REPORT

New Entrant Allocation in the Nordic Energy Sectors: incentives and options in the EU ETS

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Report Summary

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The results suggest that current allocation rules can significantly distort competition. The annual value of the allocation is comparable to the fixed investment costs for a new installation and is not insignificant compared to expected revenues from sales of electricity from the installation.

The study finds that the preferred option would be that Nordic countries should not allocate free allowances to new entrants in the energy sector. This should be combined with adjusted rules on allocation to existing installations and closures in order to avoid putting new installations at a disadvantage. A second less preferred choice would involve harmonised benchmarks across the Nordic countries

Keyword

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Summary

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Contents

1 Introduction

In the EU Emission Trading Scheme (EU ETS), the treatment of new entrants to the scheme has proven to be one of the most contentious issues. In the first set of National Allocation Plans (NAPs) this is also one of the areas where policies among Member States differ most. Clearly, given that all 25 Member States have set up provisions to give allowances to new installations free of charge, allocation to new entrants is a political priority. Decisions about allocations to new entrants involve considerations about investment incentives, perceived fairness, economic efficiency and competitiveness.

For a politician it is hard to introduce policies that would make new investments less attractive and closures of installations more favourable in one's own country than it is in neighbouring Member States. The government of a Member State may be tempted to introduce incentives that compromise the efficiency of the trading program as a whole. The possibility that Member States could obtain a better outcome by individual action that undermines the outcome for the broader ETS constitutes the well-known "prisoner's dilemma." Thus, the extent to which national competitiveness may be affected by the allocation is a highly relevant question.

Although it is still too early to pass final judgment on the effects and efficiency of the EU ETS, it is clear that the design of some allocation methodologies has created distortions in competitiveness, and that the effectiveness of the system in guiding investments to low carbon technology can be improved. However, there are good reasons to structure the discussion on competitiveness, as, in simplified terms, the EU ETS affects at least three distinct aspects of the issue:

- The competitiveness of Member States.
- The competitiveness of new vis-à-vis existing installations.
- The competitiveness of European companies active on a global market.

This paper aims at examining incentives created by the treatment of new entrants in the energy sectors of some Northern European countries in the first two phases of the EU ETS. The paper analyses potential effects of this regulation and identifies options for harmonisation and improvements in future phases of the EU ETS. At the time of writing (December 2006), not all of the Member States had notified their NAPs for 2008-12. Further, some NAPs contained too little information on the treatment of new entrants so as to allow a complete assessment, but for the objectives of this paper we believe the available material is sufficient.

The analysis primarily covers the first two of the three aspects of competitiveness mentioned above. The first aspect, the competitiveness of Member States, is affected by differences in regulation between Member States. If the objective is only to create a level playing field within the EU, harmonisation of the rules across Member States in such a way that the incentives provided to the operators by the allocation are equal is more important than the actual details of the regulation. Given that the treatment of new entrants can affect the efficiency of the entire trading scheme (Åhman et al, forthcoming), one could argue that the best solution would be to regulate at the EU level, although this would require a change in the EU Directive governing the EU ETS (European Union 2003). Harmonising the rules in the Nordic counties would be an important step in this direction. Given the structure of the Nordic energy market, with limited transmission capacity to the rest of the EU, a Nordic harmonisation may suffice to avoid the most serious distortions of competition for companies within those countries. In the longer term, in particular considering the

EU objective to reach an integrated European energy market, harmonisation across the EU would carry further advantages.

The second aspect, competitiveness of new vs. existing installations, should be analysed in the light of the close link between treatment of new entrants and rules on closures. As discussed in this paper and shown previously (Åhman et al, forthcoming, Bode et al, 2005 and Schleich and Betz, 2005) the policy on closures that dominates in the NAPs in the first two phases in the EU ETS, i.e. to withdraw the allocation to installations that close, constitutes an implicit subsidy of existing installations as it sets incentives to not close down old plants. This puts new entrants at a disadvantage if the allocation to new installations is not generous enough to compensate for the subsidy of incumbents. Hence the rules on new entrants in combination with those on closures may have important consequences for the incentives for new investments, to what technologies those investments are directed, and the competitiveness of new vs. existing installations.

The third aspect, competitiveness of European companies active on a global market, is mainly driven by the differences in climate policy between EU and the rest of the world. In the context of emissions trading, the most important factor is the difference in the price of carbon between the EU and the rest of the world. Although the general competitiveness of European industry is important and could indeed be affected by European climate policy, it is not as relevant when discussing allocation methodologies. The first priority in order for the EU to be able to pursue a progressive climate policy without risking the competitiveness of industry would be to continue to the efforts to achieve a broader, preferably a global, climate regime.

The starting point for the analysis is a comparison of the hypothetical allocation to two new standard energy installations to be localised in Denmark, Finland, Sweden, Germany, Poland, Estonia, Latvia or Lithuania, in phase I and phase II of the EU ETS respectively. In order to understand the importance of the allocation, and the extent to which differences in allocation methodology can affect where investments in new capacity are made, the value of the allocation is compared to the fixed costs and annual revenues of the standard installations.

The discussion is focussed on the Nordic countries and Germany, Poland and the Baltic States. The Nordic electricity market is almost completely integrated with increasing transmission capacity to the other countries studied. Thus, all of the chosen countries affect each other to various degrees and the chosen region is well suited to study how differences in allocation methodology can affect an integrated or semi-integrated energy system.

2 Are New Entrants discriminated compared to existing installations?

There is an ongoing debate on how allocation to new entrants should be made, and to what extent allocation affects company behaviour and decisions (inter alia Sterner and Muller, forthcoming, Åhman and Holmgren, 2006). A basic question is whether new entrants should receive free allowances at all. A second question concerns to what extent free allocation actually affects the investment decisions of operators.

Some observers claim that the denial of free allowances would discriminate against new entrants compared to existing installations, thus inhibiting new investments. Opponents (inter alia Åhman & Zetterberg, 2005, Harrison & Radov 2002, Haites and Hornung 1999) point out that the main argument for free allocation to existing installations is to compensate them for sunk costs, i.e. costs for investments that were made before the ETS was constructed and that are now less profitable due to the carbon price. Since new entrants have no such sunk costs and operate with full knowledge on the ETS, this justification for free allocation to new entrants is not valid.

In our view there are two significant arguments that could justify free allocation to new entrants:

First, capital markets discriminate in the price they charge a firm for acquiring new capital in response to observable accounting measures such as debt, liquidity, and cash flow and also due to uncertainties such as exposure to price volatility in factor inputs, including emission allowances. Since the firm is capital constrained and the cost of capital varies with the amount of capital needed, free allocation reduces the need of the firm to borrow money. The lower requirement to obtain capital may reduce the firm's cost of capital and convey economic advantage to owners of incumbent installations that receive allowances for free relative to investors in new installations in case they have to buy all the allowances they need[1].

