



Cap and Invest

Why Auctioning gains Prominence in the EU's Emissions Trading Scheme



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Adelphi Research

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Introduction

The trading of emission allowances has gained more and more prominence as a key climate protection policy throughout the world. The political as well as economic debate on how to allocate the allowances has increasingly shifted away from a free allocation procedure to a selling approach via auctions. The opportunity to use part of the revenues from the sale of emission allowances in a meaningful way opens up new possibilities for political action, as illustrated by the current German approach, the “Climate Protection Initiative”. In the following, we discuss the prospects of auctioning emission allowances as integral element of future international climate policies. The purpose of this paper is two-fold. On one hand, we discuss the experiences countries like Germany have so far gained regarding auctioning emission allowances. To this end we outline the main aspects of the political debate and the technical organization and also sum up potential options on spending the revenues from the sale of emission allowances. On the other hand, we outline the main aspects of the German Climate Protection Initiative, which earmarks revenues for national as well as international climate protection projects. The discussion of initial experiences with the instrument of auctioning emission allowances can help to inform the debate in other countries that are in the process to set-up emission trading systems and need to decide how to design the systems and how to use the revenues to further increase efforts for global climate protection.

Auctioning vs. Free Allowances

Ever since emissions trading appeared in theory, there have been ongoing debates about the appropriate way of allocating emission allowances. These allowances can be distributed for free (mostly based on historical emissions, i.e. 'grandfathering') or they can be sold – either directly on the market or via an auction. From both an ecological and an economic perspective auctioning is the only fair and efficient means of allocating emission rights in the long term (Burtraw et al. 2001). Selling emission rights helps effectively counter pressure from interest groups to allocate emissions as generously as possible, a process with negative ecological consequences. In theoretical comparisons that take into account efficiency and distributional criteria, most economists recommend auctions as the best way to allocate emissions rights (see e.g. Crampton & Kerr 2002; Ecofys 2006).

A look at the political praxis throughout Europe however, suggests that policy-makers preferred grandfathering as the principle allocation method in the first period of the EU Emission Trading System (ETS) from 2005 to 2007. Reviewing this pilot phase, empirical arguments strongly support what economists have long predicted:

- a) opportunity costs will be factored into energy prices regardless of the allocation method; only auctioning however, would allow governments to recycle revenues and thus redistribute the windfall profits;
- b) grandfathering results in complex allocation rules on the national level; these non-transparent allocation rules lead to uncertainty for investments and innovation;
- c) leakage is not an economy-wide problem but has to be dealt with on a sector-specific level. Free allocation is not the first answer to address general leakage concerns.

Since there are still prevailing arguments in favour of an allocation based on grandfathering emission allowances, it may be helpful to provide a more detailed discussion of the main arguments for and against auctioning of allowances:

- a) A widely employed argument in favour of free allocation is that it should prevent *energy prices from rising*. This argument is based on a misconception: in fact, economic literature describes in detail that a rise in energy prices is a result of imposing a carbon cap and not a consequence of the allocation method. It is indeed the main purpose of cap-and-trade systems to put a price on carbon in order to set incentives for phasing out inefficient facilities and, hence, for moving societies towards a low carbon economy. In other words, the economic costs of emission trading, reflected in the price of goods, result solely from the artificial dampening of the atmosphere for reducing carbon dioxide emissions, not from the individual allocation of emission allowances.
- b) Free allocation results in *windfall profits* for the power sector and makes the end-consumer pay for it through higher energy prices. The difference with allocation methods is the distribution of costs and benefits among societal actors. Selling emission rights enables the generation of fair economic returns. The funds can then be used in a positive fashion to relieve the burden on households and companies affected by the costs of emission trading, and to contribute to the active promotion of an environmentally-friendly energy industry. Governments collecting the revenues may reallocate the resources to further political purposes, such as cutting taxes, or reducing the overall deficit (see e.g. Crampton & Kerr 2002: 339, Hepburn et al. 2006: 139).
- c) To allocate allowances for free requires agreement on a design of *complex allocation methodologies* (Ecofys 2006: 19). In comparison to this, auctions are easier to administer at lower costs. There is, for

example, no need to develop rules on the treatment of new market entrants. In fact, auctioning provides equal opportunities for incumbents as well as for new entrants (Ecofys 2006: 16). Reviewing the process of how to determine allocation rules for the first period of the EU ETS shows that this has been a 'tedious exercise' (Görlach et al. 2008: 56) resulting in high administration and transaction costs. The full auctioning of allowances avoids non-transparent allocation rules and thus enhances investment certainty and incentives for market participants. This can also encourage further innovation since industries will benefit from decreasing carbon prices (Crampton & Kerr: 340).

d) *Leakage concerns* are another main argument against auctioning. Although auctioning will probably have some impacts on the competitiveness of certain industries, this is not necessarily an argument against auctioning and for free allocation. In principle, the competitive position of a plant depends entirely on its emission intensity compared to its competitors (Tietenberg 2006). Operators whose plants have low specific emissions face lower additional unit costs than operators whose plants use emission-intensive production technology.

The regulatory reality however, has been different: On one hand competitive distortions have already been created by Member States' national allocation plans allowing different treatments of installations belonging to the same sector (Görlach et al. 2008: 56). Some exceptional rules are even tailored for certain companies, putting other companies in the same at a disadvantage. On the other hand careful analysis of leakage concerns show that a combination of measures to tackle these concerns is required. Other mechanisms, aside from free allocation, can counteract leakage, such as direct compensation or border tax adjustments. Neuhoff et al. (2008: 9) thus argue that a solution has to be tailored in a way that suits the EU ETS carbon pricing architecture. According to them, free allocation will only play a minor role in addressing leakage concerns.

Principles of auctioning allowances

Allowances can be either sold on the market or via an auction. Selling on the (liquid) secondary market is an appropriate way to auction off small parts of the overall allowances since price signals are already available on the secondary market. For fully-fledged sales of allowances the above mentioned efficiency gains will only be gained through auctions whereas for small fractions the costs for organizing an auction may be comparatively higher than just selling them on the market (see e.g. Ecofys 2006: 17ff).

