounted for about 40% of EU's total GHG emissions. In 2013, this share had risen to about 45%. In line with the international Kyoto framework to which the EU ETS has been linked, the EU ETS covers six different GHGs. However, as regards emissions from EU ETS installations, the scheme only regulated CO_2 emissions in Phase 1; added N_2O emissions in

36 Whereas the original directive which provided provisions for the establishment of the EU ETS was referred to as the «ET Directive», the directive resulting from the 2009 revision is referred to as the «EU ETS Directive» and comprises provisions from the ET Directive in addition to amendments.

37 Moreover, the use of international credits in the EU ETS is currently under review, and as of 12 July 2013 the EP and the Council are scrutinising a draft Commission regulation on international credit entitlements (European Commission, 2013b).

38 The relevant sectors and sub-sectors are listed in Annex 2 to the Commission communication (2012a).

Phase 2; and PFCs in Phase 3. Some new sectors were included in the scheme in Phases 2 and 3, and by Phase 3 all production of metals were covered.

Aviation was included in the EU ETS from 2012, but the application of the EU ETS to international flights that either arrive in or depart from a country outside the scheme has currently been deferred for the year 2012, as EU politicians hope significant steps towards an international agreement on aviation emissions can be made in 2013.

The entry into Phase 3 saw the elimination of NAPs and removed the responsibility of national governments to set national allowance caps, and hence the overall cap of the EU ETS. An EU ETS-wide cap came into place, and is set to decrease by 1,74% annually to 2020. This will ensure a reduction of EU ETS GHG emissions of 21% compared to 2005 level; contributing to achieving the aim of a 20% reduction in total emissions by 2020.

Whereas auctioning of allowances was restricted to maximum 5% in Phase 1 and 10% in Phase 2, Phase 3 introduced a regime which is set to incrementally augment the use of auctioning, from around 40% of allowances in 2013. In Phase 3 free allocation is partly dependent on achieving common benchmarks for efficient production. The goal is to auction all allowances by 2027. However, increased use of auctioning raised concerns about carbon leakage, which led to a relaxation of state aid rules allowing for subsidising exposed sectors to cover most of the increase in electricity prices ET causes.

Chapter 4: The functioning of the EU ETS

This chapter will highlight important aspects of how the EU ETS has worked since its inception. The proverbial road has been riddled with potholes. First initial problems which mainly were features of Phase 1 will be examined. This includes over-allocation, which was facilitated by the decentralised setting of allocation caps. Then the large windfall profits from free allocation in the power sector in Phases 1 and 2 are looked at, before the perverse incentives for new entrants and closures caused by free allocation is discussed. The chapter then moves on via the development of the chronically low EUA spot price, to the complexities of assessing abatement caused by the EU ETS, and the view of the scholarly literature. Whereas the EU ETS has incentivised modest abatement in Phase 1, and probably in Phase 2 as well, the discussion turns to why the scheme seems to have failed to induce a shift to low-carbon strategies and low-carbon innovation. Then the inefficiencies of the use of credits from the flexible mechanisms is discussed. Finally the inclusion and subsequent one-year derogation of the EU ETS regulation of most of aviation emissions are explained, before the situation in Phase 3 and the future prospects of the EU ETS are evaluated.

4.1 Phase 1: A trial period

The ET Directive of October 2003 stipulated that the EU ETS would be working from 2005. This gave the EU and national authorities scarce time to establish the institutions and infrastructure necessary for regulating and supervising a formidable chunk of the EU economy responsible for GHG emissions. But it was precisely an acknowledgement of the challenge of successfully implementing the EU ETS that prompted the EU to embark on the first phase already from 2005. The EU considered the first phase a trial period which would provide time to develop the system and accumulate experience. This would ensure that the EU ETS would work adequately in the second phase, from 2008 to 2012, and thereby help the EU to fulfil its commitments in the First Commitment Period under the Kyoto Protocol, which coincided with Phase 2 of the EU ETS (Ellerman & Joskow, 2008)

Data problems were probably the most significant initial problem. Even if authorities had assembled fairly good data on CO_2 emissions which had been used to report to the UNFCCC, the data comprised aggregate numbers for energy use and did not extend down to the installation level[39].

39 Denmark was the single exception, as it had been operating a national CO_2 eCO_2emissions trading system (Ellerman & Buchner, 2007, p. 69).

This was a significant problem given that the *a priori* preference was to make allocations according to installation-level emissions. The lack of such data required voluntary cooperation from EU ETS sectors with national authorities to draw up NAPs (Ellerman & Buchner, 2007, pp. 69-70).

Combustion sources with a rated thermal input exceeding 20 megawatt (MW) were covered by the scheme. As Ellerman and Buchner noted, while this ensured a low degree of distortion of competition, it vastly increased the number of installations which authorities were required to allocate allowances to on an individual basis. 80% or more installations emitted 10% or less of CO_2 accounted for. If the threshold for inclusion in the scheme initially had been higher, authorities would have been able to use the little time they had at their disposal to improve allocations to the relatively few installations which were responsible for the vast majority of emissions. This was however a problem which was resolved by Phase 2.

4.2 Phase 1 over-allocation

As Wråke (2009) observed[40], decentralised setting of allocation caps created a prisoner's dilemma whereby national authorities saw that they could increase the competitiveness of national industries by inflating the national allocation cap. And because national authorities probably considered the possibility that other national decision-makers had made the same realisation, they were faced with the threat that the intra-EU ETS competitiveness of their national industries, in addition to their extra-EU ETS competitiveness, could be negatively affected by setting a stringent allocation cap. Wråke also highlighted that during the submissions of NAPs for Phase 1, the United Kingdom (UK) government requested to be able to increase its allocation cap after discovering that other countries had submitted NAPs with relatively less stringent caps[41]—an indication that national governments probably were preoccupied with competitiveness considerations that entered into this particular prisoner's dilemma.

Whereas base year levels emissions would have been preferred in order to have data consistent with the Kyoto framework for emissions reductions, the lack of such data made most national authorities use business as usual (BAU) projections to guide allocations, and they were generally related to historical emissions. But these projections had to be made in concert with industry. And since industry were in possession of the hard data, such cooperation was characterised by information asymmetry. Moreover, the tight time frame of setting up the EU ETS meant that no legal provisions

40 Kettner et al (2008)) also noted that the decentralised structure created inherent incentives for generous allocations.
41 The various NAPs were not submitted simultaneously (Wråke, 2009, p. 6)

for the collection of such data had been established in time and it therefore happened on a voluntary basis (Ellerman & Buchner, 2007, p. 70). This exacerbated the asymmetric relationship that already existed because of national governments' risk-averse approach to competitiveness concerns. The consequence was that those sections of industry that produced the most optimistic or exaggerated projections would profit most from subsequent allocations[42] (Michael Grubb et al., 2005). And this lead to over-allocation in Phase 1. This is supported by Anger et al (2008), who found evidence of successful lobbying for increased allocations in Germany.