Second, most Member States implicitly subsidise existing installations by withdrawing the allocation to existing installations that decide not to operate (inter alia Neuhoff et al, 2006, Egenhofer et al, 2006). Under this policy the operator of an installation will not only maximise profits with respect to the cost of production and market price of the products, but also has to take into account the value of the allowances that will be lost should the installations be closed. This puts new entrants, which could potentially replace existing installations, at a disadvantage.

It can be shown that if the value of the allowances that are lost equal the allocation to the new investment, this effect is diminished (Åhman et al, forthcoming). One approach that approximates this prescription is the transfer rules used by for instance Germany and Austria: the allowances from an installation that closes can be transferred to a new installation. However, Bode et al. (2005) have argued that the German transfer rule still discriminates against new entrants and causes large profits for incumbent generators. Furthermore, the Austrian rules explicitly states that the new installation has to be have the same owner as the old one, thus the rule provides little comfort to new investors wanting to enter the market.

1 One reviewer suggested a countervailing effect: the volatility of sales revenue minus allowance costs and thus investment risk could be lower if electricity prices are positively correlated with allowance prices and allowances are auctioned frequently.

Thus, it is our view that there may be some justification for allocating free allowances to new entrants, particularly considering the effects of the current rules on closures.

3 A comparison of new entrant allocation methodologies

Although in theory there are an infinite number of options to compare allocation methodologies, as well as many different terminologies, the allocation methods can be structured in a few different approaches:

- Input- or output-based.
  Input-based allocation is calculated by multiplying input- or production factors such as fuel use or installed capacity with a benchmark (e g 1710 EAU/MW). Output-based allocation is calculated by multiplying e.g. emissions or generated energy with a benchmark . The major advantage of choosing output-based allocation over input based is that it rewards high efficiency technologies.
- Fuel-neutral or fuel-specific.
  Some countries use different benchmarks for different fuels, or groups of fuels. The major advantage with fuel neutral benchmarks is that they provide incentives to use low carbon fuels. Fuel specific benchmarking provides incentives that are similar to allocation based on emissions only, thus does not encourage investments in low carbon fuels[2].
- Technology-neutral or technology-specific.
  This means using different methodologies for electricity generated in condensing plants and in CHPs. This can be used in order to promote one specific technology or to accommodate for the different conditions in which different technologies are used. If the objective is to create incentives for least cost emissions reductions, however, there is little justification for technology specific benchmarks[3].
- Product-specific or product-neutral ('product' in this context being electricity or heat).
  In the context of competition for investments between countries, heat and power have very different characteristics. The advantage of using different benchmarks for heat and electricity is that it would allow for taking this difference into account. Harmonisation is a higher priority for electricity than it is for heat.

The NAPs of the Member States in this study contain examples of all the approaches listed above, in various combinations. In addition, even when the same basic approach is used, for instance output based, fuel specific benchmarking, the actual number of allocated allowances differs

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[2] If a common benchmark is used for all fossil based energy generation, but no allocation is given to energy based on biofuels as is the dominating methodology in the EU ETS, this is an example of fuel specific allocation since it discriminates between different categories of fuels.

[3] In the case of CHP, it has been argued that two reasons can justify generous allocation: first, generation of energy is more efficient in CHP than in condensing plant, and second heat generated in CHPs compete with small scale heating installations that are not covered by the EU ETS. The first argument is weak as long as each technology bears the full costs of production; a higher efficiency is then rewarded on the market. The second argument is relevant, but it can be questioned whether one distortion should be fixed by creating another.

significantly between countries. The Nordic countries all apply different benchmarks for electricity and heat.

Depending on which approach is used, different incentives are created for investments. This will affect the competitiveness of different fuels, products and technologies. Even if two different approaches can result in identical allocation, the investment incentives can still be different.

For the competitiveness of a country, the total volume of allocated allowances for a given installation may be as important as what incentive structure is created by the allocation methodology. That is, an operator who has already chosen fuel or technology only cares about how many allowances he will receive upon entering the market.

For a more comprehensive analysis of phase I NAPs, see e.g. Åhman & Holmgren (2006), Kolshus & Torvanger (2005), DEHSt (2005), Matthes et al (2005), Zetterberg et al (2004) and Ecofys (2004).

3.1 Quantitative examples

We have calculated the allocation that would be awarded to two hypothetical installations if they were to be started. The first installation type is taken from an ongoing Elforsk project (Ekström et al. 2006). The second is modelled closely on the CHP currently planned by Göteborg Energi (Göteborg Energi, 2005).

Table 1. Hypothetical standard new installation

Fuel	Technology	Power efficiency	Total efficiency	Production capacity	Operational hours
Natural gas	CC condensing	58%	58 %	400 MW_e	6000 h/a
Natural gas	CHP	50%	92,5%	261 MW_e, 294 MW_{heat}	5000 h/a

Figures 1 and 2 show what allocation the installations would receive if they were built in the respective countries, in relation to expected annual emissions.

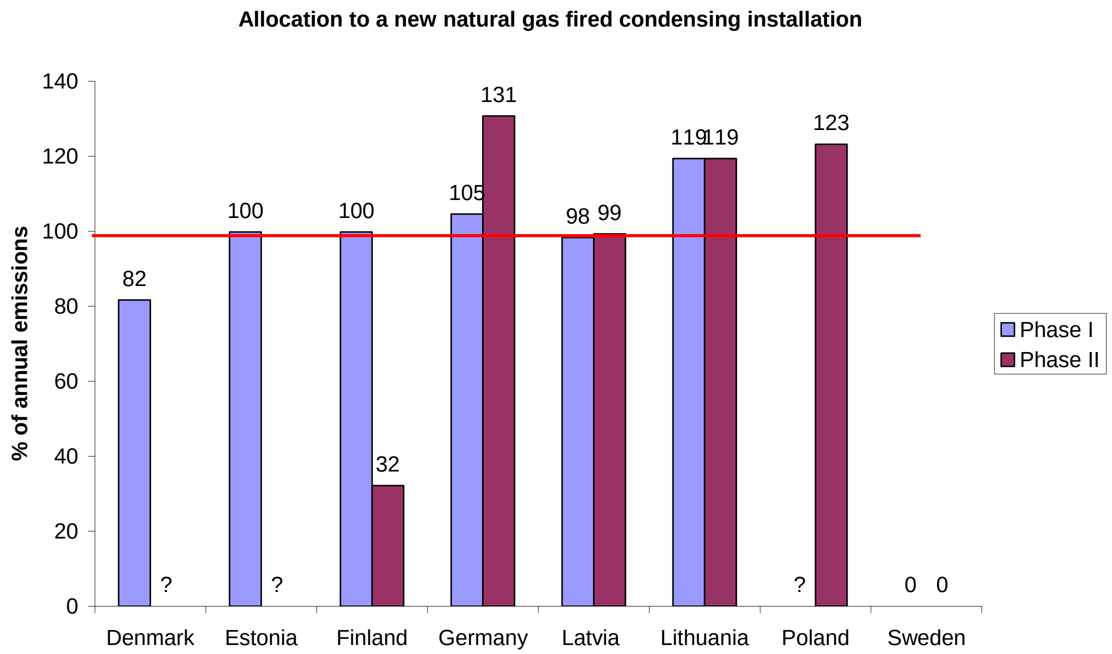

Figure 1. The allocation to a new natural gas combined cycle electricity production unit (no heat) in different member states. Results presented as percentage of expected annual emissions, i e the number of allowances required for compliance, covered by the allocation, with the horizontal line representing one hundred percent of allowances needed for compliance. NAP I of Poland and NAP II of Estonia did not contain enough information to allow calculation of the allocation, while Denmark had not notified its NAP II to the European Commission at the time of writing (December 2006).

