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New Entrant Allocation in the Nordic Energy Sectors

– An Update

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Nordic cooperation is one of the world's most extensive forms of regional collaboration, involving Denmark, Finland, Iceland, Norway, Sweden, and three autonomous areas: the Faroe Islands, Greenland, and Åland.

Nordic cooperation has firm traditions in politics, the economy, and culture. It plays an important rol in European and international collaboration, and aims at creating a strong Nordic community in a strong Europe.

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Content

Preface

The Climate Change Policy Working Group of the Nordic Council of Ministers is a co-operation between energy and environmental division under the Nordic Council of Ministers. The most important task of the Nordic group for Climate Change Issues is to look into international climate change policy issues linked to the UN Framework Convention on Climate.

The Climate Change Policy Working Group has commissioned IVL Swedish Environmental Research Institute to update the findings of the report TemaNord2007:516: “Harmonising New Entrants allocation in the Nordic Energy Sectors – current principles and options for EU Emission Trading Scheme phase II" with the national allocation plans fore NAP2.

The Climate Change Policy Working Group does not necessarily share the views and conclusions of the report.

Oslo, November 2007

Jon D. Engebretsen
Chairman

Summary

This report presents an update of the findings of the TemaNord report "Harmonising New Entrant allocation in the Nordic Energy Sectors - Current principles and options for EU ETS phase II" (TemaNord 2006:515; Åhman & Holmgren, 2006).

The original report showed that phase I allocation plans can distort competition between fuels, technologies and member states. This update shows that there is little evidence of progress in phase II[1]. Harmonisation across member states is still virtually absent, the general rule is still to use fuel- and technology specific benchmarks, and no trend towards more stringent allocations can be detected.

The report concludes that competitiveness of member states, fuels and technologies is likely to be distorted by allocation methodologies for new entrants in the energy sector in phase II of the EU ETS. The recommendation for the future is to remove or at the very least significantly reduce free allocation to new entrants in the energy sectors. Should free allocation be retained, fuel and technology neutral benchmarks should be introduced and increased harmonisation between member states made a priority, in order to avoid distorting competition between fuels, technologies and member states.

[1] The national allocation plans as of November 2006 have been used for all countries except for Denmark. The results for phase II for Denmark were added in October 2007, based on the NAP published in March 2007.

Introduction

This report presents an update of the findings presented in TemaNord report "Harmonising New Entrant allocation in the Nordic Energy Sectors - Current principles and options for EU ETS phase II" (Åhman & Holmgren, 2006). The scope of the project was limited to providing an overview on the allocation methodologies to new entrants in phase II of the EU Emissions Trading Scheme (EU ETS) and to making a brief comparative analysis of the allocation in the first and second trading periods[2]. For a more comprehensive discussion on allocation methodologies, please refer to the original report.

Objectives

The objective of the study was to map and analyse the allocation methodologies for new entrants in the energy sectors in the Scandinavian countries, the Baltic States, Germany and Poland. More specifically, the study seeks to give an indication of how important the allocation may be in investment decisions in the energy sector, and how differences in allocation methodologies may impact competitiveness of fuels, technologies and member states.

Methodology and assumptions

As a starting point of the analysis we calculated the allocation to two hypothetical standard energy installations – a natural gas combined cycle condensing electricity plant and a natural gas fired combined cycle CHP plant (Table 1) - if they were to be localised in Denmark, Finland, Sweden, Germany, Poland, Estonia, Latvia or Lithuania. In order to understand the importance of the allocation, and to what extent differences in allocation methodology can affect investment decisions, the value of the allocation was calculated and compared to estimated fixed costs and projected annual revenues for the standard installations. Due to the absence of a uniform market price on heat energy, the comparison with projected revenues was only made for the electricity installation. The basic underlying assumptions on economic parameters are presented in Table 2. Compared to the original report, we have only changed the assumed price on

[2] The national allocation plans as of November 2006 have been used for all countries except for Denmark. The results for phase II for Denmark have been added in October 2007.

allowances, from 20 € used in the first report, to 10 € in this project. This reflects the development on the spot market for EAU, as of November 21 2006.

Table 1 Hypothetical standard installations

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

Table 2 Assumptions on selected economic data. 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
Allowance price	10 €/ton

Results

Figures 1–5 present data on how the allocation relates to emissions, annualised fixed costs and projected revenues.