Ellerman and Buchner (2008) estimated that 6% of total allowances were over-allocated, and Anderson and Di Maria (2011) estimated that 6% of free allowances were over-allocated.
Notably, the Commission had imposed a 4,6% reduction of allocations in the initial submissions of NAPs (Venmans, 2012, p. 5497). For Phase 2, the Commission was able to impose more stringent allocation caps during revisions of NAPs and thus address the problem of over-allocation (Egenhofer, 2007).

Over-allocation is apparently a generic problem for ET systems that base allocation on emissions projections. Grubb and Ferrario (2006) assembled evidence that showed that sector emissions projections in emission trading systems are uncertain; but in addition they found clear evidence that these projections have a clear upward bias of about 1% per year, cumulative. In this respect the EU during the first two phases of the EU ETS forewent an opportunity to shield the allocation process from the detrimental dynamic discussed in the previous paragraphs that non-transnational ET systems do not have—namely the opportunity to establish the allocation authority at a supranational level.

EU ETS industry would have been expected to seek to reduce costs induced by ET, and this discussion suggests that it managed to do so by contributing to establishing a decentralised system of setting allocation caps. Even with the Commissions authority to order changes in NAPs, this

42 An indication that this recurred in Phase 2 is found in an official UK report: «As most companies have received allocations broadly in line with their BAU emission projections for the period 2008-2012, any decrease in production will lead to emissions being lower than the allocations of allowances they received» (Davies, Lewis, & Thomas, 2009, p. 6).

system was less conducive to stringent allowance caps, firstly, because it produced strategic behaviour from national authorities; and secondly, because it created an asymmetric situation in which industry was able to negotiate generous allocations from national authorities.

Many of the countries that did over-allocate[43] had scope to do so. Whereas the EU-15 burden-sharing agreement determined the QELRCs of EU-15 Member States, new EU members were given QELRCs in accordance with the Kyoto Protocol targets. Most former USSR countries entered the First Commitment Period under the Kyoto Protocol significantly below their respective Kyoto targets[44] [45](European Environment Agency, 2012a). Consequently they were able to allocate generously without concern about Kyoto targets—to the extent that the Commission allowed it—and subsequently sell EUAs to EU-15 Member States with more stringent commitments[46]. Hence the EU ETS also became a vehicle for a substantial intra-EU wealth transfer from west to east: EU-15 bought EUAs to the tune of 700 million euros from EU-12 to cover for 40 million tonnes (Mt) CO_2e only in 2005 and 2006 (Convery et al., 2008).

4.3 Windfall profits from free allocation

During Phase 1 it became evident that the power generating sector was able to pass on a substantial share of the notional cost of allowances to consumers. This prompted in particular companies from energy-intensive industry to protest (Ellerman & Buchner, 2007, p. 73). The profits that were passed through to consumers were real and have been documented; Sijm, Bakker, Chen, Harmsen, and Lise (2005) found that in the Netherlands, Germany, Belgium and France, between 40% and 70% of the value of the freely allocated allowances were passed through and paid by consumers. Sijm, Neuhoff, and Chen (2006) later found that, in the Netherlands and Germany, the corresponding numbers were between 60 to 100%. The Commission also has acknowledged that the power generation sector was able to do this in the first two phases of the EU ETS (European Commission, 2013a)

In countries which had achieved a low degree of liberalisation of the power sector, the pass-through of allowance prices was less problematic than in other parts. If electricity companies are under state

43 See Convery et al (2008).
44 The Kyoto targets of the EU-12 were set out in a Commission Decision (2010a).
45 The former USSR countries that joined the EU in 2004 and 2008 generally experienced very large reductions in national GHG emissions in the first few years after 1990 as a consequence of comprehensive changes to their economies after the Collapse of Communism in 1989. When the Kyoto Protocol was agreed on, most of these countries were therefore far below their respective Kyoto targets.
46 In addition, EU-12 Member States had the opportunity to sell Kyoto credits in parallel.

control, their profits ultimately accrue to the public. However, in countries such as the Nordic countries, which compared to EU countries on the continent had a very liberalised electricity market by 2005 (Ellerman & Joskow, 2008, p. 26), profits from the allowance cost electricity price hike were largely passed through to investors (Fell, 2008), even though the low-carbon intensity of power production in Norway and Sweden in particular probably contributed to somewhat lower pass-through costs for Nordic consumers (see Lise, Sijm, & Hobbs, 2010).

The UK also had a relatively liberalised power sector by 2005 (Ellerman & Joskow, 2008, p. 26), and there the pass-through to consumers entailed that private power companies made huge profits to little or no social benefit. The extent to which this happened worried for example British policy-makers; in 2006 the UK Department for Trade and Industry reported that in the UK six large energy generators had recorded a yearly 800 million pound increase in profits as a result of the introduction of the EU ETS (Wettestad, 2008, p. 8).

Other estimates of the windfall profits in the EU ETS power sector vary, but agree that that power generators in sum raked in several billion euros a year in Phases 1 and 2 because of free allocation. Sijm (2007) estimated that power generators got windfall profits of between 24 and 35 billion euros yearly in 2005-2006 because of the EU ETS[47]. The lion share of these profits—between 18 and 20 billion euros—was attributed to free allocation specifically. Point Carbon's (2008) estimate that as a result of free allocation power generators in the UK, Spain, Germany, Italy, and Poland raked in between 23 and 71 billion euros[48] during Phase 2 (2008-2011) has been frequently cited.

While the pass-through of costs of emitting GHGs by power generators to consumers—who are the ultimate cause of emissions—were welcomed on environmental grounds (Convery, 2009), by the time the EU ETS was reformed in 2009 there was a general consensus in political circles that the windfall profits that had accrued to the power generators in the two first phases because of free allocation, needed to be eliminated.

47 Estimates were made by using the extended EU20 COMPETES model.
48 The wide range of the estimate is partly explained by uncertain data and a carbon price of either 21 or 32 euros per tCO_2.