There are few signs of increased harmonisation of the allocation methodologies to new entrants in phase II, and it is striking how much the allocation differs between member states. For a natural gas fired condensing plant the percentage of emissions covered range from zero in Sweden in both phases, to 119 in Lithuania (phase I) and 131 in Germany (phase II). For a CHP, the allocation also differs widely across countries: in phase I ranging from 62 % of emissions covered (Sweden) to 131 % in Germany, and in phase II from 70 % in Finland to 157% in Germany (Figure 2).

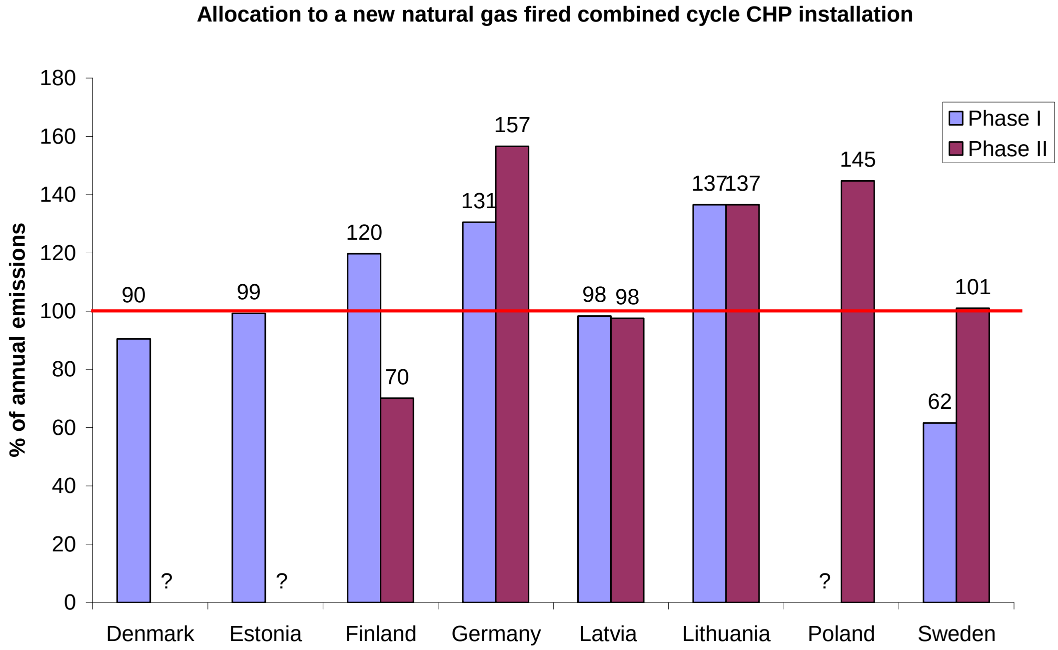

Figure 2. Allocation to a new natural gas based combined cycle CHP plant assuming location in different countries. Results presented as percentage of expected annual emissions, i e the number of allowances required for compliance, covered by the allocation, with the horizontal line representing one hundred percent of allowances needed for compliance. NAP I of Poland and NAP II of Estonia did not contain enough information to allow calculation of the allocation, while Denmark had not notified its NAP II to the European Commission at the time of writing (December 2006).

Germany has changed the allocation methodology to new entrants in phase II, resulting in significantly increasing volumes allocated on installation level. The allocation is based on so called standard utilisation factors, specifying the number of operational hours for different installation types, installed capacity and BAT factors. In phase I, the allocation was not based on standard utilisation factors but on projected emissions. Further the allocation was proposed to be subject to ex-post adjustments, although this proposal was rejected by the EU Commission. In phase II, the explicit ex-post adjustment rules have been discarded. However, the NAP states that the allocation in coming periods will be based on the actual number of hours of operation in previous periods, thus providing an updating component of the allocation methodology.

It is interesting that while both Poland and Germany claim they use benchmarks based on BAT, the benchmarks used are very different. For a natural gas fired power plant the Polish benchmark is 430 kg CO2/MWh electricity whereas the corresponding German value is 365 kg CO2/MWh electricity, a difference of almost 18%. For heat the benchmarks used are more similar, being 60kg/GJ for a Polish natural gas fired CHP, corresponding to 216 kg CO2/MWh, and 215 kg CO2/MWh heat for a corresponding German installation.

3.2 The role of assumptions and forecasts

Forecasts and assumptions are used frequently in the NAPs. Parameters like assumed annual operating hours and efficiency of the installations differ significantly across Member States, which has a significant impact on the allocation.

For instance, the Danish allocation to a new natural gas combined cycle condensing plant (NGCC) in phase I cover approximately 82% of the estimated annual emissions. The main reason for the 20 % shortfall is that the estimated number of operational hours is 20% higher in our example than the default value used for the calculation of the benchmark in the Danish NAP.

In Finland we find an opposite example. The 20 % surplus of allowances allocated to the CHP can be explained by the fact that Finland in its NAP assumes 6000 hours of operation per annum, while our standard assumption is 5000 hours.

An interesting feature of the German NAPs is that they specifically state in that the benchmarks used in the allocation will not be changed until 14 years after the installation has started its operation. In the Commission decision for the first phase this was not commented on, whereas the second phase Commission decision includes language that can be interpreted as disallowing this rule.

In some Member States the regulator produces forecasts while other Member States rely on operators to provide forecasts on which the allocation is based. This creates potentially large differences in the allocation even if the principles on which it is based are the same.

We have also found some differences between our calculated results and a previous study on allocation to energy installations (BALTREL, 2004). When analysing these differences we found that BALTREL had applied different assumptions regarding for instance operating hours, efficiencies and emission factors. Some of these parameters are stated in the individual NAPs, some are to be submitted by the operator of the firm that applies for allocation. Furthermore, the BALTREL study used draft NAPs for some countries, which also may explain some of the discrepancies.

4 Does the allocation matter?

The value of the allocated allowances compared to other costs and sources of revenue of the firm is a key factor in determining whether the allocation actually has an impact on investment decisions and to what extent the observed differences between countries can distort competition.

This section illustrates the relative importance of the allocation by comparing the monetary value of the allocation to the fixed costs associated with the installations, and to the expected annual revenue from sales of electricity on the Nordic electricity market.