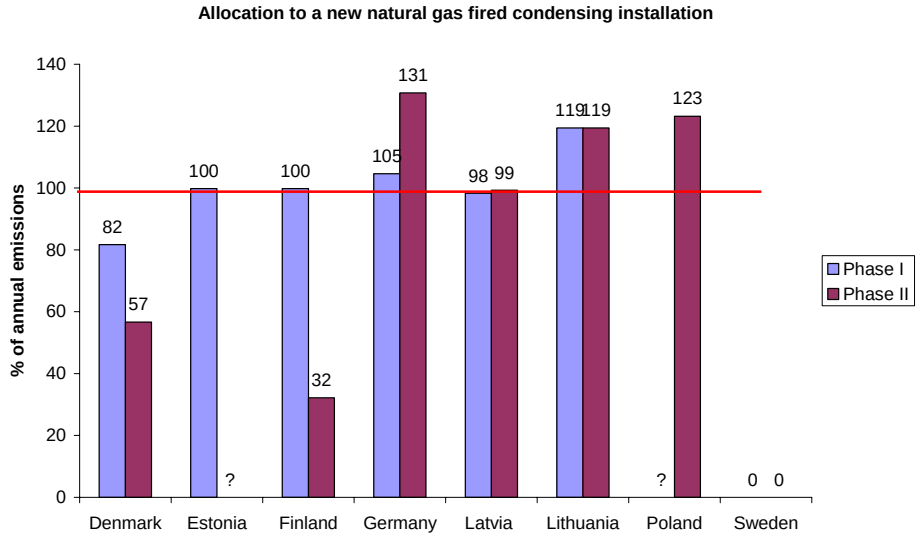

Figure 1 The allocation to a new natural gas combined cycle electricity production unit (no heat) in different member states. Results presented as percentage of annual emissions covered by the allocation.

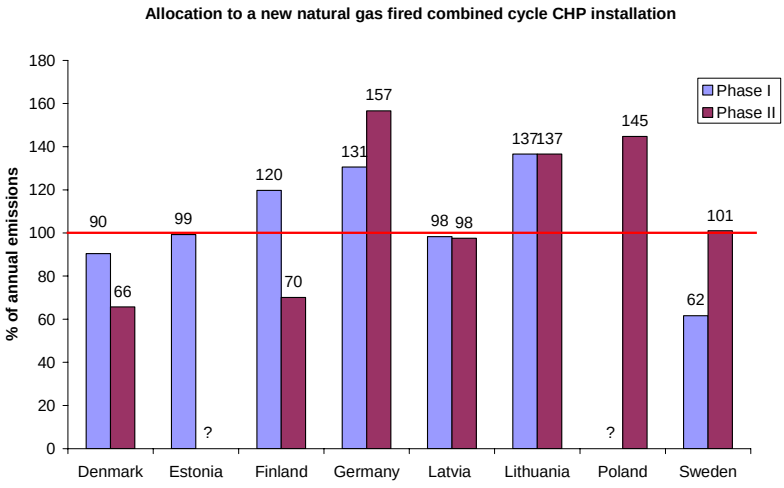

Figure 2. Allocation to a new natural gas based combined cycle CHP plant assuming location in different countries. Results presented as percentage of annual emissions covered by the allocation.

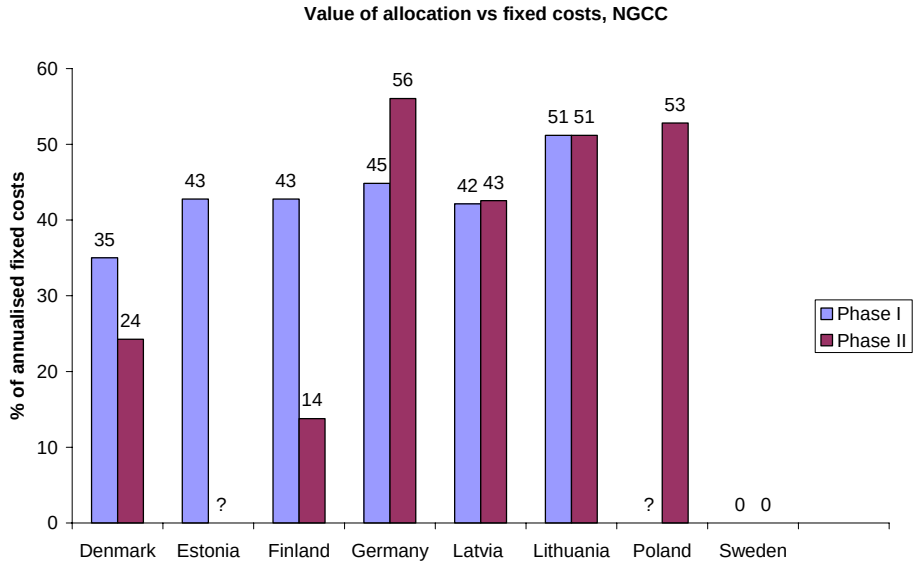

Figure 3 The value of the annual allocation shown as percentage of estimated annualised fixed costs for a new natural gas combined cycle electricity production unit. Assumed real interest rate is 6 %, depreciation time 20 years. EAU price 10 €. Data on investment costs and fixed operation and maintenance taken from Elforsk (2003).