4.4 New entrant and closure provisions

Free allocation also created problems related to provisions for new entrants and closures. The legal framework for the EU ETS gave member countries considerable discretion regarding the treatment of new entrants and closures. This resulted in practices which differed significantly from country to country. The variation shaped an uneven playing field for emitters entering and exiting the scheme. By the issuing of the guidance document for Phase 2 NAPs, the Commission judged it premature to identify best practices, but encouraged simpler and more transparent NAPs (European Commission, 2005). All EU ETS member countries reserved allowances for new entrants, but the manner in which, and the extent to which this was done, varied. For closures, the general practice was to withdraw the allowances. Because this is tantamount to subsidising the emitters that do not close down, it gives them an advantage, and incentivises a continuation of polluting activities. An unfortunate aspect of that is that it effectively prevents modernisation and replacement of old polluting facilities with newer and more efficient ones (Åhman, Burtraw, Kruger, & Zetterberg, 2006).

Yet it would still be problematic if closures were able to retain their allowances, which would constitute a windfall profit for those operators who would then be able to sell their allowances upon closure, making it more attractive to relocate[49]. A regime based upon pure auctioning of allowances would not have given rise to these concerns.

In the energy generating sector, the majority of EU ETS member countries allocated more allowances to carbon-intensive energy producers than they allocated to less carbon-intensive energy producers, reflecting a policy of using past emissions rather than output to calculate the allocation of allowances. Analyses of the treatment of new entrants and closures reveal that high-emitting installations have an advantage over low-emitting ones (Wråke, 2009, pp. 12-13). Consequently, incentives to develop and shift to low-carbon technologies were reduced. Significantly, the policy was applied to new entrants and closures as well—the candidates most likely to take such measures. Again, if auctioning had been preferred as method of allocation instead of free allocation, the undermining of the main purpose of ET—incentivising a shift to less carbon-intensive technologies—would not have happened.

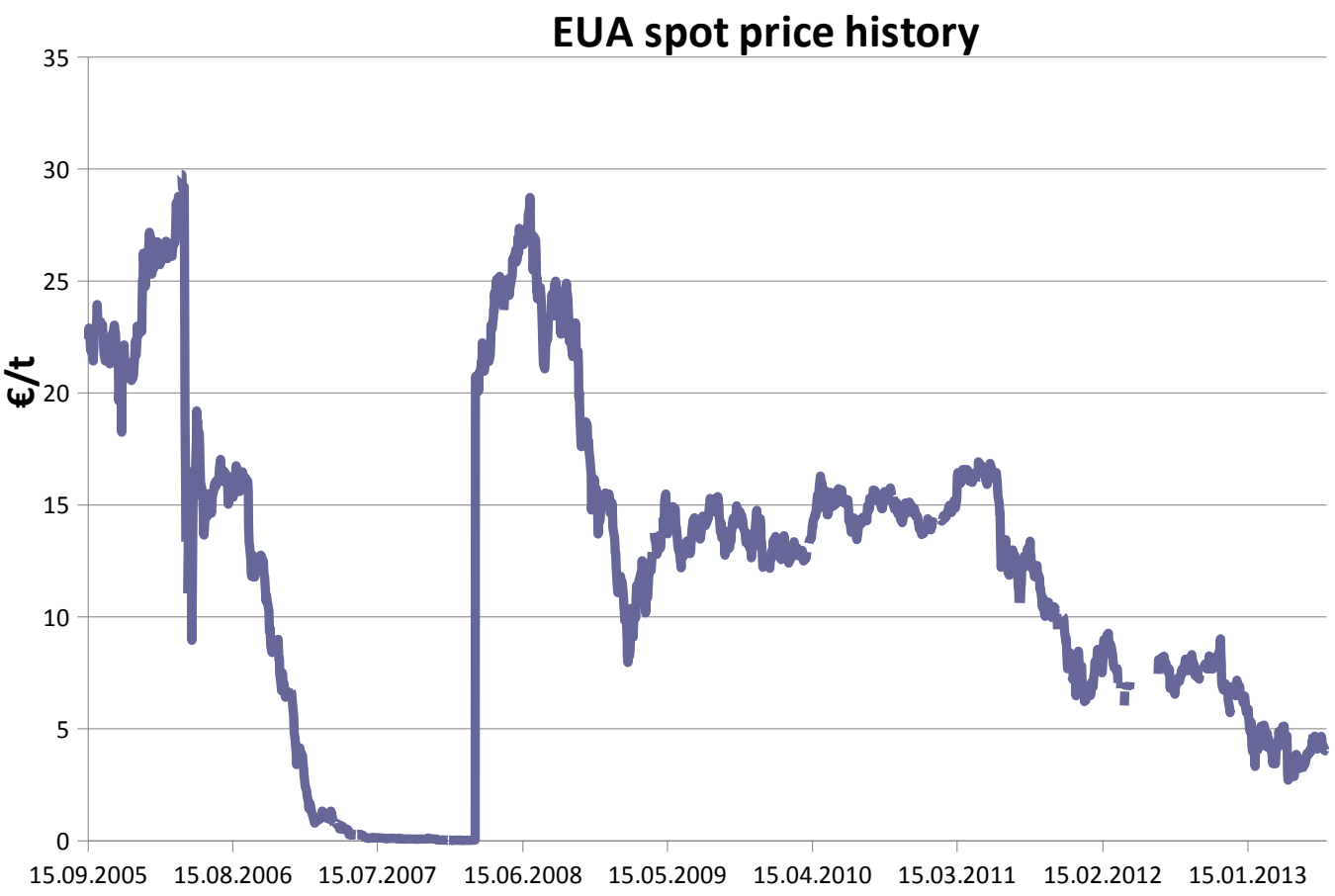
49 This takes for granted that closures are not considered a desirable abatement option by the national governments involved.

4.5 EUA spot price development

Because allowances could not be banked and used in subsequent phases, the demand and hence the price of EUAs was influenced by economic growth, weather conditions, relative energy prices and marginal abatement costs (Convery et al., 2008). The EUA price started out at around 7 euros and then gradually rose toward reaching a historical maximum of almost 30 euros in April 2006 (see figure 2). The increase was driven by rising natural gas prices that induced a switch to coal-driven electricity generation, which in turn increased emissions (European Environment Agency, 2012b, p. 48). While unexpectedly high EUA prices from mid-2005 increased abatement incentives among emitters, they also served to underline the distributional impacts of the EU ETS, which were enhanced. Thus the windfall profits that accrued to power generators because of free allocation gave rise to public debate and concern at the political level about the efficiency and legitimacy of the EU ETS (Wettestad, 2008).