Table 2 shows the absolute value of the allocation to the two standard installations discussed above in different member states. In Figure 3 and Figure 4 these values are compared to the annualised fixed costs of the installations that are shown in Table 3, i.e. the annualised investment costs plus fixed operation and maintenance costs. Finally, in Figure 5, the value of the allocation to the condensing plant is compared to estimated annual revenues from sales of electricity from the installation.

Table 2. Value of annual allocation for the two standard installations. Million euros. EAU price 10 €.

	Value of annual allocation [million € / yr]			
	NGCC		CHP	
	Phase I	Phase II	Phase I	Phase II
Denmark	6.8	n.a.	5.5	n.a.
Estonia	8.4	?	6.0	?
Finland	8.4	2.7	7.3	4.3
Germany	8.8	11.0	7.9	9.5
Latvia	8.2	8.3	6.0	5.9
Lithuania	10.0	10.0	8.3	8.3
Poland	?	10.3	?	8.8
Sweden	0.0	0.0	3.7	6.1

Table 3. Estimated selected costs and revenues. The calculations on investment costs are based on data from Elforsk (2003)

Fixed annual costs NGCC:	19.5 million €.
Fixed annual costs gas fired CHP:	15.7 million €.
Annual sales revenues NGCC	74.4 million €.
Underlying assumptions :	
Depreciation rate:	20 years
Real interest rate	6 %.
Investment costs NGCC:	560 000 €/MWe
Investment costs gas fired CHP:	690 000 €/MWe
Fixed operation and maintenance costs:	2% of investment cost
Power price:	31 €/MWh
Annual power generation NGCC:	2.4 TWh

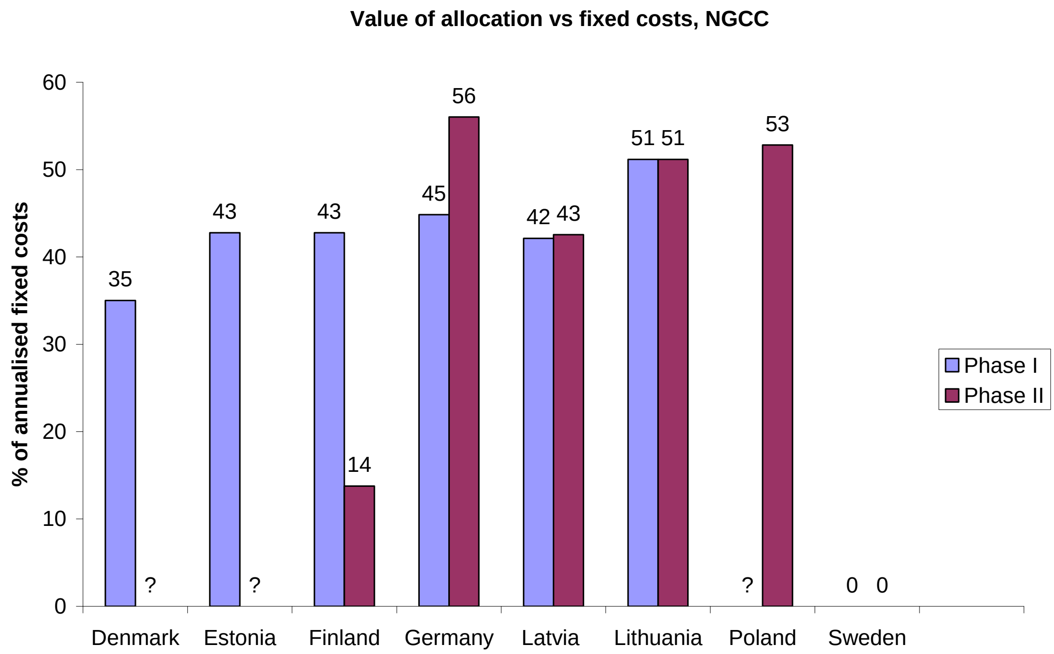

Figure 3. The value of the annual allocation shown as percentage of estimated annualised fixed costs of a natural gas fired condensing installation. Assumed real interest rate is 6 %, depreciation time 20 years. EAU price 10 euro. Data on investment costs and fixed operation and maintenance taken from Elforsk (2003).

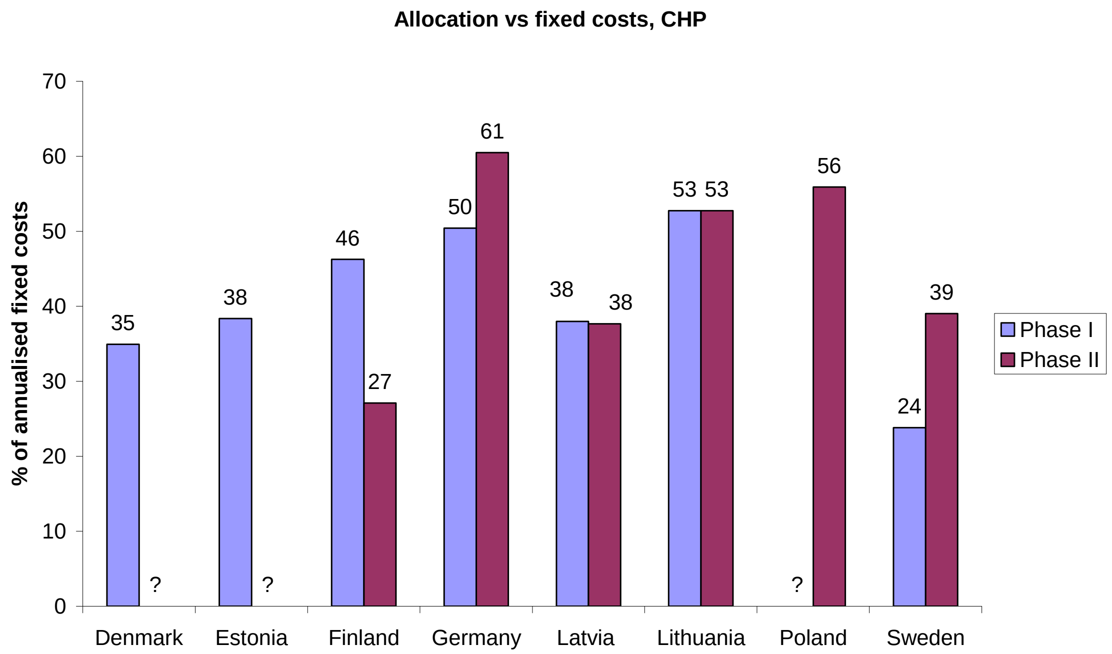

Figure 4. The value of the annual allocation shown as percentage of estimated annualised fixed costs of a natural gas fired combined cycle CHP installation. Assumed real interest rate is 6 %, depreciation time 20 years. EAU price 10 euro. Data on investment costs and fixed operation and maintenance taken from Elforsk (2003).