There are two basic principles of auctioning allowances: the static sealed-bid auction and the dynamic ascending-bid auction. Both auctioning mechanisms are regarded as appropriate and feasible methods to allocate emission allowances.

a) In a sealed-bid auction, participants render their bids at the same time. The auctioneer constructs an aggregated demand curve and determines the clearing price. The clearing price is the point where the aggregated demand curve intersects the supply of emission allowances offered by the auctioneer. In a uniform-pricing mode, every winning bid pays the clearing price. Otherwise, the winning bidders pay the price they bid. The sealed-bid uniform price auction is the simplest way of auctioning and therefore recommended by many policy advisers (e.g. Neuhoff et al. 2008: 10).

b) Ascending-bid auctions allow for a dynamic price adaptation of the bids. In case a bid has not succeeded in winning the requested amount of allowances, the bidder may raise the price offer. The auction stops when no bidder is willing to raise prices anymore. The advantage of this procedure is that it allows the detection of the market price (see e.g. Crampton & Kerr 2002: 337). If there is already a secondary market – as in the case of the EU ETS – there will be already enough information on the value of allowances

available. Therefore it is not necessary to establish a dynamic auction especially in case allowances are only partially auctioned off.

Experiences with Auctions in the EU

Emission trading as a policy instrument has its main roots in the United States. The US gained relevant experience in particular with its national sulphur dioxide emissions-trading program, implemented in 1992 as a major component of its strategy to combat "classical" air pollution. By and large, this experience has been positively evaluated: emissions were reduced in excess of the actual requirements and the overall costs turned out to be much lower than anticipated (see Aulisi et al. 2000). The concept of greenhouse gases (GHG) emission trading gained support within the EU despite the organization's original scepticism and opposition during the Kyoto negotiations. Serious discussions on, and preparations for, establishing domestic emissions trading systems started in several member states following the adoption of the Kyoto Protocol in 1997 (Hasselknippe & Høibye 2001; Oberthür & Tänzler 2007).

The European Emission Trading Scheme (EU ETS) is based on a proposal by the European Commission dating back to 2001. After extensive negotiation with Member States and concerned companies, the scheme entered into force in 2005. The EU ETS is the largest multi-national and multi-sectoral installation-based emission trading scheme worldwide, covering more than 10,000 installations in 27 EU Member States, accounting for around 40 percent of EU greenhouse gas emissions. Apart from the power sector, carbon intensive industries such as cement, glass or paper were covered by the scheme from the beginning. The scope of the EU ETS has been extended to include aviation and other industry sectors. For the first two trading periods each Member State was required to develop national allocation plans (NAPs) determining the overall national cap as well as detailed allocation rules for the installations. For the post 2012 scheme an EU-wide cap has already been agreed upon. In reducing the overall emissions by 21 percent compared to 2005, only 1729 million allowances will be available for all European installations. The EU ETS can therefore be regarded as a frontrunner deserving a more detailed analysis. The following sections will review the initial experiences with emission allowances auctions in Europe.

Initial experience with the auctioning mechanisms

Despite the early emergence of tradable permits in the late 1970s, the political history of auctioning as allocation method is still in its early stages. This becomes clear when reviewing the short history of auctioning in emissions trading schemes in Europe. Most EU Member States decided not to make use of the possibility to auction 5 percent of their allowances. This was mainly a result of strong lobbying from industries and the power sector, which created strong political pressure for free allocation in the first trading period of the EU ETS. Still, four smaller Member States (Denmark, Ireland, Hungary, and Lithuania) gained experiences with selling part of their allowances. These first applications of auctions are usually regarded as 'learning-by-doing' in order to become familiar with an allocation method that is likely to substitute free allocation in future schemes.

A second strong reason for governments to partially auction allowances was the expected revenues. These were often designated for financing the administration of the scheme. Selling or auctioning procedures however, proved neither too complicated nor overly costly. Despite a change in attitude towards increased auctioning, sales of allowances in the second trading period are also an exception. Nevertheless, a slight increase can be recorded with some larger Member States starting to sell part of their allowances. The case of Germany is particularly interesting as it sells the biggest part of allowances, both in absolute and in

relative terms. Additionally, Germany has already started the International Climate Protection Initiative, which will receive part of the revenues (see below).

In the following sections, experiences with auctioning in EU member states are presented in more detail. This includes experiences with auctions in the UK ETS, as well as auctions in different Member States in the first and second period of the EU ETS and, finally, the current debate on post-2012 auctioning. The latter indicates a growing trend in arguing for a complete sale of allowances, among remaining opposing arguments.

Limited experience in national Emissions Trading Schemes

Before the Europe-wide emissions trading scheme entered into force in 2005, two Member States were already experimenting with their own national emissions trading schemes. The most prominent example of national CO₂ Emissions Trading Schemes is the UK ETS, running from 2002 to 2006. Participation was voluntary and open to the public and private sectors. In order to establish a cap for individual participants, an auctioning process allowing the distribution of incentive money was conducted. In an appraisal of the scheme, pros and cons have been summarized as follows (see ENVIROS 2006). It was generally agreed that the scheme was a good opportunity for learning, especially since it involved a large number of stakeholders. The auctioning of incentive money gave some certainty about costs although some doubts were expressed that better deals for lower costs could have been realized. The costs for preparation and participation in the auction were not significant. Still, some people called for simpler rules and sufficient time to fully understand the auction procedures. Interestingly, the United Kingdom opposed auctioning as a main allocation method for the EU ETS in the beginning and did not include any provision for auctioning in the first period of the European scheme. Certainly the fact that the UK scheme has been voluntary may explain different attitudes towards allocation methods in the two schemes. Furthermore, the different focus of auctioning in the UK ETS serving as the determination of the participants' cap may explain different attitudes towards auctioning when it comes to the European scheme.

The second national emissions trading scheme in Europe was developed in Denmark (2000-2005). The Danish CO₂ Emissions Trading Scheme covered only the power sector and did not include any auctioning provisions. As it will be shown in the next section, Danish industry has been outstanding in Europe with their support for auctioning in the Europe-wide scheme although they had no previous experience with auctioning within their national ETS.

EU ETS – Initial experience with auctions in the first period 2005-2007

The European Emissions Trading directive allowed Member States to auction up to five percent of the total amount of allowances in the first period (2005-2007). Although most Member States did not include auction as an allocation method due to strong opposition by the owners of existing facilities (see e.g. Ellerman et al. 2007: 362) there are four member states that decided to auction off part of their allowances. An important rationale for the small Member States Denmark, Ireland, Hungary, and Lithuania to sell part of their allowances were the expected revenues. Among these four Member States, Denmark being the only country utilizing the full possible margin (see table 1). Altogether the total amount of allowances to be set aside for auctions amounts to 8.4 Mt allowances annually. This equals a percentage of 0.13 percent of all EU ETS allowances (Ellerman et al. 2007: 362). Another nine member states made a provision for a later decision on whether or not to auction off the surplus of the new entry reserve.