After having reached a high point in late April 2006, the EUA spot price collapsed by over 50% in the course of four days after announcements by The Netherlands, the Czech Republic, the Walloon region of Belgium, and France that emissions were significantly below allocations, in addition to an announcement by Spain that it had a smaller shortage than expected. The EUA price then stabilised around 15 euros for a few months, until late September 2006, when it started to slide inexorably towards zero, as it became increasingly apparent that weather and other factors would not create additional demand for EUAs (Ellerman & Buchner, 2008). As figure 2 shows, the EUA was nearly worthless from mid-2007.

Figure 3. EUA spot price history



Source: Thomson Reuters Point Carbon

The 2006 EUA spot price crash and the subsequent slide towards zero clearly undermined the efficiency of the EU ETS by substantially reducing abatement incentives. Given that banking of allowances generally was not an option, the combination of uncertain emissions data and BAU projections with relatively unambitious emissions reductions targets proved lethal for the EUA price (Egenhofer, 2007).

Due to the non-transferability of EUAs between Phases 1 and 2, the spot price jumped to over 20 euros at the start of Phase 2, and in mid-2008 it almost reached the historical high the EUA rose to in 2006. However, the financial crisis that unravelled in late 2008 produced a recession in 2008-2009 which reduced demand significantly (Parker, 2010, p. 4), sending the EUA price well below 10 euros in early 2009. Thereafter the economy recovered somewhat from the financial crisis during 2009, and pressed the EUA price upwards to around 15 euros. It stabilised roughly at that level until

2011, during which primarily a renewed cyclical downturn pushed the price down towards 5 euros at the end of the year (NOU 2012: 16, p. 134). Throughout 2012 the spot price fluctuated between 5 and 10 euros. With the entry into Phase 3 more allowances were available, and the price sank further and stayed mostly between 3 and 5 euros in the first half of 2013.

The reason why the EUA price did not fall further was clearly related to the decision by the Commission (2010b) to allow for banking of allowances from Phase 2 to Phase 3. It is widely believed that there was a considerable surplus of allowances in Phase 2; in a leaked draft of the 2050 roadmap the Commission (2011d) estimated that between 500-800 million allowances would be surplus and banked to Phase 3[50]. Whereas the possibility to bank allowances shored up the EUA price at the end of Phase 2, it also depressed the price in the beginning of Phase 3.

The mentioned surplus of allowances in Phase 2 seems to be the result of the economic crisis rather than over-allocation. Certainly the Phase 2 cap seemed relatively stringent prior to the financial crisis (see Egenhofer, 2007). That arguably reflected the benefits of the experience accumulated in Phase 1, which included sound verified emissions data despite continued reliance upon uncertain BAU projections. Thus, even if Phase 2 evidenced serious systemic flaws as well, improvements in allocation implied that Phase 1 at least to some extent served its purpose of learning-by-doing.

4.6 Assessing abatement

The monumental resources which have been committed to the EU ETS beg the question of what impact the EU ETS has had on emissions. But the intricacy of international economics and modern governance means that assessing the impact of the EU ETS on emissions is difficult. Polluters in EU ETS sectors are influenced by a very complex economic and regulatory reality in which a wealth of factors may affect their behaviour, and to disentangle the effect of those factors from that of the EU ETS is only possible to an extent.

To identify a few of the most important factors, firstly, the level of growth and investment in the sectors of the economy in question clearly influence emissions. Secondly, fossil fuel prices affect emissions in a variety of ways including through production and transportation costs. Thirdly, international competitiveness in the sectors concerned influences emissions, and the former is influenced by many factors, one of which is international exchange rates. Affecting all the aforementioned factors is the overall global economic climate. On the regulatory side there is inter

50 The estimate did not appear in the final version of the Communication (European Commission, 2011a)

alia the challenge of distinguishing the impact of the EU ETS from other environmental policies, such as the climate and energy package and the Energy Efficiency Directive (European Parliament and the Council, 2012).

One straightforward way of assessing the impact of the EU ETS would be to compare verified emissions with projected emissions according to allocations in Phase 1 and 2. However, the resulting estimates would be inaccurate for obvious reasons. BAU projections on which Phase 1 allocations were made were too high, as previously discussed. And the economic crisis which cast a long shadow over Phase 2 made economic growth and hence emissions, lower than expected.

The lack of credible BAU projections implies that they need to be generated in studies that estimate EU ETS-induced abatement. Convery (2009) and Laing et al. (2013) have observed that the analysis of abatement in the scholarly literature is weakened by a lacking discussion and agreement about credible counter-factuals which are necessary in order to produce a sound estimate of the impact of the EU ETS.

Notwithstanding the mentioned challenges, Convery et al. (2008) emphasised two observations which indicate that the EU ETS led to some abatement in 2005-2006. The first is that real output in the EU in this period increased at a relatively robust rate. And the second is that EU verified emissions in 2005-2006 were lower than EU emissions in 2002-2004, «even after allowing for plausible upward bias in the pre-2005 data» (p. 17). Since historical rates of improvement of energy and CO_2 efficiency indicated that emissions should have increased, or at least remained at the 2002-2004 levels, the authors concluded that the evidence indicated that the EU ETS had led to some abatement.

Ellerman and Buchner (2008) argued that the EU ETS produced substantial abatement, and estimated it to be between 50 and 100 $MtCO_2e$ yearly in 2005-2006. Anderson and Maria produced a somewhat higher abatement estimate of 247 $MtCO_2e$ in total during Phase 1. The majority of Phase 1 abatement estimates are in agreement with that of Ellerman and Buchner, estimating EU ETS-induced abatement to be between -2,5 and -5% in Phase 1 (Venmans, 2012).

As mentioned, Ellerman and Buchner (2008) also calculated that 6% of allowances were over-allocated, but underlined that over-allocation and abatement could both occur in Phase 1. Importantly, the market could not know about the over-allocation until verified emissions were

reported. But as the market became aware of it, over-allocation together with non-transferability of allowances to Phase 2 gradually destroyed the value of EAUs. Hence Convery et al (2008) argued that little abatement likely happened in 2007. Delarue et al (2008) estimated abatement of nearly 90 $MtCO_2e$ in 2005 and nearly 60 $MtCO_2e$ in 2006 in the power sector. Given the EUA price crash in April 2006, the estimated decline in abatement in 2006 supports the argument that little abatement likely occurred in 2007.