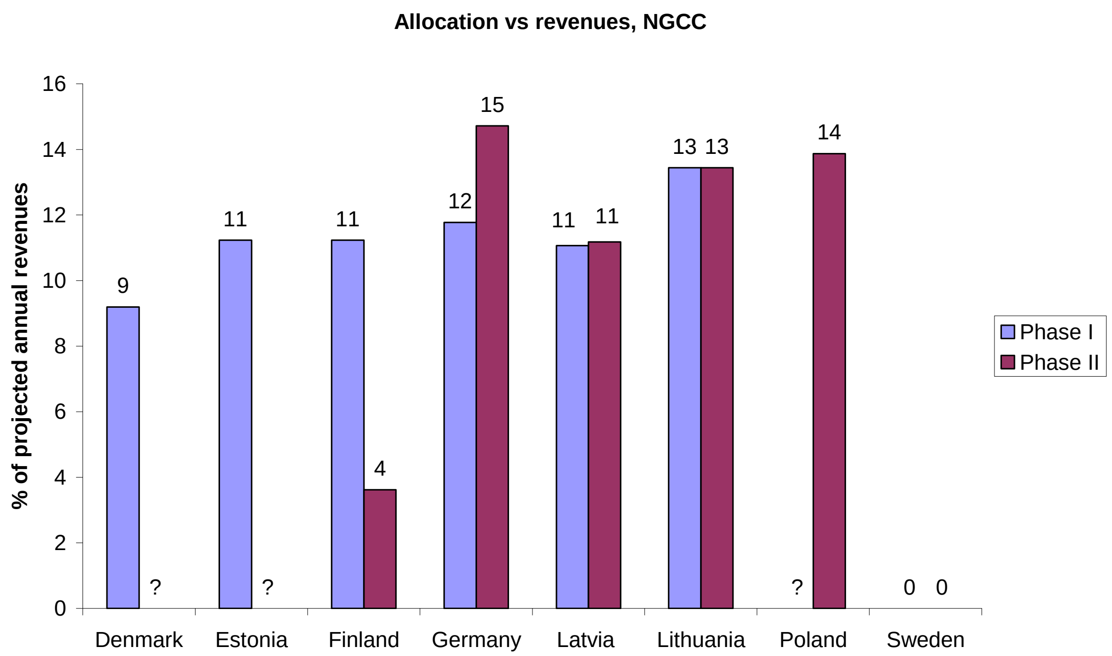

Figure 5. The value of the annual allocation shown as percentage of estimated annual sales revenue from electricity for the standard NGCC installation. Assuming 2 400 GWh annual electricity generation, allowance price 10 euro electricity price 31euro/MWh.

5 Does the allocation to New Entrants affect investment decisions?

At the core of this study lies the hypothesis that the allocation does have an impact on investment decisions and competitiveness. However, this hypothesis can be challenged. The EU Commission has stated (Zapfel, 2005) that it is the price of allowances, not the allocation, which should drive new investment in CO_2 efficient technologies and changes in behaviour. According to this position, the allocation is a way to compensate for sunk costs and to facilitate the introduction of the trading scheme, not an instrument to drive technological change or strengthen the competitiveness of industry.

Behind this lies the view that since the allocation does not affect the variable costs for an installation, it has no significant impact on the competitiveness. However, this reasoning only holds as long as the allocation is not conditioned on the choices of an investor (for instance the choice to start operations or the choice of fuel or technology) and does not significantly affect the cost of capital for an operator.

The first assumption is negated by the fact that an operator can indeed affect the allocation to a new entrant: first of all through the decision to start operations at all, and then, depending on what allocation methodology is used, the allocation could be affected through choice of fuel, technology etc. In this respect, the allocation to a new entrant is different from allocation to existing installations based on historical measures, since the allocation can be directly affected by the operator's investment decisions.

The second assumption, that the capital costs are not a barrier to investment, is also unlikely to hold true. As discussed above, capital is a scarce resource for most firms, although the significance of this scarcity may vary between firms and settings.

Furthermore, the value of the allocated allowances in relation to other costs must be understood in order to determine its importance for investment decisions. Simply put; if the allocation represents a significant source of revenue for an installation, and the value of the allocation depends on the investment decisions, the allocation is likely to affect the decisions taken by the investor.

For a more formal presentation of incentive distortion caused by different allocation methodologies see e.g. Sterner and Muller (forthcoming) and Zetterberg (forthcoming). A general conclusion is similar to the one suggested above: when the firm can influence the allocation, the allocation does affect firm behaviour.

In Table 2, the annual values of the allocated allowances are presented. As shown in Figure 4, the annual value of the allocation is comparable to the estimated annualised investment cost for the installation. This implies that the allocation is an important source of revenue for the operator of an installation. It is also worth pointing out that the results are very sensitive to the EAU price. If the price increases from 10 euros to levels around 20 euros (which is close to the average price during the first two years of trading scheme) the value of the allocation will in fact be higher than the fixed investment costs in several member states. Further, we see significant differences between countries in the outcome of the allocation, thus distorting competition between countries.

However, in order to get a more complete assessment of the importance of the allocation, several other factors have to be taken into account. While a full analysis is beyond the scope of this paper, a few issues that are likely to be important can be pointed out:

- Uncertainty in the allocation. The operator can only be certain of receiving a five year allocation under current rules.
- Variable costs, such as fuel prices and salaries.
- Market factors such as energy prices and access to customers vary over time and between countries, which affects the role of the allocation in determining the investment decision. The large differences in power prices that currently exist between Germany and the Nordic countries are likely to have a significant impact on investment decisions.
- Uncertainty in other energy policies. The European energy system is affected by a wide range of policy instruments that differ between member states, for instance subsidies for renewables, guaranteed feed in tariffs, green certificates and restrictions on nuclear power. Many of these policies are important for which fuels or technologies are profitable, and they are all subject to more or less predictable changes.

Hence it is difficult to precisely estimate to what extent the allocation will impact the decisions on where to invest and in what type of installations. But all this said, we conclude that the sheer magnitude and value of the allocation, in combination with the incentive structure the current methodologies provide, makes it very likely that the allocation to new entrants does affect investment decisions and competitiveness of countries, firms and technologies in northern Europe.

6 Transition from New Entrant to existing installation

The treatment of new entrants is closely related to the general issue of updating allowance allocations over time. Although this does not directly affect the competitiveness between Member States, it is an important issue for the efficiency of the trading scheme as a whole. As such it should be addressed when discussing how to harmonise the allocation rules between the Nordic countries.

The question is for how long a new installation should receive allocation according to some special allocation methodology before it is regarded as an existing installation, and how the transition between different allocation methodologies could be made without opening up for gaming of the system. According to the EU Directive on Emission Trading (European Union 2003) a "New Entrant" is an installation that starts its operations after the NAP has been submitted to the EU Commission[4]. This would suggest that a new installation could only be regarded as a New Entrant for one trading period.

In general, the economics literature indicates that changing or updating allowance allocations over time may have a distorting effect on company decisions. For example Burtraw (2001) and Fisher (2001) found that updating output-based allocation methodologies serves as an economically inefficient subsidy for production that lowers product prices for consumers. Similarly, in an analysis

[4] The technical definition is given in article 3(h) of the Directive: "any installation carrying out one or more of the activities indication in Annex I, which has obtained a greenhouse gas emissions permit or an update of its greenhouse gas emissions permit because of change in the nature or function or an extension of the installations, subsequent to the notification to the Commission of the national allocation plan".'

of a potential emissions trading program in Alberta, Canada, Haites (2003) found that an output-based updated allocation provides an incentive for production.