Although the expected revenue was a main driver in all four states to choose partial selling of allowances, the political context differed. Denmark stands out as the only country where power producers were asking for auctions across the EU ETS. Their preference for auction has to be set in context of Denmark's high burden sharing agreement commitment (21 percent reduction compared to 1990 emissions). The power sector feared competitive disadvantages in case of Europe-wide free allocation based on Kyoto commitments. Therefore they called for auctions across Europe as the general allocation method. The Danish government supported this approach; they favoured the idea of gaining experience with this method and welcomed a revenue increase to the treasury (Pedersen 2007:115; 127f).

The main purpose for Ireland to auction off part of their allowances was to cover expenses for administering the scheme. In Hungary, the main driver for auction was the prospect of raising revenues for the treasury. Initially, only one percent was intended to be auctioned off in order to cover the costs associated with the introduction of the scheme. Aiming at rising revenues for the state, the Ministry of Economy and Transport wanted to increase the share to five percent. After long and tough negotiations with the operators, Hungary finally decided to auction off 2.5 percent of allowances. This compromise was made under the condition that the government promised to spent revenues on climate protection (cf. Bart 2007: 261).

Auction provisions in NAP II – Changing preferences in another pilot phase

The main conclusion from the first period in EU ETS was that free allowances would not prevent the power sector to factor opportunity costs into energy prices (cf. e.g. Hepburn et al. 2006). It became evident in April 2006 that more allowances had been allocated for 2005 than GHG in fact were emitted in the respective year. As a consequence allowance prices fell heavily, reaching a price below € 0.05 per tCO₂ at the end of 2007. As a result, the power sector benefited from windfall profits in the first period. In addition, significant price decreases did not lead to any reduction in electricity prices. This constellation further convinced policy-makers in Europe to consider as an important element of the overall design of trading schemes and accordingly current European initiatives clearly signal that future schemes will fully rely on auction as allocation method in order to redirect windfall profits.

Despite the increasing prominence of this allowance method, most countries did not make use of the opportunity to auction up to 10 percent of their allowances in the Kyoto commitment period (2008-2012). However, selling activities increased compared to the first period from 0.13 percent to up to 3 percent. Larger Member States, including Germany, the United Kingdom, and the Netherlands, will sell allowances in the second trading period.

Germany decided to allocate all allowances for free in the first period of the European scheme and is now the country with the highest share (8.8 percent) of allowances for sale. After an internal struggle between different governmental ministries, the obvious windfall profits in the first trading period convinced not only the finance minister but also the minister of economy and the environmental minister to start selling the maximum possible level of allowances already in 2008. In trying to agree on a common position for allocation in the post 2012 period, the German debate mainly addressed leakage concerns. In the European negotiations, the German chancellor asked for fully-fledged auctioning for the power sector, but exempting carbon intensive industries.

Despite some experiences with auctions in their national ETS, British policy-makers did not overrule the power sector's resistance towards auctions in the first trading period of the EU scheme. Similar to

Germany, this position has changed and the British government has already carried out a first auction in the second period. The UK further supported the EU Commissions proposal to completely sell allowances in post-2012 schemes.

The European debate: proposals and positions regarding the post-2012 scheme

A 100 percent auction has strongly been promoted by the European Commission for a post-2012 scheme of the EU ETS. This vision was also established by European Commission in its proposal for amending the Emissions Trading Directive from January 2008 (European Commission 2003/87/EC). However, even in light of this strong preference for auctions in the ongoing debate, the further discussions around the Commission proposal revealed that there is still considerable resistance to fully-fledged auctioning, especially among new member states. This was also reflected in the revised directive finally adopted in December 2008. The following section presents some details on the Commission's proposal and the European debate around the following critical issues:

- Shall full auctioning be introduced only for the power sector or also for carbon intensive industries?
- How can leakage concerns be adequately addressed?
- Shall Member States with lower economic capacity benefit more from allowances sales?
- Shall auctioning rules be harmonized across Member States and centrally organized?

The European Commission differentiates in its proposal between the power sector and carbon intensive industries. Full auctioning was foreseen for the power sector from 2013 onwards. By the end of 2020, significant revenues of around € 75 billion per annum would be generated in this way (Müller 2008). For other industrial sectors, however, a gradual phase-in of auctioning would be allowed, leading to full auctioning by the end of the commitment period. This provision aims at addressing leakage concerns expressed by various stakeholders. Not only carbon-intensive industry sectors such as the cement or paper industries oppose auctioning. Coal-based Poland strongly argued against auctioning also in the power sector, whereas France with its huge nuclear power sector is in favour of selling all allowances. Shortly before the meeting of the heads of state in December 2008, representatives of both the German power sector as well as the carbon intensive industries exerted increasing pressure on German chancellor Merkel. They argue that German plants will be at a competitive disadvantage bearing higher costs for emission allowances compared to French companies.

The European parliament finally adopted a resolution based on the Council's decision on 17 December 2008: auctioning will be the general allocation principle for post 2012 schemes (see European Parliament 2008; 2008a). Whereas the power sector will have to buy their allowances starting in 2013, auctions for the remaining sectors will be gradually phased-in. In 2013, at least 80 percent of their allowances will be distributed for free, in 2020 30 percent will still be allocated free of charge and by 2027 auctions will represent the sole possibility to receive allowances. Further exceptions are made for countries that need to modernize their power sector. This concerns especially new member states such as Poland. These countries may opt to freely distribute allowance up to 70 percent to the power sector in 2013 phasing free allocation out until 2020 at the latest.

The EU, hence, differentiates between Member States with a comparatively high degree of economic development and those lagging behind. To address these differences they suggested the introduction of a

solidarity mechanism according to which only 90 percent of the allowances would be allocated according to the verified share of emissions. The remaining 10 percent are to be redistributed from wealthier Member States to EU Members with lower economic capacity through a so-called solidarity fund. Poland, as a new Member State, announced that it would only approve the proposal under the condition that such a solidarity mechanism was included. Not all Member States welcomed this proposal. The distribution of this 10% will take into account levels of income per capita in the year 2005 and the growth prospects of Member States. A further 2% of the total quantity of allowances to be auctioned should be distributed amongst Member States whose greenhouse gas emissions in 2005 were at least 20% below their emissions in their levels applicable to them under the Kyoto Protocol. As a result, the compromise finally decided by the Council goes beyond the Commission's proposal. Among the countries to benefit from this mechanism are the new Member States but also countries such as Belgium, Italy, and Spain.