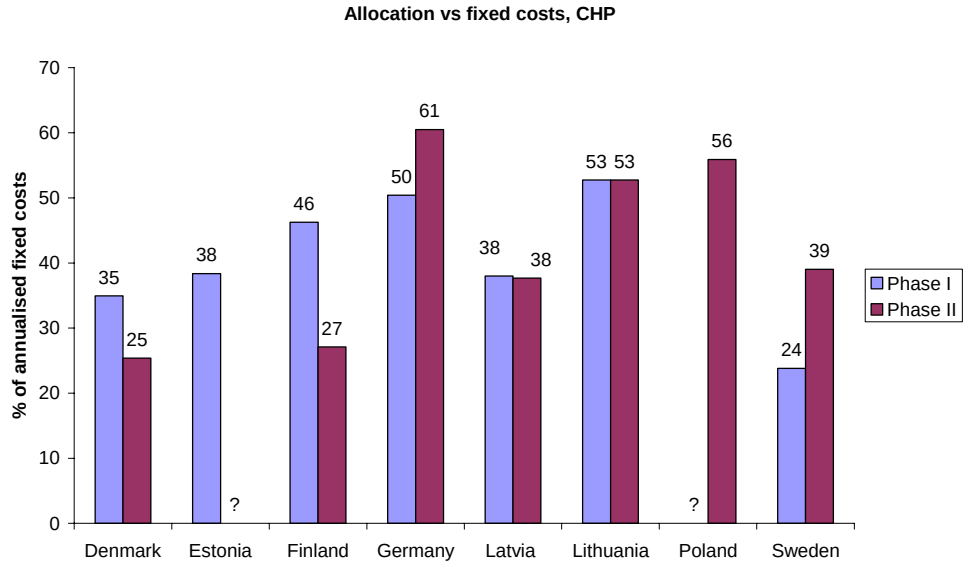

Figure 4. The value of the annual allocation shown as percentage of estimated annualised fixed costs for a new natural gas based combined cycle CHP plant. Assumed real interest rate is 6 %, depreciation time 20 years. EAU price 10 €. Data on investment costs and fixed operation and maintenance are taken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

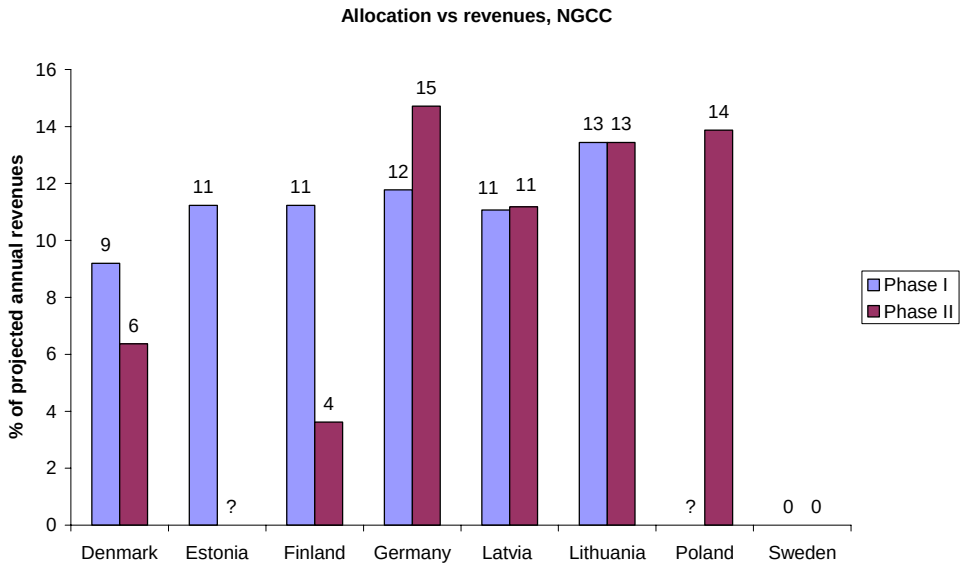

Figure 5 The value of the annual allocation shown as percentage of estimated annual sales revenue from electricity for the standard NGCC installation. Assuming 2 400 GWh annual electricity generation, electricity price 31 €/MWh.

Comments on NAPs

Denmark

Denmark[3] is together with Finland the only country in the study which have reduced the allocation to new entrants considerably. Just as in the first trading period, the allocation to new entrants is based on installed MW fossil-fuel electricity and heat respectively. The allocation in phase II is 1185 allowances per MW fossil-fuel electricity generation capacity installed (down about 30% compared to phase I). The heat generated in a CHP is allocated 305 allowances per MW fossil-fuel heat capacity (down 13% compared to phase I). This allocation is valid under the condition that the electricity-generating installation is expected to have at least 3 000 full load hours annually. If the full load hours are expected to be lower the allocation is reduced. If the installation solely produces heat the allocation is also reduced.