Without LULUCF, EU-15 emissions in 2011 were 14,9% below base year levels. EU-15 is therefore comfortably on course to achieve its common Kyoto commitment to achieve an 8% reduction compared to base year levels in 2008-2012[51] [52]; and the EU-12 Member States were also on course to compliance (European Environment Agency, 2013). However, the final Kyoto compliance assessment will not be possible before late 2014 or early 2015 (European Environment Agency, 2012b, p. 21)

Studies of the effect of the EU ETS are mostly focusing on Phase 1. Laing et al (2013) suggested the reason for this is that the financial crisis complicates the task of establishing credible econometric counter-factuals. There is of course also a time-lag in emissions reporting which implies that it is premature to draw conclusions on the impact of EU ETS in Phase 2.

However, Laing et al (2013, p. 9) cited reports that "seem to indicate" that EU emissions reductions since the EU ETS came into operation are to a greater extent caused by the economic downturn than EU ETS-induced abatement. But that does not exclude significant EU ETS-induced abatement also in Phase 2. While the question if any abatement occurred in the last couple of years of Phase 2 when the economy took a turn for the worse is still unanswered, the authors cited two studies (Abrell et al., 2011; Egenhofer et al., 2011) focusing on 2008-2009 which both showed stronger abatement in that period than in 2005-2006, suggesting that the EU ETS induced more emissions reductions in Phase 2 than in Phase 1.

The overall picture is therefore that the EU ETS induced some abatement during part of Phase 1, before the EUA price collapsed; and probably also in 2008-2009. Some credit for this should be laid at the door of the Commission, which slashed initial submissions of NAP allowance caps by 4,6%, and corresponding submissions for Phase 2 by 10,4% (Venmans, 2012). However, the ability of the

51 EU-27 does not have a common commitment for 2008-2012 like the EU-15 has.

52 Italy and Spain were however not on track to achieve their targets individually, which is required for the EU-15 to achieve its target. Their compliance can nevertheless be ensured by purchase of Kyoto credits.

EU ETS to cause abatement has been significantly undermined by over-allocation and the financial crisis.

4.7 EU ETS and incentives to shift to low-carbon strategies

Beyond relatively cheap abatement options such as fuel-switching, the EU ETS can cause limited abatement without a perception that it incentivises a fundamental shift to low-carbon strategies. The chronically low carbon price throughout most of the EU ETS lifespan is a reason for questioning if it has been able to do this. While the EUA spot price was well over 20 euros for a considerable period in Phase 1 and in the first year of Phase 2, it fluctuated between 10 and 15 euros for most of Phase 2, before dropping below 10 euros in 2011. After that happened, there has been a general perception that the price has been too low to provide incentives for investment in green technology (The Economist, 2012a; Øvrebø, 2013).

Some research indicates that the EU ETS so far to a very limited degree has triggered a shift to low-carbon strategies, which involve long-term abatement options. Research done by Climate Strategies (K Neuhoff, 2011) during 2010 gives an interesting insight into how businesses considered the incentives related to the EU ETS. "Many" companies reported that climate policy continued to be a less important factor in investment decisions; and 40% of companies told that the Phase 2 stringency allowed them to continue BAU. In addition, the majority considered that the current 20% reduction target is not sufficient to trigger a shift to low-carbon strategies (p. 5).

Another study with a different approach (Calel & Dechezlepretre, 2012) looked at the number of low-carbon patents filed to the European Patent Office by a dataset of EU ETS companies and comparable non-EU ETS companies between 2000 and 2009. Before 2005 the two groups had very similar patent activity levels. Measured as a share of all patents filed in per cent, EU ETS firms started with less than 1% in 2005, and increased to about 2% in 2009. Non-EU ETS firms started with over 3% in 2005, and increased to about 8% in 2009. Although the shares rose with a similar multiple, the data suggests that non-EU ETS firms were more committed to low-carbon innovation than EU ETS counterparts. The authors of the research could not identify what caused this particular pattern; only that rising low-carbon innovation was not caused by the EU ETS.

4.8 The use of flexible mechanisms

Ten EU-15 Member States[53] have reported their intention to use flexible mechanisms to comply with their individual and common obligation under the Kyoto Protocol for 2008-2012. These plans involved the purchase of an amount of credits equivalent to 84 million euros per annum during Phase 2, which corresponds to 2% of base year emissions. The EU-15 had allocated 2890 million euros to that end (European Environment Agency, 2012b, p. 29), but the amount might have to be increased to cover the planned purchase of credits (p. 32).

The idea behind the use of flexible mechanisms for EU ETS compliance is partly that they reduce emissions where it is cheapest to do so—after all addressing climate change requires a global solution. But use of such credits in the EU ETS weakened the EUA price because of the huge oversupply of international credits that particularly was evident towards the end of Phase 2 (The Economist, 2012b).

A perhaps more significant problem with the use of such credits was that they did not necessarily reflect implementation of "real" emissions cuts—that is, cuts in emissions which would have been produced regardless. Wara and Victor (2008) documented that generation of CERs from CHF_3 capture was far more valuable than the production of the refrigerant gas that CHF_3 supposedly was a by-product of. Given that CHF_3 has a GWP of 11700 and was cheap to capture, such projects mushroomed. This perverse incentive transformed refrigerant manufacturers into waste CHF_3 manufacturers and contributed to the huge oversupply in the international carbon credit market. According to the authors, payments to parties who profited from this manufacturing would end up totalling 4,7 billion euros, whereas the real abatement costs were estimated at about 100 million euros (pp. 11-12).

Since the oversupply of Kyoto credits undermined the EUA price and since large quantities of CERs that did not represent real reductions of emissions were generated, the use of these credits in the EU ETS clearly weakened the scheme's efficiency[54]. The Commission decision (2011c) to prohibit the use of credits from CHF_3 destruction in Phase 3 is indicative of this.

53 Austria, Belgium, Denmark, Finland, Ireland, Italy, Luxembourg, The Netherlands, Portugal and Spain.
54 Additional doubts about the efficiency of the flexible mechanisms have been expressed (see Wara & Victor, 2008).