Earmarking of revenues is an emerging debate on the European level and here again the debate is reflected in the evolution of the European decision making process from the Commission's proposal to final agreement of Council and Parliament in December 2008. Currently, Member States can decide how to spend the revenues they gained from the sales. The Commission's proposal however, envisages one cap for the whole ETS instead of leaving the definition of allocation rules to the Member States. The discussion about the distribution of costs and benefits in Member States will accordingly shift from the struggle about detailed allocation rules towards the question of who gets the revenues. For the period post 2012 the European Commission already proposed a partial revenue earmarking. This proposal foresees the spending of at least 20 percent of the revenues for climate protection. In absolute terms this would amount to a hypothecation of around € 15 billion (Müller 2008). The Environmental Committee (ENVICom) of the European Parliament has further developed these ideas. Their amendment to the proposal foresees the complete spending of revenues for mitigation and adaptation of climate change. At least 50 percent of the revenues shall be spent on developing countries (Müller 2008: 6). A list further breaking down the spending of the money clearly shows the competing interests in these funds. ENVICom stresses funding that supports afforestation and reforestation projects and links support to the conditions that developing countries ratify future international agreements on combating climate change. The Economic and Financial Affairs (ECOFIN) Council has different ideas towards the treatment of revenues. As expressed in a note addressing the Commission's proposal, ECOFIN rejects earmarking of revenues on the EU level for the sake of subsidiarity and sustainable public finance.

The final resolution decided to earmark 50 percent of the proceeds from auctioning of allowances. The list of possible ways to spend this money mainly consists of climate protection measures in order to reach the targets of the European Climate and Energy Package. The list also includes spending on environmentally safe capture and storage of greenhouse gases as well as on the Adaptation Fund as operationalized by UNFCCC COP 14 in Poznan. The discussion on the European level is highly concerned with the harmonization of auction rules including timing and volumes of auction. Therefore, the European Commission elaborates a set of harmonized rules to be established by 2011.

Technical organization of auctions in Germany and the EU

The technical organization of allowance sales is neither prescribed nor harmonised. In fact, the four countries selling allowances in the first period made use of different mechanisms. The first sales in the second period – so far realized by Germany and the United Kingdom – also differ in organization.

Generally, Member States decide between two options: they either make use of sealed-bid auctioning processes combined with uniform pricing, or they sell allowances at market prices via an operating agent on the secondary market.

Auctioning during the first commitment period (2005-2007)

Hungary, Ireland and Lithuania conducted sealed-bid auctions with uniform pricing in the first period of the EU ETS. Denmark finally decided not to hold any auction but to sell the allowances on the market via contracting agents. Danish authorities found two contracting agents via a tendering process. First allowances were sold in October 2006 using both spot and forward markets. The auctions in Ireland were accomplished by the Irish EPA. The Irish mechanism was a paper-based scheme, collecting bids in sealed envelopes. In Hungary, the EUAs were sold via an electronic auction through euets.com¹.

One of the results of the auctioning approaches is that none of the Member States achieved the highest market price level of around € 30 per EUA with their sales. On the contrary, the price ranged from € 7.42 (auctions by Hungary sold on 11 December 2006) to €0.88 three month later (see e.g. DEHSt 2007). According to Danish authorities, the direct sale, as opposed to auctioning, did not provide a price signal. But since only minor shares of allowances were sold and prices on the secondary markets were easily assessable, no significant drawbacks of direct sales could be expected or observed. On the other hand it was found that price risks were much lower compared to selling via auctioning. Selling via an agent achieved prices above the average market price (Fazekas 2008).

Generally it was realized that allowances would be auctioned off at a price close to the current market price. There seems to be also no factual difference between auctioning or just selling allowances by the state to single trade on the market as long as only a small fraction of the total allowances is to be auctioned (cf. Bart 2007).

Auctioning during the second period (2008-2012)

Only a few countries have already gained experiences with certificate sales in the second trading period of the EU ETS. Germany has a year-long history of EUA sales, and the United Kingdom started in November 2008 to auction part of their allowances. Although using different mechanisms, both countries are so far satisfied with the first results, presented below in more detail.

Auctioning in the United Kingdom

As detailed in their NAP II, the UK plans to auction up to 7 percent of their allowances, which would equal around 85 Mt CO₂-equivalent between 2008 and 2012. Revenues will go into the Consolidate Fund, which is a general fund for public revenues. Nevertheless, the allocation of additional resources for climate change mitigation through the Environmental Department, Defra, is very much linked to the expected revenues from emissions trading auctions (Zapfel 2008). The Treasury originally appointed the Department of Energy and Climate Change (DECC) with conducting the auction. DECC chose the UK Debt Management Office (DMO) as its agent to carry out the auctioning process in the UK. Although being legally and constitutionally part of the treasury, the DMO is operating independently as an executive agent. Similar to auctions realised in three EU Member States in the first period, the UK also chose a static

¹ Euets.com, European Energy Auction and New Values merged to form Climex emissions trading platform.

auction mechanism with uniform pricing. This simple way of auctioning had been strongly supported by the consultation process conducted before setting up the legal provisions. No need for further price discovery via a dynamic (e.g. ascending-bid) auction was identified by the stakeholder as the secondary market would provide enough information on the price (Defra 2008). The British Treasury has the right to determine a reserve price before the close of the bidding window. This would prevent the sales of allowances for a price far below the market price (HMT 2008). At a first auction on 19 November 2008, a clearing price of € 16.14 has been achieved (DECC 2008).

Selling activities in Germany

In Germany auctioning was envisaged to start in January 2008. By the end of 2007, details regarding the technical organization of auctioning allowances were not agreed upon. In December 2007, the German Federal Environmental Ministry finally commissioned the KfW Bankengruppe with the completion of sales. The KfW – a promotional bank – is a public law institution owned by the federal government (80 percent) and the German Länder (20 percent). KfW had already been assigned by the German government to buy allowances on the secondary market in the first period in order to refill the new entrants reserve.

In order to sell the annual 40 million EUAs, the KfW is accredited on the most liquid European Market places for carbon emission allowances, the European Climate Exchange (ECX) in London and the European Energy Exchange in Leipzig.

KfW sold EUAs on each trading day between trading hours from January to November 2008. Each week an equal volume of EUAs was offered in order to enhance liquidity and stability on the market. The volume weighted average prices attained by KfW sales differed throughout the year 2008 with an average of -0.1 percent (monthly ranges between -0.14 percent to + 0.12 percent) compared to the volume weighted average price at ECX, converging more and more towards the average market price (BMU 2008).

The spending of revenues is annually fixed by the budget act of the government. For 2008, the expected 400 million Euros revenue is allocated to the Federal Environmental Ministry. In case the revenue exceeds € 400m, the money will be directed to the general treasury. Up to € 280 million may be spent on national climate protection projects. The other € 120 million are to be spent on projects within the International Climate Protection Initiative that Germany launched for this purpose. The International Climate Protection Initiative is already on its way to become a driving force for negotiating future climate protection schemes. It will be depicted in further detail in the section on revenue spending on page 21.