These considerations have clearly guided the Commission's prohibition on updating within each phase of the EU ETS. Nevertheless, it is not clear how this should be applied to the treatment of new entrants. One option suggested by Åhman et al (forthcoming) would be to introduce a ten year time delay in the allocation. Under such a scheme a new entrant would first be allocated based on some projected measures, but then after ten years the allocation would be updated. For instance, an installation starting in operation in 2006 would receive free allocation based on forecasts until 2015. From 2016 onwards the allocation would be based on actual activity ten years previously. A ten year time delay would significantly weaken the tendency of updating to produce perverse incentives for operators and thus reduce some of the distortions of free allowance allocation. A similar approach, but with a four year time delay, is used in the US NO_xSIP call, a program that requires summertime reductions in NO_x in the eastern half of the United States[5].

7 What about auctioning?

According to the Emission Trading Directive (European Union, 2004), a Member State only has to explain how new entrants can gain access to allowances; it does not need to provide special allocation to them. Furthermore, up to 10 % of the total volume of allowances may be sold, for instance in an auction, in the second trading period. This means that there would be room to use full auctioning of allowances to new entrants. The directive also allows for forcing new entrants to buy allowances on the open market. The discussion regarding free allocation or not to new entrants is analogue to the one on whether new entrants are discriminated compared to existing installations held above. For a full discussion on the advantages of auctioning versus grandfathering, see for instance Cramton and Kerr (2002) and Hepburn et al (2006). The major advantage of auctioning is that it provides efficient incentives for investments in efficient technologies and low carbon fuels. It also eliminates the creation of windfall profits in the energy sector. Further, it avoids the problems of getting accurate data that are associated with benchmarking methodologies. However, if allocation is not harmonised across Member States with a common energy market, competition for investments may be distorted. Thus if other northern European countries continue to apply free allocation this adds weight to the arguments favouring free allocation to new electricity producers in the Nordic countries.

[5] Of course, there are risks associated with longer allocation periods; committing to policies that turn out to be bad, for a long time into the future, can be worse that updating. Since the EU ETS is still in its infancy, there may be reasons to conduct more frequent reviews, although it should be a priority to keep correct incentives in place.

8 Framing the discussion: Input from authorities and industry

In order to gain a better understanding of the rationale behind the current allocation methodologies and the potential changes that could be possible and politically realistic in future phases, we sought input from policy makers in Denmark (Sigurd Lauge Pedersen), Finland (Timo Ritonummi) and Sweden (Truls Borgström). We also interviewed representatives from the energy associations from the respective countries; Danish Energy Companies (Charlotte Söndergren), Finnish Energy Industries (Jukka Leskelä) and Swedenergy (Maria Sunér Fleming).

All of the interviewed persons have extensive experience from working with the design of phase I NAPs, and several were also involved in phase II NAPs. The respondents acted in their personal capacity and were not asked to, nor could they or intended to, give the official position of their respective countries or industry associations. For reasons of confidentiality we have summarised the respondents' comments in the sections below, only disclosing individual views in a few cases. At the time of the interviews, no member states had notified their phase II NAPs to the European commission. Thus the views expressed primarily refer to phase I allocation.

8.1 Views from policy makers

There seems to be agreement that should the current allocation methodologies remain unaltered, it will distort competition between the Nordic countries. However, since the allocation is only determined for a short period of time in relation to the life span of a power plant, it is difficult to judge the importance of the allocation compared to other factors determining investment decisions. Further, both Sigurd Lauge Pedersen and Truls Borgström expect that the allocation will be decreased in coming trading periods, and thus its importance and impact on competitiveness will also decrease.

There seems to be no fundamental or principal reasons that would prohibit the countries from adjusting their allocation principles in order to harmonise them with each other. The main barriers are probably political. What other member states, in particular Germany, do, is very important for what is feasible in the Nordic countries.

None of the respondents ruled out the option to force new entrants to pay for their allowances, although it will probably be politically difficult to pursue if other neighbouring countries continue with free allocation.

8.2 Views from industry

All respondents believed that the current allocation methodologies distort competition and that harmonising them is of high priority. However, allocation is expected to be decreased in coming trading periods, thus this effect is likely to decrease also. All respondents also pointed out that there are differences in other energy policies between the Nordic countries that strongly affect investment decisions, including taxation and application process. There is a need to harmonise other policies as well in order to obtain a level playing field.

There seem to be no fundamental barriers to adjusting the allocation principles in future phases. However, a critical condition for almost any changes is that the Nordic countries would in fact implement harmonised allocation methodologies. Further, since all allocation methodologies create winners and losers, it may be difficult to get general support for any one system. Auctioning would probably meet great resistance unless at least Germany, Poland and Estonia also radically decreased the allocation to new entrants.

The first priority according to all respondents is to get a harmonised system, preferably across the entire EU or at least on the northern European energy market. A harmonised Nordic system would be a step forward, but the approach used in particular in Germany should be considered. The exact design of the allocation is important but a secondary priority. It would probably be easiest to get wide support for a common benchmarking methodology that would take technology and fuel into account, thus avoiding the creation of major winners and losers, although not all respondents did favour this methodology.

9 Conclusions

Given the current allocation methodologies, and the discussion above, several options for a harmonised allocation methodology exist. But first, a few general conclusions can be drawn:

- Current allocation rules do have an impact on investment decisions, and can significantly distort competition if they remain unchanged.
- Under current allocation rules the annual value of the allocation is comparable to the fixed investment costs for a new installation. Further, it is not insignificant compared to expected revenues from sales of energy from the installation.
- There seem to be no fundamental obstacles in any Nordic country to changing the allocation system to new entrants as part of a harmonising process.
- Although it would be an important accomplishment if Denmark, Finland and Sweden could harmonise their allocation methodologies, the Nordic countries must also consider policies in the other neighbouring countries when deciding allocation methodology. This is also stressed by both policy makers and industry representatives. Although the transmission capacities between the Nordic countries are significantly higher than it is to other countries, the Nordic energy sector is already part of the larger northern European energy market. Germany, Poland and Estonia are of particular importance since the transmission capacities to those countries are relatively large.
- Harmonising allocation is a higher priority for electricity generation than for heat, due to the higher sensitivity of electricity generators to competition.
- Since the energy sector can pass on the majority of the cost for emission allowances to clients, a stringent allocation is easier to justify in this sector than in others.