4.9 Aviation

The 2008 directive (European Parliament and the Council) which included aviation in the EU ETS and demanded 15% auctioning, was temporarily hampered by the decision (European Parliament and the Council, 2013) to derogate the enforcement of the EU ETS on international flights for the year 2012. The EU felt that progress had been made recently in the ICAO toward a global framework for emissions control policies in aviation, and this decision was made so as to «facilitate this progress and provide momentum» (p. 1) ahead of the ICAO General Assembly in the autumn 2013. However, as the European Low Fares Airline Association has argued (Greenair, 2013), the exemption of the vast majority of EU ETS aviation CO_2 emissions renders the regulation of the aviation sector completely inefficient—for the time being.

EU ETS regulation of the aviation sector has started poorly, and while the current provisions impose relatively small cuts on CO_2 emissions from aviation, projections of future global aviation emissions—estimated to increase by 300-700% by 2050 (European Commission, 2013g)—emphasise the need for stringent emissions controls on the aviation sector. It should also be noted that only restricting CO_2 emissions is insufficient since other impacts from aviation than CO_2 emissions that increase radiative forcing and cause global warming, significantly surpass the effects of CO_2 emissions (European Parliament and the Council, 2008, pp. 5-6).

4.10 Phase 3 and future prospects for the EU ETS

Phase 3 introduced structural changes to the EU ETS that improved its efficiency in several ways, including increased auctioning, which will create revenues than can be recycled, as well as eliminate windfall profits (from free allocation) in the power generating sector. And the application of benchmarks to qualify for full free allocation is another improvement which will incentivise operators to increase efficiency. But these and other improvements are largely overshadowed by a combination of access to flexible mechanism credits and credits banked from Phase 2; the continued economic depression; and complementary environmental policies such as the climate and energy package and the EED Directive, which have conspired to dictate a very weak allowance price, which severely weakens the efficiency of the EU ETS (see Caisse des Dépôts, 2013).

The current low EUA price reflects an oversupply of allowances which is expected to persist throughout Phase 3 and spill over into Phase 4. Deutsche Bank forecast an oversupply of 1.26 billion allowances by 2020 (Commodities Now, 2012).

A low EUA price is bad not only because it fails to incentivise abatement by investment in green technology, but also because coal-fired power plants are more able to compete with gas-fired power plants, which causes emissions to increase. As the EU ETS was about to enter Phase 3, Commission Director-General for Climate Action, Jos Delbeke, expressed concern about the low EUA price as coal consumption once again was on the rise in Europe, after a long period of decline. These concerns made the Commission propose so-called "back-loading", or postponement, of EUAs scheduled for auctioning in the first couple of years of Phase 3 (Øvrebø, 2013). But the short-term fix was rejected by the EP in April 2013 (Harvey & Vaughan, 2013), and left the EU ETS in need of reform.

Without LULUCF, EU-27 emissions decreased 18,4% between 1990 and 2011. The implication of this is that EU-27 had almost reached its 2020 objective, which is a 20% reduction. But it should be noted that the climate and energy package included a unilateral commitment by the EU which differs in some ways from the Kyoto 2020 commitment. The EU has legally binding legislation which requires it to achieve an *average* reduction in Phase 3 of 20% below *1990 level*. The unilateral goal also includes international aviation and excludes the use of LULUFC. For these reasons the numbers are not directly comparable; the EU is a little further away from its reduction target than the UNFCCC submission suggests. Furthermore, it also remains to be seen how a potential economic recovery could increase emissions.

But the general consensus is that structural measures are needed to strengthen the EU ETS, and the EU held two public consultation meetings during the first half of 2013 to generate discussion about policy options. The perception in recent years that allowance surplus and low prices have damaged the efficiency of the EU ETS has triggered many recommendations that the EU should increase the abatement burden on the EU ETS. Whereas it before the entry into Phase 3 was suggested that the EU should increase the 2020 reduction target to 30%[55], more recent suggestions tend to consider alternative options, such as establishing a binding post-2020 target[56].

The prolonged economic crisis is an extraordinary event, but revealed an inability on behalf of the EU ETS to adapt to such events; and a need for more flexibility in the future. One way to marry the ET mantra of regulatory stability with flexibility, can be found in the Australian ETS, which will

55 See for instance D'Oultremont (2010), and Point Carbon (2009).
56 See for instance Caisse des Dépôts (2013), Laing et al (2013), K Neuhoff (2011), Kollmuss and Lazarus (2010), Commodities Now (2012), and Øvrebø (2013).

have a fixed five-year emissions cap that is updated and fixed five years in advance with a long-term reduction target in mind (Egenhofer, Marcu, & Georgiev, 2012, p. 18). Considering the huge problems the economic crisis created for the EU ETS recently and the fact that businesses would favour a stable allowance price, there is reason to believe that a similar mechanism could be introduced into the ETS Directive by Phase 4.

The framework for use of credits from the flexible mechanisms is currently under review. More restrictions would increase the efficiency of the EU ETS. The continued use of the CDM and JI in the EU ETS is questionable in that respect as it for instance can be argued that a large number of the projects that qualify for participation in this framework would have been completed without financial support, and that alternative, cheaper mechanisms could be used instead to encourage clean development in developing countries (see Wara & Victor, 2008).

A reform of the EU ETS in the short-term depends to a great extent on if an international climate agreement materialises, and what it will look like. The EU ETS will necessarily reflect a new climate agreement. However, a legally binding agreement is not to be expected, according to Jos Delbeke (Øvrebø, 2013). The hurdles that must be overcome in order to conclude such an agreement suggest that it is not imminent. However, countries that for years have hindered progress, such as the US and China, are moving in the right direction (Flannery, Beale, & Hueston, 2012).

A pivotal concern for the EU is the possibility of increased carbon leakage if a more stringent regime is imposed unilaterally by the EU. Thus a key element of a new international climate agreement will be the implementation of an international framework which prevents carbon leakage —but that will arguably require a relatively broad agreement. Meanwhile, building on the Phase 3 inclusion of the aluminium sector[57] and the revision of state aid rules, targeted policies that mitigate the effects that produce carbon leakage may contribute to EU agreement to unilaterally increase its reduction target in the future.