In fact, the revenues raised by the allowance sales already amounted to € 422, 22 million in the period between January and May 2008. At the end of November 2008, KfW sold the total amount of 40 million EUAs. Revenues of € 933,329,250.00 were generated in 2008. For detailed prices and volumes see annex I. From 2010 on, the selling modus is going to transition towards auctioning. Up to now, no decision to specify the auctioning mechanism has been taken. It is also not yet clear which institution is going to carry out the auction. The German Parliament has to decide upon the procedures and a decision on these open issues can be expected by the end of 2009. The German Emissions Trading Authority (DEHSt) proposed to conduct the auction and already presented a simple sealed-bid procedure to the government. The DEHSt is part of the German Environmental Protection Agency and has been established to administer the EU ETS for Germany. Employing a staff of 120, the services provided by DEHSt amount to €11 million every year. During the first trading period, these costs have been covered by a charge on the participating companies

(€ 0.025 per EUA). With the beginning of the second trading period, these charges have been dropped. Part of the auction revenues will be spent on covering the costs for administrating the scheme.

Concepts of Revenue Spending

The auctioning of emission allowances raises the question of how best to use the revenue generated in this way. In the recent political and scientific debate, a number of basic options for how the money should be used have been discussed. They open up the possibility of political actions that would help counter scepticism about the cost of the auctioning process and support specific political priorities in a targeted way. The already mentioned revised emission trading directive, for example, suggests using it for climate protection measures, for promoting the use of renewable energies, developing the market for capturing and storing carbon dioxide (CCS technology), avoiding deforestation, facilitating adaptation to the impacts of climate change, and addressing social aspects and covering administrative expenses. In the US, the 2007 proposed Lieberman-Warner Climate Security Act likewise outlined a number of options, inter-alia improving the energy efficiency of household appliances and buildings.

The main options for using revenues are as follows:

- Redistributing revenues (fully or partially) to consumers
- Using revenues to relieve the tax burden on people with earned or capital income
- Compensating the plant operators involved in emission trading
- Financing measures aimed at climate protection and energy security nationally
- Financing international projects in order to support climate mitigation and adaptation projects and further policy objectives

The following section details the rationale for different ways of using revenues from auctions to pursue specific policy goals.

Compensating consumers

Emission trading systems place an additional burden on the end consumers of energy. It would therefore stand to reason that these consumers should be compensated. This remuneration could take the form of direct, lump-sum payments to individuals, for example. A simulation carried out for a future US emission trading system indicates that using revenues in this way would primarily benefit households with low incomes (Butraw & Palmer 2008). These households are particularly hard hit as spending on energy accounts for a large portion of their available income.

Relieving the burden on households with particularly low incomes could lead to greater acceptance for ambitious environmental protection policies. Additional measures such as distributing free low-energy light-bulbs, multiple socket power strips that can be switched off and time switches, or co-financing energy-efficient large household appliances (via vouchers, small personal loans or mini-contracts), would also offer quick relief to low income households. Support for consumer advice at the point of sale, in local information centres or at home would also ensure a constant momentum for increasing energy efficiency.

Cutting taxes

A second option is to use the revenue from auctioning emission rights to cut taxes. This option is favoured by some economists since it produces efficiency gains. The existing taxation of earned or capital income has a distorting effect on work/leisure and spend/save decisions; using the revenue from auctions to reduce this taxation would stimulate growth and increase prosperity. The design of the German eco-tax in 1999

follows this rationale by raising the costs of energy consumption in order to reduce social security costs. One drawback of this "revenue recycling" approach, however, is its regressive distribution effect. People with low incomes are particularly hard hit by the cost of emission trading, but would benefit far less from a reduction of marginal tax rates since their taxable income is much lower. People with higher incomes, on the other hand, are less affected by the cost of emission trading, but would benefit the most in terms of efficiency gains from a reduction in the marginal tax burden on income.

Compensating plant operators

A common argument advanced in favour of the current system of distributing free emission rights is that plant operators must be compensated for rising costs and competitiveness loss. However, as already discussed, allocating generous free emission credits to plant operators does not reduce their competitive advantage compared to players not operating under the conditions of an emission trading system. In fact, distributing free emission rights is no guarantee that the value created by industry remains in the geographical area covered by emission trading. It is almost impossible to avoid over- or under-compensating shareholders, if only because shares are often split between a large number of different companies. Moreover, only the owners of companies are directly involved in emission trading benefits, while manufacturers indirectly affected by higher prices for preliminary services are left empty-handed.

Studies of the burden distribution of emission trading indicate that a small percentage of the value of emission rights would suffice to compensate for companies' actual abatement costs. In the electricity sector in particular, where passing on costs to end consumers is relatively straightforward, much smaller losses in market value are to be feared (Butraw 2008).

Financing measures for climate protection and promotion of sustainable energies

Against the backdrop of specific conditions in the energy sector, the only truly reliable way to keep value creation and jobs in the country is to provide compensation in the form of sponsoring innovative energy technology – which in turn boosts enterprise value – and to base this on companies proving that they operate a system of efficient energy management. In this way it is possible to steer companies' investment activities in a conscious manner towards creating an environmentally-friendly energy supply structure and energy-efficient methods of production. This example of using revenues from auctioning of emission rights to encourage further climate friendly investments applies not only to the energy sector but to society as a whole (Fischer & Newell 2008).

One focus may be placed on improving the framework for integrating environmentally-friendly technology into existing energy markets. Developing markets for energy services by promoting professional energy consulting and targeted marketing of energy efficiency, and creating real economic incentives for investing and innovating, can help overcome the existing barriers to new energy technology and highly energy-efficient products. In addition, significant potential for energy efficiency can be exploited in the building sector by using revenues from auctions to finance building refurbishment programmes or to restructure energy provisions to large public housing developments. Improvements here are a key precondition for the more efficient use of combined power and heat generation in district heating systems. Promoting the use of combined power and heat generation and developing demand-side management would make it possible to capture additional efficiency potentials.

Looking at a longer time horizon, investing in such efficiency measures reduces the level of energy consumed by households. This should lead to less carbon dioxide emissions, lower prices for emission allowances and hence lower final energy prices in the medium to long term. Using revenues from auctions to finance investments in energy efficiency thus helps reduce the overall costs of emission trading to the economy. This is an approach that also has positive energy strategy effects as it limits dependency on imported sources of energy and so ultimately enables greater freedom in terms of foreign policy. Moreover, it will help economies better adjust to price volatility on global fuel markets.