The primary reasons to allocating free allowances to new entrants in the energy sector are:

a. Level playing field vis-à-vis existing installations. Under current regulations on closures, Sweden excepted, incumbents are favoured over new entrants. If rules on closures are changed so that a plant that closes does not lose its allocation, this argument falls.

b. Level playing field vis-à-vis neighbouring countries. As long as neighbouring countries (in particular Germany, Poland and Estonia) allocate free allowances to new entrants, there may be reason to allocate free allowances to electricity producers in order to avoid discouraging investments in the Nordic electricity sector. For heat generation, the argument is less relevant since the market is local, although in the choice between investing in heat generation in two different countries the allocation may be a factor if capital is a constraining factor.

c. Stimulate investments in new capacity. Since capital is a scarce resource, allocating free allowances may have a positive impact on the rate of new investments. However, setting a "correct" level of subsidy is difficult and subsidising investments through the allocation risks distorting the market in other ways.

Although we include both electricity and heat generation in the 'energy sector', the need for a harmonised allocation methodology is greatest for electricity generation. However, as heat and power are often co-generated, and to some extent can be substituted for one another, a harmonised allocation methodology for heat generation would also carry advantages.

A few observations can also be made regarding the changes in allocation between phase I and phase II. First, no harmonization of allocation methodologies between Member States can be detected[6]. Rather, there are still striking differences in how Member States allocate allowances to new entrants. This includes differences in general principles, but also in underlying assumptions such as emission factors and activity rates for energy installations.

Second, the use of fuel- and technology-specific benchmarks is still widespread. No Member State applies a uniform benchmark regardless of fuel or technology used.

Third, Finland is the only member state that significantly reduces the allocation to new entrants. Instead, we see important increases in the allocation to new entrants in Germany and Sweden.

These findings are particularly disturbing considering the growing economics literature showing that the efficiency of EU ETS would benefit from a much more stringent allocation to new entrants, as well as from more harmonized allocation methodologies across member states, fuels and technologies (inter alia, Bartel & Mussgens, Gagelmann, 2006, Grubb and Neuhoff, 2006, Hepburn et al, 2006, Rogge et al, 2006, Åhman et al, 2006).

We conclude that the preferred and most cost effective solution would be that the Nordic countries do not allocate free allowances to new entrants in the energy sector. It is crucial to avoid updating, i.e. allocations must not depend on some variable that the firms can influence. Instead operators would have to buy allowances, either from the government or on the open market. Combined with adjusted rules on allocation to existing installations and to installations that close, this would give the most efficient incentives for new investments. However, this solution may not be the most appropriate, or even efficient, if Germany and Poland[7] do not follow or radically decrease their allocation to new entrants.

A full discussion on allocation rules to existing installations is beyond the scope of this paper. However, a restrictive allocation to the entire energy sector can be justified considering the

[6] This said, one can speculate whether individual Member States may have adjusted their allocation methodology in phase II in response to how other Member States set up their allocation in phase I. Two possible examples of this is the significant increase in allocation to new CHP in Sweden, and the introduction of compliance factors in Finland.

[7, 20] We base our conclusion on the figures given in the Polish NAP submitted to the Commission in July 2004. We have not been able to obtain any official confirmation of changes to these in response to the Commission decision.

possibility of energy producers to pass on costs to clients. Further, a level playing field between existing and new installations and between technologies would be achieved if auctioning to incumbents was applied, if the rules on closures were changed or if identical, fuel and technology independent, benchmarks were used for both existing and new installations.

This solution would eliminate the distortion of competition between the Nordic countries and decrease windfall profits created by the allocation[8] to the energy sector. It would also provide incentives to invest in efficient technologies and low carbon fuels.

Free allocation to electricity producers in the Nordic countries may be justified in order to avoid distorting the competition in relation to Germany, Estonia and Poland[7] if those countries continue with a generous allocation to new electricity producers, and if the rules on allocation to incumbent emitters and closures remain unaltered. In such a scenario, a second option would be to use harmonised fuel and technology independent benchmarks based on output. The allocation should be kept as restrictive as possible, in particular for heat producers. There should also be harmonised assumptions and guidelines on how to forecast production, and if compliance factors are used, of course these should be harmonised as well. This solution, while definitely in the realm of second best, would eliminate the distortion of competition between the Nordic countries created by the allocation. It would also give incentives to invest in low carbon fuels and efficient technology. However, there would still be windfall profits created by the allocation to energy producers. Further, if other neighbouring northern European countries continue to use fuel and/or technology specific benchmarks, there will still be distortion of competition between those countries and the Nordic Countries. However, the benefits of preserving correct incentives for investments could well be greater than the potentially negative effects created by some distortion in competition. A 'race to the bottom', where the Nordic countries apply allocation methodologies that create perverse incentives for fear of losing investments to neighbouring countries would be regrettable. In the long term, this would risk shifting the structure of the energy system in the wrong direction. Furthermore, the magnitude of the distortion in competition, and the impact this will have on investments, depends not only on the allocation principle but also on the actual level of allocation.

A third option would be to use harmonised, fuel- and/or technology-dependent benchmarks, keeping the allocation as restrictive as possible. This would probably meet less resistance from industry and some policy makers than the first or second options. It would also fulfil the objective of removing distortion of competition from the allocation. However, the incentives to invest in low carbon fuels and efficient technologies would be reduced, and windfall profits would still be created by the allocation. In this case, the benefits of having harmonised allocation methodologies have to be weighed against the negative effects of not having incentives to invest in low carbon energy generation.

9.1 Further research

Although the allocation as shown in this study has a large monetary value, it is only determined for five years into the future. Considering the long investment cycles in the energy sector, increased certainty over the allocation would carry significant benefits. If auctioning is used for the allocation to existing installations as well as to new entrants in the energy sector, this issue is dealt with. An

[8] However, it would not address 'secondary' windfall profits created by electricity producers being able to sell *all* electricity, not just fossil based, at higher price due to the price on carbon. This secondary effect is probably at least as important as direct windfalls from the allocation.

area identified for future research is therefore to explore the options to provide higher certainty, for instance by extending the allocation periods.

This also relates to the issue of how the transition from status as a new entrant to existing installation is to be done. If free allocation to existing installations is kept, we find that a solution where a new installation is treated as a new entrant in the allocation for two successive trading periods would be preferable to the current regulation. It would weaken the perverse incentives to increase production and/or emissions created by updating the allocation at the beginning of each trading period. For further discussion of this topic, see Åhman et al (forthcoming). An argument against an approach with longer allocation periods would be if there is an intention to move away from free allocation in coming trading periods. Such a transition may be more difficult to make if allocation to certain installations is determined many years into the future. As we find that auctioning carries significant advantages over free allocation, there is a need for research that could facilitate a transition to such a scheme. The power of policy and political path dependency should not be underestimated, which adds to the urgency of changing the allocation system.

Finally, a question that is beyond the scope of this paper but is important to understand, is *why* it is important to have the same incentives for new investments across Member States and to what extent this objective should be given priority over others. In an integrated electricity market such as that in the Nordic countries, harmonising incentives makes economic sense and is intuitively appealing. But when markets are only semi-integrated, like the northern European electricity market, or even completely separated like the market for district heating, there may be other considerations that are more important when designing the allocation, for instance security of supply, volatility in energy prices, and the structure of the energy system. Thus the interaction between the EU ETS and other policy instruments, and the potential trade off between the objectives of the trading programme and other priorities, are areas where further research is needed.