But such an agreement would very unlikely revise the 2020 target (Egenhofer et al., 2012, p. 11). Reopening the ETS Directive would not only be difficult politically, but it would also be time-consuming and would not eliminate the allowance surplus in a short period of time (M. Grubb,

57 The inclusion of the aluminium sector in the EU ETS in Phase 3 was a positive step for the scheme's efficiency to the extent that it induces abatement without simultaneously causing significant carbon leakage. With the expiration of long term electricity supply contracts in 2010 for 65% of the European aluminium production capacity, the sector suddenly to a much larger degree thence became exposed to a new reality in which electricity prices to a large extent include EUA costs (Convery et al., 2008, p. 21).

2012; Øvrebø, 2013). Therefore a post-2020 target, for instance a 2030 target, is a more realistic possibility.

And EU Member States have strong incentives to adopt a more demanding binding target beyond 2020. The current 1,74% annual reduction puts the EU on a trajectory which will lead to reductions of only 51% by 2050 for total EU emissions, far below the 80-95% commitment in the 2050 Roadmap (K Neuhoff, 2011). Since much of the investment required for a comprehensive shift to a low-carbon economy is on a time-scale of decades, a credible long-term incentive is essential (Laing et al., 2013, p. 11). For every year this shift is delayed, emissions reductions to stop global warming beyond 2 degrees Celsius will be several hundred billion US dollars more expensive globally (D'Oultremont, 2010, p. 44).

Nonetheless, if no international agreement materialises and the ongoing debt crisis continues to depress the EU economy, agreement to commit to a binding post-2020 target may still take years to achieve, especially because of the unwillingness of new Eastern Member States to agree to unilateral action (D'Oultremont, 2010, p. 44).

4.11 Conclusions

Phase 1 was considered a trial period, so expectations were not as high as for Phase 2. Particular Phase 1 problems included poor emissions data and BAU projections, which contributed to over-allocation along with the tight time schedule. Decentralised determination of national allocation caps also facilitated over-allocation in Phase 1 by producing a prisoners dilemma, whereby Member States could benefit from inflating their allocation caps—and be disadvantaged if they did not.

Several of the factors which undermined the efficiency of the EU ETS in Phases 1 and 2 were related to the widespread use of free allocation. It produced windfall profits of several billion euros annually through Phases 1 and 2 in the power generating sector. It also created perverse incentives for new entrants and closures by subsidising polluting manufacturing and disincentivising investment in less carbon-intensive production.

A consistently low EUA price undermined the overarching goal of the scheme, which is to incentivise abatement in an effective manner. After an unexpectedly high EUA spot price initially, it completely collapsed during 2006 as the market became aware of over-allocation, and was near zero by mid-2007. The price crash was caused by over-allocation and the inability to transfer allowances

to Phase 2. In Phase 2 the financial crisis that unravelled in 2008 substantially depressed emissions and hence EAU prices. The price fluctuated between 10 and 15 euros for most of the period, but sank well below 10 euros from late 2011. Allowances were transferable between Phases 2 and 3, so the price kept a stable, but downward trajectory into Phase 3, due to a large surplus of allowances.

Assessing EU ETS-induced abatement is notoriously difficult because of the challenge of distinguishing the effects of a complex web of interrelated factors that influence emissions. However, scholars agree that the EU ETS caused a modest amount of abatement during 2005-2006, equivalent to a reduction in emissions of between 2,5 and 5% in Phase 1. Much less research has been conducted on Phase 2 abatement, but some research indicates that the EU ETS caused slightly more abatement in 2008-2009 than in 2005-2006. It should be noted that these two periods were the ones with relatively high EUA prices; and the common perception is that lower prices induces less abatement. There is moreover a general agreement that an EUA price below 10 Euro—which has been the case since late 2011—is insufficient to induce abatement.

Some research suggests that the allowance cost has so far been too low to trigger a shift to low-carbon strategies, and that EU ETS sector companies do not distinguish themselves from the rest in terms of low-carbon innovation.

For Phase 2 compliance EU-15 Member States had allocated 2980 billion euros to buy ERUs and CERs. However, there is evidence that the flexible mechanisms have created perverse incentives, and there are additional doubts about their efficiency. Moreover, the huge oversupply in recent years of the credits they generate have pushed the price of EUAs downwards, hence weakening the efficiency of the EU ETS. The use of these credits have been subject to some restrictions in Phase 3, and the rules for their use are currently under revision.

Several structural changes that improved the EU ETS' efficiency were introduced in Phase 3. However, they look set to be overshadowed by an allowance price that is too low to incentivise abatement. Unless measures are taken, the oversupply of allowances will persist throughout Phase 3 and spill over into Phase 4. The EU may introduce a mechanism by Phase 4 which will give the EU ETS more flexibility in the future to adjust to extraordinary events such as the financial crisis. However, it will in any event be necessary to increase the abatement burden to make the EU work efficiently. If an international climate agreement is concluded, the EU ETS will be revised. If it does not materialise in the near future, and if the EU economy continues to suffer, it may take several

years before EU Member States can agree on a post-2020 target.

Chapter 5: Conclusions

The first objective of this paper was to explain why the EU ETS was set up. Chapter 1 details how an acknowledgement that concerted global action was needed to prevent dangerous human intervention with the climate system led to the signing of the UNFCCC in 1992. Developed countries took primary responsibility to act, which they legally committed themselves to do in the Kyoto Protocol in 1997.

After a carbon tax was deemed politically unviable in the early 1990s, around the turn of the millennium ET emerged as the EU policy-mechanism of choice to lower EU GHG emissions. The resulting ET Directive of 2003 stipulated that the EU ETS would be working from 2005. That would give the parties involved opportunity to improve the performance of the scheme prior to entering Phase 2 (2008-2012), which coincided with the First Commitment Period of the Kyoto Protocol, wherein the EU-15 Member States had committed themselves jointly to achieve an 8% reduction in GHG emissions compared to base year levels.

In chapter 2, the first answers to why the EU ETS has developed into an inefficient mechanism to lower GHG emissions are found in the political economy which dictated the premises for the making of the ET Directive. The scholarly literature and the Commission favoured auctioning of allowances and centrally set allocation caps, and inter alia warned that free allocation would create perverse incentives for new entrants and closures, and underlined the positive potential of recycling revenues from auctioning of allowances. In addition, although policy-makers did not appear to have taken note of this, the scholarly literature had predicted windfall profits from free allocation in the power sector.