Promoting international activities

The latest review of climate science by the Intergovernmental Panel on Climate Change (IPCC) in 2007, as well as the assessment of economist Nicolas Stern on the costs of climate change, once more stressed the need for a global approach to tackle the challenges of global climate change (IPCC 2007; 2007a; Stern 2006). To this end, further activities and resources are needed to reduce GHG emissions, especially in developing countries, which historically played only a minor role in emitting but show currently increasing emission levels. At the same time most of these countries have only low capacities to address this issue. Hence, activities to promote sustainable energy structures can be encouraged by industrialised countries through the use of auction revenues. This is not only true for the mitigation side but also with respect to adaptation since developing countries are most severely affected by climate change impacts. Hence, there is a fundamental need for action to expand and strengthen local and regional capacities to analyse and manage the impacts of climate change. This process is already being initiated within the context of adaptation activities under the UNFCCC and the Kyoto Protocol, but needs to be intensified through other, complementary activities. The relevance of adaptation strategies in many developing countries has gained increasing prominence given the inevitability of a certain degree of climate change to occur. The potentially conflict-preventive relevance of adaptation measures has also been discussed from a foreign and security policy perspective (Busby 2007; Carius et al. 2008). Increasing the adaptive capacities of societies, also in so called fragile states, offers important political pathways for action. Accordingly, appropriate human and financial resources must be provided to address priorities in the sphere of adaptation.

Revenue spending in Practice: the German Climate Protection Initiative

In 2008 the German government started to sell about 8.8 percent of the total emission allowances under the framework of the EU ETS. In light of the strong commitment to avoid dangerous climate change, a lion's share of the revenues has been used to design the German "Climate Protection Initiative" (CPI). In 2008, the CPI allocated €280 million for national purposes and €120 million for international activities. The latter part is also referred to as the International Climate Protection Initiative (ICPI). Thus, €400 million of the revenues were earmarked in the federal budget to the CPI, which is implemented by the German Ministry for the Environment in cooperation with other ministries such as the Federal Foreign Office and the Ministry for Economic Cooperation and Development. Since the concrete details of the overall procedures on selling emission certificates and spending the revenue for national and international climate protection purposes were developed only recently, the selection of appropriate projects as well as their implementation is still in the beginning stage. Nevertheless, the overall rationale and priorities of the CPI are already visible. The project selection procedure during 2008 indicates that project priorities have been shaped by close interaction between the government and a range of implementing organisations such as the Gesellschaft für Technische Zusammenarbeit (gtz).

The national chapter of the Climate Protection Initiative (CPI)

The national chapter of the CPI currently supports energy efficient buildings, mini combined heat and power systems, the expansion of renewable energies as well as information campaigns targeted at consumer or other interest groups.

The table below offers an initial estimate of the amount of revenues spent for certain areas based on the information of the German Federal Ministry for the Environment.

Climate Protection Initiative - national	280 Mio. €
Renewable Energies	180 Mio. €
Economy	50 Mio. €
Products/Consumers	25 Mio. €
Municipalities, cultural and social establishments	25 Mio. €

Source: BMU 2008a: 3.

A March 2008 governmental report to the German Parliament gives an overview of the cornerstones activities of the CPI (BMU 2008a). Current activities under CPI's umbrella are outlined in further reports to the German parliament (BMU 2008b) and, in addition, the CPI project website currently offers insights into how the Initiative's objectives are implemented². The German Federal Ministry for the Environment emphasizes that the CPI should help meet the international climate protection targets of the country. The

² See http://www.bmu.de/english/climate_initiative/general_information/doc/42000.php.

Initiative therefore aims at supporting projects that meet the following strategic criteria: greenhouse gas reduction, innovative character, multiplier effect and positive economic benefits.

During 2008 the following five pillars were established:

1. Guidelines on promoting climate protection projects in municipalities and in social and cultural establishments,
2. Climate incentive programme for the installation of mini- combined heat and power (CHP)-plants in private households and commercial enterprises,
3. Climate incentive programme for commercial refrigeration plants,
4. A programme for promoting projects to optimise biomass energy use, and
5. An extension of the existing market incentive programme for renewable heat.

In addition, a programme for single projects was established aimed at, for example, supporting flagship projects (such as the first German offshore wind farm in the North Sea) or initiating information campaigns for consumers or small and medium sized enterprises. The Initiative's "Climate action weeks", organised in cooperation with the financial sector in late 2009/ early 2010, are an example of how to address important interest groups. The objective of this approach is to put a stronger focus on climate protection as a business case for financial services in Germany. There are already a number of financial products aimed at sustainable and responsible investments. Many of these products are also dedicated to climate change mitigation. Although this sector is increasingly evolving, consumer awareness has so far been limited, for a number of reasons. The "Climate action weeks" aim at addressing this deficit by combining a range of activities:

- increasing the popularity of the sustainable financing and investment portfolios;
- fostering a climate-related policy dialogue among different stakeholders in the financial sector;
- outlining the economic potential of investments that contribute to climate protection and thereby building capacity in the sector to further increase attention on the question of sustainable investment; and
- encouraging further innovation within the sector, leading to an enlargement of the portfolio.

The International Climate Protection Initiative (ICPI)

The German government, through the ICPI, supports climate protection activities in emerging economies, developing countries and countries in transition. It thus addresses both major pathways, the reduction of GHG emissions and adaptation to climate change. A total of 138 projects each spending ranging up to 60 million euro for both pathways, are under implementation as of late 2008. In addition, in designing these activities, potential synergies with further areas relevant for a sustainable development should be used – such as the conservation of further climate relevant biodiversity.

Among the criteria for project selection are:

- Direct and economically efficient mitigation effects
- Conservation of climate-relevant biodiversity (carbon sinks)
- Adaptation to climate change
- Innovative, exemplary character of projects
- Multiplier effect (leveraging additional resources)
- Support by the partner countries (ownership)
- Official Development Assistance (ODA) eligibility

Among the geographical priorities are:

- The so called BRICS countries Brazil, Russia, India, China, and South Africa
- Innovative projects in other countries: e.g. Mexico, Turkey, Ukraine, Indonesia and the Mediterranean region (e.g. "plan solaire" of the European Union)
- Biodiversity conservation with climate protection effects and projects that avoid deforestation (so called REDD): the Amazon region, Congo Basin, and South-East Asia
- Selected adaptation projects in Least Developing Countries (LDCs) and small island states
- Multilateral activities in the areas of biodiversity/REDD and adaptation: payments to funds

Among the projects on the mitigation side are the establishment of a German-Chinese platform for renewable energies, the promotion of eco-industrial parks in India, a feasibility study and capacity building for the development of solar thermal power plants in Algeria, energy efficiency promotion in the tourism sector in Thailand and the conceptualization of climate friendly energy supply during the Olympic Winter Games in Sochi (Russia) in 2014. With respect to adaptation, the emphasis is on climate relevant biodiversity protection and sustainable forest management (about 38% of the overall project volume) as well as on the development of adaptation strategies (accounting for about 24% of the overall project volume).