10 References

Åhman, M. & Holmgren, 2006 K. Harmonising New Entrant Allocation in the Nordic Energy Sectors – current principles and options for phase II. TemaNord 2006:515, report for the Nordic Council of Ministers, Copenhagen.

Åhman M. Burtraw, D. Kruger, J, Zetterberg, L., forthcoming, A Ten-Year Rule to Guide the Allocation of EU Emission Allowances. In press Energy Policy.

Åhman, M. & Zetterberg, L. 2005, "Options for Allowance Allocation under the EU Emissions Trading Directive. Mitigation and Adaptation Strategies for Global Change, 10:, 597-645, Springer.

BALTREL, 2004, "Emission trading task force of BALTREL", final report. Presented at BALTREL Committee meeting, Riga, November 4, 2004

Bode, Sven, Lothar Hubl, Joey Schaffner and Sven Twelemann, 2005. "Discrimination Against Newcomers: Impacts of the German Emission Trading Regime on the Electricity Sector," Hamburgisches Welt-Wirtschafts-Archiv Discussion Paper 316 (June).

Burtraw, D., Kahn, D. and Palmer, K. 2006. "CO2 Allowance Allocation in the Regional Greenhouse Gas Initiative and the Effect on Electricity Investors," The Electricity Journal, 19 (2): 79-90 (March).

Burtraw, D., 2001. "The Effect of Allowance Allocation on the Cost of Carbon Emission Trading," Resources for the Future Discussion Paper 01-30 (August).

Cramton, Peter, and Suzi Kerr, 2002. Tradable carbon permit auctions: How and why to auction not grandfather, *Energy Policy*, 30, 2002, pp. 333–345.

DEHSt, 2005. Implementation Of Emissions Trading in the EU: National Allocation Plans of All EU States. UBA, Berlin.

Ecofys, 2004 "Analysis of the National Allocation Plans for the EU Emissions Trading Scheme". Ecofys report, London, United Kingdom.

ECN, 2005, "CO2 price dynamics – the implications of EU emissions trading for the price of electricity. Petten, the Netherlands.

Elforsk, 2003, "El från nya anläggningar", Elforsk, Stockholm, Sweden

Ekström, C., Bröms, G., Eidensten, L., Hammarberg, A.; Herbert, P., Kapper, R. Krohn, P, Larsson, S., Rydberg, S., Nyström. O and Olsson, F. "Kostnader och potential för att minska CO2-utsläppen i Sverige". Elforsk-report 05:47, Stockholm, 2006.

European Union, 2003, Directive 2003/87/EC of the European Parliament and the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending the Council Directive 96/61/EC

European Union, 2004. COM (08/III/2005). Commission Decision concerning the national allocation plan for the allocation of greenhouse gas emission allowances notified by Poland in accordance with Directive 2003/87/EC of the European Parliament and of the Council.

Finland, 2004. Government Decision on proposal for national allocation plan. 19 August 2004, Helsinki, Finland.

Fischer, Carolyn. 2001. "Rebating Environmental Policy Revenues: Output-Based Allocations and Tradable Performance Standards," Resources for the Future Discussion Paper 01-22 (July).

Göteborg Energi. 2005. Definition of new power plant under construction, November 2005. http://www.goteborgenergi.se/Om_Goteborg_Energi/Var_verksamhet/Rya_Kraftvarmeverk_DXNI-5363_.aspx

Haites, E., 2003. "Output-based allocation as a form of protection for internationally competitive industries," Climate Policy, Vol. 3, Supplement 2, December 2003, S29-S41.

Haites, E. & Hornung, R, 1999, "Analysis of Options for Gratis Distribution of Allowances", National Roundtable on the Environment and the Economy, Canada

Harrison, D., and Radov, D., 2002. "Evaluation of Alternative Initial Allocation Mechanisms in a European Union Greenhouse Gas Emissions Allowance Trading Scheme," National Economic Research Associates, prepared for DG Environment, European Commission.

Hepburn, C., Grubb, M., Neuhoff, K., Matthes, F., Tse, M., 2006. "Auctioning of EU ETS Phase II Allowances: how and why?. Emissions Trading and Competitiveness, special issue of Climate Policy, Earthscan, United Kingdom.

Kallaste, Tiit, 2005. Summary of developments on EU ETS in Estonia, Stockholm Environment Institute – Tallin.

Kolshus, Hans H. and Asbj¢rn Torvanger (2005) "Analysis of EU member states' national allocation plans", Working Paper No. 2, CICERO, Oslo.

Matthes, F., V. Graichen, J. Repenning, C. Doble, J. Macadam, S. Taylor, D. Zanoni and M. Chodor (2005). "The environmental effectiveness and economic efficiency of the European Union Emissions Trading Scheme: Structural aspects of allocation." WWF-report.

Neuhoff, K., Keats, K., Sato, M., 2006. Allocation and Incentives: Impacts of CO2 Emission Allowance Allocation to the Electricity sector. Emissions Trading and Competitiveness, special issue of Climate Policy, Earthscan, United Kingdom.

Stavins, R. N., 2005. "The Effect of Vintage-Differentiated Environmental Regulations," Discussion Paper 05-12. Washington, DC: Resources for the Future (March).

STEM, 2005, "Bränsleoberoende riktmärken i energisektorn", Swedish Energy Agency, Eskilstuna, Sweden

Schleich, J.; Betz, R., 2005. "Incentives for energy efficiency and innovation in the European emission trading system", European Council for an Energy-Efficient Economy (Paris): Proceedings of the 2005 ECEEE Summer Study "Energy Savings: What Works & Who Delivers?", ECEEE, Mandelieu, Côte d'Azur, France

Stavins, R., 1998. "What Can We Learn from the Grand Policy Experiment? Lessons from SO2 Allowance Trading," Journal of Economic Perspectives, 12:3 (summer), 69-88.

Sterner, T. & Muller, M., forthcoming, "Output and Abatement Effects of Allocation Readjustment in Permit Trade. Submitted for review to J. of Climatic Change

Tietenberg, T., 2001. The Tradable Permits Approach to Protecting the Commons: What have we Learned*? Nota di Lavoro 36.2002*, Fondazione ENI Enrico Mattei (FEEM).

Zetterberg, L. Forthcoming " Abatement Incentives for Free Allocation of Tradable Permits". In preparation.

Zetterberg, L, Nilsson, K., Åhman, M. Kumlin, A-S., Birgersdotter, L "Analysis of National Allocation Plans for the EU ETS. IVL-report 1591, Stockholm, Sweden. www.ivl.se

Personal communications

Peter Zapfel. DG Environment, EU Commission, 24 October 2005.

Inga Valuntiene, Ekostrategija, Vilnius, 8 December 2005.

Sigurd Lauge Pedersen, Denmark

Timo Ritonummi., Finland

Truls Borgström. Sweden

Charlotte Söndergren, Danish Energy Companies

Jukka Leskelä, Finnish Energy Industries

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