Nevertheless, stakeholder industry and Member States forced through free allocation of allowances and decentralised setting of allocation caps. Stakeholder industry wanted these features due to rent-seeking motives, and Member State authorities were concerned about and susceptible to worries expressed by the former that auctioning and centralised setting of caps would damage the competitiveness of national industries. The latter wanted free allocation because it involved the least cost. As for decentralised setting of caps, the parties also favoured that particular design because of the possibility that a centrally set cap might disadvantage their intra-Community competitiveness as well. In addition, industry plausibly anticipated that this structure would facilitate over-allocation, thereby making the scheme less costly for them.

Several factors indicate that stakeholder industry had a crucial influence on the decision to opt for free allocation in the EU ETS, including past experiences with ET; the policy-making process; studies on the impact of lobbyism on environmental legislation in Germany; and the susceptibility of politicians to concerns about negative effects on the competitiveness of national industries. Energy-intensive industry with high exposure to international competition, such as the steel sector, played an important role in convincing politicians that free allocation was necessary to prevent carbon leakage. NGOs that were involved in consultations facilitated the outcome by not objecting to free allocation per se.

By the 2009 revision that produced the ETS Directive, the structural inefficiencies related to the mentioned features of the EU ETS were so obvious and serious that they inevitably were addressed. By Phase 3, a common EU ETS-wide cap was determined on the basis of Phase 2 NAPs. However, the unravelling of the financial crisis in late 2008, combined with a massive and coordinated lobbying effort by industry, weakened the determination of politicians such as Angela Merkel to introduce auctioning across the board; leading to an agreement to auction about 40% of EUAs in the first year of Phase 3.

Chapter 3 highlights central facets of the legal framework of the EU ETS— including the framework of the Kyoto Protocol—and important changes made ahead of Phase 3. It thus provides basic knowledge which is required to adequately understand how the EU ETS works. Among the key changes ahead of Phase 3 was the decision to start to auction about 40% of allowances in the first year of Phase 3, and incrementally augment this percentage in subsequent years. The aim is to auction all allowances in 2027. Centralised direction of the allocation process was increased and a common allocation cap was set to decrease in linear fashion by 1,74% per annum throughout Phase 3. This will ensure a reduction of EU ETS GHG emissions of 21% compared to 2005 level; contributing to achieving the aim of a 20% reduction in total emissions by 2020. Free allocation to the power sector was (nearly) abolished; and full free allocation in other sectors was made conditional on the fulfilment of EU ETS-wide benchmarks. Due to concerns about possible carbon leakage, these changes were accompanied by a relaxation in state aid rules to enable national subsidies to cancel unwanted impacts of EUA costs in electricity prices. Aviation was also included from 2012, but the application of the EU ETS to other than intra-EU ETS flights was deferred for the year 2012 in anticipation of a possible agreement on international aviation emissions controls.

Chapter 4 discusses main aspects of the functioning of the EU ETS in terms of efficiency and explains why the EU ETS has developed into an inefficient scheme. In Phase 1 decentralised determination of allocation caps facilitated over-allocation by producing a prisoners dilemma which lead Member States to inflate national allocation caps, thereby undermining the stringency and hence efficiency of the system.

However, to some extent Phase 1 served its purpose by enabling endogenous sources of inefficient performance such as poor emissions data and over-allocation, to be tackled. As it managed to impose substantial cuts on NAP allocation caps in both Phase 1 and in Phase 2, the Commission was largely responsible for limiting over-allocation.

But inefficiencies inherent in the EU ETS were only tackled to an extent. The continued use of free allocation to power generators in Phase 2 produced windfall profits for power generators of several billion Euros yearly from 2005 to 2012. Also the continued use of free allocation created perverse incentives for new entrants and closures which undermined the efficiency of the scheme.

Since banking of allowances between Phases 1 and 2 in practice was prohibited, the EUA price crashed in 2006 and was near zero by mid-2007, after a high EUA price in the first half of Phase 1. More stringent caps also produced a positive EUA price at the start of Phase 2, but as the financial crisis unravelled in late 2008, emissions were reduced, and hence the EUA price. It fluctuated between 10 and 15 euros during most of the period, before diving below 10 euros in late 2011. Due to the possibility of banking allowances, the EUA price kept a stable, but downward trajectory into Phase 3, because of a large surplus of allowances.

In spite of the difficulty of assessing abatement caused by the EU ETS, scholars have agreed that the EU ETS induced a moderate amount of abatement in 2005-2006, equivalent to a reduction between 2,5 and 5% of emissions in Phase 1. There is currently limited research on Phase 2 abatement, but some research showed that slightly more abatement was caused by the EU ETS in 2008-2009 than in 2005-2006.

But these two periods were the high points of the EUA price, and it is generally presumed that lower EUA prices produced less abatement in other years. According to the ET literature, minimal abatement occurred in 2007, and the general perception is that an EUA spot price below 10 euros—which has been the case since late 2011—is too low to induce abatement.

Some research suggests that the allowance cost has so far been too low to trigger a shift to low-carbon strategies, and that EU ETS sector companies do not distinguish themselves from the rest in terms of low-carbon innovation.

EU-15 Member States had allocated 2980 billion euros to buy ERUs and CERs for compliance in Phase 2. The use of such credits raises questions about efficiency. There is evidence that the flexible mechanisms created perverse incentives and involved very inefficient abatement. The huge oversupply of Kyoto credits in recent years has moreover pushed the EUA price downwards, hence undermining the efficiency of the EU ETS.

It is clear that the relatively low EUA price throughout most of the lifespan of the EU ETS has rendered the scheme relatively inefficient. The cost associated with emitting GHGs is the incentive on which the scheme relies to induce emissions reductions.

Whereas over-allocation initially undermined the EU ETS, since 2008 the financial crisis has severely undermined the efficiency of the EU ETS by substantially diminishing emissions and hence demand for allowances. Unfortunately, several structural changes that improved the EU ETS' efficiency in Phase 3 on paper will probably be overshadowed by a surplus of allowances that is projected to persist throughout Phase 3 and spill over into Phase 4. That will result in an EUA price which is too weak to incentivise abatement throughout Phase 3, unless measures are taken.

Therefore, an inefficient aspect of the EU ETS which has been exposed by the financial crisis, is the inability to adjust to extraordinary events. The EU may introduce a mechanism by Phase 4 which will give the EU ETS more flexibility in the future to adjust to extraordinary events such as the financial crisis. However, it will in any event be necessary to increase the abatement burden to make the EU work efficiently. If an international climate agreement is concluded, the EU ETS will be revised. If it does not materialise in the near future, and if the EU economy continues to suffer, it may take several years before EU Member States can agree on a post-2020 target.

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