Conclusion

The trading of emission allowances has gained increasing prominence as a key climate protection policy throughout the world. The findings of our analysis suggest that the establishment of emissions trading is currently entering a decisive stage since arguments against the free allocation of allowances are gaining strength. Accordingly, the following conclusions can be drawn:

- If allowances are allocated for free, power companies are most likely to price-in the value of allowances into electricity prices. This can lead to considerable windfall profits.
- Windfall profits can only be avoided in a fair manner when selling allowances and thus receiving revenue: this is no longer an exclusive insight of economists – based on initial experiences in emissions trading and allocation, policy-makers now widely believe in auctions;
- Auctioning as an allocation method is in fact still in a learning phase but is transitioning to a full implementation phase as the next phase of emissions trading will start throughout the EU in 2013. There are still four years left to adjust auction mechanism until fully-fledged auctioning will be practiced;
- A number of countries experimented with how to best sell allowances; it has become clear that selling small fractions on the secondary market is easily done also for smaller member states. Additionally, simple sealed-bid uniform price auctions were held without any major problems;
- Germany's experiences with selling emission rights may provide useful insights for other countries in several ways:
 - Germany has a year-long experience with regular selling of allowances on the secondary market – no country has sold allowances so frequently before;
 - As the largest EU Member States, with the highest share of allowances to be auctioned off, Germany gained a considerable amount of revenues.

The Climate Protection Initiative could be a role model on spending revenues; this becomes even more important since the EU resolution foresees earmarking 50 percent of the revenue for a variety of purposes: it still allows Member States to decide how to spend the money, leaving room for national preferences. In addition, as the presentation of the German Climate Protection Initiative during the 14th Conference of the Parties to the United Framework Convention on Climate Change in Poznan in December 2008 indicated, the example of earmarking the revenues from auctioning for climate protection measures may become an important input for the discussion on how to structure future climate governance. The opportunity to use part of the revenues from the sale of allowances in a meaningful way opens up new possibilities for political action. How the revenues are used can form part of a proactive investment and location policy, as well as contributing to a long-term reduction in the costs of climate protection. However, revenue redistribution is a highly competitive business – reviewing first experiences (of role models) therefore may help to make sure that money is spent according to general welfare principles such as cost-effective climate protection, long-term energy security, and so on.

Annex 1: Results of monthly sales of EUAs through KfW Bankengruppe 2008

Month	Total Volume of EUAs sold	Volume weighed average price KfW	Volume weighed average price - ECX	Revenues
January	3,960,000	21.98€	22.00€	87,050,000.00€
February	3,780,000	20.61€	20.64€	77,912,770.00€
March	3,431,000	21.74€	21.74€	74,595,980.00€
April	3,949,000	24.25€	24.26€	95,748,000.00€
May	3,425,000	25.38€	25.39€	86,915,660.00€
June	3,770,000	27.37€	27.38€	103,189,980.00€
July	4,118,000	25.90€	25.87€	106,658,020.00€
August	3,859,000	23.47€	23.45€	90,587,910.00€
September	3,953,000	23.98€	23.98€	94,795,180.00€
October	3,934,000	21.00€	20.97€	82,624,980.00€
November	1,821,000	18.26€	18.24€	33,250,770.00€
Total	40,000,000	23.33€	23.33€	933,329,250.00€

Source: own calculations based on data from the monthly reports of KfW (KfW Monthly Emission Reports: <http://www.bmu.de/emissionshandel/downloads/doc/40928.php>)

Annex 2: EUA selling activities under the European Emissions Trading Scheme

State	Scope		Revenues/ price		Revenue spending		Comment
	2005-07	2008-12 ¹	2005-07	2008-12	2005-07	2008-12	
Austria		1.2%					Climex auction platform
Belgium		0.3%				climate protection ²	auctions only in Flanders
Denmark	5%				Treasury ⁴		
Germany ⁵		8.8%		Average price €23.33; total revenue of more than €900m		€400m on climate protection	Completed sales of 40 million EUAs
Hungary	2.5%	4.2%	1.18m EUAs for €0.88 (Mar07) 1.197m EUAs for €7.42 (Dec06) ³		treasury, climate protection ⁶		climex auction platform
Ireland	0.75%	0.5%	963.000 EUAs for €6.87 (Dec06) 250,000 EUAs for €26.30 (Feb06) ³		Cover expenses for administration ³		Phase I: auction Phase II: not decided whether to auction or sell ³

Italy		5.7%					auction plans cancelled ³
Lithuania	1.5%	2.8%	552,000 EUAs for €0.06				climex auction platform
Luxemburg		5%					auction plans cancelled ³
Poland		1%				Climate protection	Due to plans in April 2007 ³
Netherlands		4%				Directed to low-volume user ²	Delay of 2008 auctions ³
Norway		>50% ²					Norway as non-EU Member is not restricted to the 10% auction limit
United Kingdom		7%				Indirectly on climate protection ⁷	First auction in Nov 2008

¹Sources: DEHSt http://www.dehst.de/cln_099/nn_719154/SharedDocs/Bilder/Grafiken/Grafik__Auktionierung__NAPII.html

²National Allocation Plans of Member States and Norway

³Point Carbon, www.pointcarbon.com

⁴Pedersen 2007

⁵BMU, KfW Monthly Reports

⁶Bart 2007

⁷Zapfel 2008

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References

- Aulisi, A., D. Dudek, J. Goffman, M. Oppenheimer, A. Peterson and S Wade. 2000. From Obstacle to Opportunity: How Acid Rain Emissions Trading is Delivering Cleaner Air. New York: Environmental Defense.
- Bart, I. 2007: Hungary, in: A.D. Ellerman, B.K. Buchner & C. Carraro (eds.) Allocation in the European Emissions Trading Scheme. Cambridge University Press: Cambridge, pp. 246-268
- BMU 2008 Veräußerung von Emissionsberechtigungen in Deutschland, Monatsbericht Januar 2008. URL.: http://www.bmu.de/files/pdfs/allgemein/application/pdf/monatsbericht_kfw.pdf
- BMU 2008a: Eckpunkte der Klimaschutzinitiative. Bericht an den Haushaltsausschuss (12. März 2008). Berlin: Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit.
- BMU 2008b: Klimaschutzinitiative. Bericht an den Haushaltsausschuss zum Stand der Umsetzung (Stand 27. August 2008). Berlin: Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit.
- Burtraw D. 2008: Cap, Auction, and Trade: Auctions and Revenue Recycling under Carbon Cap and Trade. Washington, DC: Resources for the Future.
- Burtraw, D. and K. Palmer 2008: Compensation for Electricity Consumers under a U.S. CO2 Emissions Cap, RFF Discussion Paper. Washington, DC: Resources for the Future.
- Burtraw, D., K. Palmer, R. Bharvirkar and A. Paul 2001: The Effect of Allowance Allocation on the Cost of Carbon Emission Trading. RFF Discussion Paper 01-30. Washington, DC:
- Busby, J. 2007: Climate Change and National Security. An Agenda for Action. CSR No. 32. Washington: Council on Foreign Relations.
- Carius, A., D. Tänzler, A. Maas 2008: Climate Change and Security - Challenges for German Development Cooperation. Eschborn: Gesellschaft für Technische Zusammenarbeit (GTZ).
- Crampton, P. & Kerr, S. 2002: Tradable carbon permit auctions. How and why to auction not grandfather, in: Energy Policy, 30 (4), pp. 333-345.
- DECC 2008: Result of the Sale by Auction of 4 million EU Allowances. Press notice. URL: <http://www.dmo.gov.uk/documentview.aspx?docname=ETS/20081911auctionresult.pdf&page=ETS%20Auction>
- Defra 2008: Government Response to Consultation on Proposed UK Auction Design for use during phase II EU Emissions Trading Scheme, URL: <http://www.defra.gov.uk/environment/climatechange/trading/eu/pdf/auctionphase2-consult-govresp.pdf>
- DEHSt 2007: Entgeltliche Abgabe von Emissionsberechtigungen in der Handelsperiode 2008-2012: Verkauf oder Auktionierung, URL

http://www.dehst.de/cln_099/SharedDocs/Downloads/Publikationen/Zut2012__Diskussionsbeitrag__Auktionierung,templateId=raw,property=publicationFile.pdf/Zut2012_Diskussionsbeitrag_Auktionierung.pdf

Ecofys 2006: Auctioning of CO2 emission allowances in the EU ETS. Report under the project "Review of EU Emissions Trading Scheme", October 2006 URL:

http://ec.europa.eu/environment/climat/emission/pdf/etsreview/ets_co2_emission_auctioning.pdf

Ellerman, D., Buchner B. K. & Carraro, C. 2007: Unifying themes, in: A.D. Ellerman, B.K. Buchner & C. Carraro (Eds.) Allocation in the European Emissions Trading Scheme. Cambridge University Press: Cambridge, pp. 341-369

ENVIROS 2006: Appraisal of Years 1-4 of the UK Emissions Trading Scheme, report for DEFRA, URL:

<http://www.defra.gov.uk/environment/climatechange/trading/uk/documents.htm#evaluations>

European Parliament 2008: Legislative resolution of 17 December 2008 on the proposal for a directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading system of the Community (COM(2008)0016 – C6-0043/2008 – 2008/0013(COD)).

European Parliament 2008a: Position of the European Parliament adopted at first reading on 17 December 2008 with a view to the adoption of Directive 2009/.../EC of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading system of the Community (P6_TC1-COD(2008)0013).

Fazekas, D. 2008: Auction Design, Implementation and Results of the European Emissions Trading Scheme, URL: <http://www.economicclimatechange.com/2008/08/auction-design-implementation-and.html>

Fischer, C. and R. Newell 2008: What's the Best Way to Promote Green Power? Don't Forget the Emissions Price", Resources, Summer 2008, No. 169 (2008): pp. 10-13.

Görlach, B., Hermann, H. & Hölzer-Schopohl 2008: The European Emissions Trading Scheme – Coming of Age?, in: Carbon & Climate Law Review, No.1, pp.105-109.

IPCC 2007: Climate change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [B. Metz, O. R. Davidson, P. R. Bosch, R. Dave, L. A. Meyer (eds.)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

IPCC 2007a: Climate Change 2007: Impacts, Adaptation and Vulnerability. Working Group II Contribution to the Intergovernmental Panel on Climate Change Fourth Assessment Report. Summary for Policymakers. Available at <http://www.ipcc.ch/SPM13apr07.pdf>.

Stratmann, K. 2008: Kompromiss zu Emissionshandel steht. In: Handelsblatt, 13 November 2008. URL: <http://www.handelsblatt.com/politik/deutschland/kompromiss-zu-emissionshandel-steht;2088102>

Hasselknappe, H. and G. Høiby 2001: Meeting the Kyoto Protocol Commitments: Domestic Emissions Trading Schemes. Energy and Environment Confederation of Norwegian Business and Industry

Hepburn, C., Grubb, M., Neuhoff, K., Matthes, F. & Tse, M. 2006: Auctioning of EU ETS phase II allowances: how and why?, in: *Climate Policy*, 6 (1), pp. 137-160

HMT 2008: The Community Emissions Trading Scheme (Allocation of Allowance for Payment) Scheme 2008, URL: <http://www.hm-treasury.gov.uk/d/euetsscheme050808.pdf>

Pedersen, S.L. 2007: Denmark, in: A.D. Ellerman, B.K. Buchner & C. Carraro (eds.) *Allocation in the European Emissions Trading Scheme*. Cambridge University Press: Cambridge, pp. 106-131.

Müller, B. 2008: To Earmark or Not to Earmark? A far-reaching debate on the use of auction revenue from (EU) Emissions Trading. Oxford Institute for Energy Studies EV 43, November 2008 URL: <http://www.oxfordenergy.org/pdfs/EV43.pdf>

Neuhoff, K. & Matthes, F. Chr. 2008: The role of auctions for emissions trading, *Climate Strategies* URL: http://www.climatestrategies.org/reportfiles/role_of_auctions_09_oct_08final.pdf

Oberthür, S. and D. Tänzler 2007: *Climate Policy in the EU: international regimes and policy diffusion*. In: Paul G. Harris (ed.): *Europe and Global Climate Change. Politics, Foreign Policy and Regional Cooperation*. Celtaenham (UK), Northampton, MA (USA): Edward Elgar, pp. 255-277.

Stern, N. 2006: *The Economics of Climate Change. The Stern Review*. http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm.

Tietenberg, T.H. 2006: *Emissions Trading: Principles and Practice*. 2nd edition. Washington, DC: Resources for the Future.

Zapfel, P. 2008: Hearing by the Select Committee on Energy Independence and Global Warming U.S. House of Representatives on "Cap, Auction and Trade: Auctions and Revenue Recycling under Carbon Cap and Trade", written statement, 23 January 2008 URL: <http://globalwarming.house.gov/tools/assets/files/0327.pdf>

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