Estonia

The Estonian NAP for phase II does not give clear information on how the allocation to new entrants will be made. The allocation to incumbent installations will be based on historic emissions (grandfathering) and the NAP states that all new installations will be treated equally, independent of which sector the installation belongs to. It is also stated that there is a set aside for new entrants and that 100% of the allocation will be made at no cost to the operators. It is also mentioned that the allocation to new entrants will be made on a first-come first-served principle and that installations will be allocated allowances corresponding to the emission allowances applied for under the integrated environmental permit. The exact meaning of the latter is unclear.

Finland

Finland and Denmark are the only countries in the study which have reduced the allocation to new entrants considerably. Just as in the first trading period, the allocation is based on rated thermal input, specific emis-

[3] The case of phase II for Denmark has been updated in October 2007. It has therefore been possible to use an allocation plan dated in March 2007. For the other countries in this report the allocation plans that existed in November 2006 have been used.

sions for the fuel used as reference fuel and the annual peak operating time of the installation type. However, the specific emissions for the reference fuel has changed from 56.1 g CO_2/MJ in phase I to 54.76 g CO_2/MJ (for liquid and gaseous fuels) in phase II, and the annual peak operating time of district heat and related power base load has been lowered (by 25%) from 6000 h/a to 4500 h/a. The annual peak operating time for condensing plants remains at 6000 h/a.

In addition reduction coefficients are used for the energy sector. For CHP installations the reduction coefficient is set to 0.80 whereas for condensing plants the reduction factor is set to 0.33. In the first trading period no reduction coefficients were applied. Note that these reduction coefficients are proposed values given in the *Government Proposal for the amendment to the Emissions Trading Act* (HE 161/2006 vp). Final decision will not be made until earliest November 2006.

An interesting feature in the Finnish NAP is that installations that entered the system during the first trading period 2005-2007 will, in phase II, be allocated allowances based on the same rules as new entrants in the period 2008-2012. This is motivated by the short emission history of the installations which implies that grandfathering can not be used. The NAP also points out that with this method installations, and parts of installations, that have come within the scope of application of the Emissions Trading Act as new entrants are treated equally irrespectively of in which emissions trading period the installation was taken into commercial use. If the new entrants reserve is depleted, operators will have to buy the required allowances on the market.

Germany

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. An important feature of the German NAP is that new entrants will be allocated according to these rules for 14 years.

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.

For the power station (NGCC), which in our calculations have an estimated number of operational hours of 6000, the standard utilisation factor is 7500, i.e. 25% higher than our assumption. This is also the explanation to why the allocation is so high to this installation compared to the allocation to a similar installation in the first trading period. If the standard utilisation factor instead had been 6000 (or if it were to be adjusted due to information given by the owner) the allocation would have been 105% instead of 131%.

The increase in allocation to a new combined heat and power station in phase II is due to the same reason; the standard utilisation factor for a CHP for public use is set to 6000 h, while we assume 5000 h. If the standard utilisation factor would have been reduced to 5000 h the allocation would be 131% instead of the current 157%. The BAT factors for new installations in the energy sector have not been changed compared to the values used in the first period.

Another important feature of the German NAP is the transfer rule, which was also used in phase I. The rule allows operators to transfer allowances from an installation that is closed to a new installation. The new installation receives this allocation for four years. Following this transfer period, allocations to the new installation will be made according to the rules for existing installations, i.e. either based on historic emissions, or when historic emissions are lacking, based on product specific emission factors (BAT-factors) and standard utilisation factors. For the first ten years after the transfer period the compliance factor will be set to 1. Installations that start operating in 2008 and use the transfer rule will get allocation for 2012 according to the rules on new entrants, then they too will be allocated based on historic emissions.

Latvia

The Latvian NAP in phase II requires that the operator submits detailed information on the installation. For instance, the allocation to a new power plant is based on projected sales of electricity to the market, estimated based on contracts with buyers.

In order to be able to calculate the allocation to our standard installation, we made the assumption that all of the projected generated electricity could be sold on the market. Furthermore, we also assumed that the actual efficiency of the plant would be applied when calculating the amount of allowances. If the plant efficiency would not have been known, a default factor of 50% is used in the Latvian NAP. For the standard installation in this study, that would result in an allocation of 115% instead of the 99% shown in figure 1. The reason for the allocation being lower than 100% is that a somewhat lower emissions factor for natural gas is used in the Latvian NAP compared to the emission factor we used

when calculating the actual emissions. We have not analysed the reason behind this choice of emission factor, but properties of natural gas do differ, which means that discrepancies are not unreasonable.

For a CHP plant the allocation is based on the energy delivered to costumers, assumed energy loss in the distribution system and fuel specific emission factors. The amount of heat and electricity delivered to costumers is based on signed contracts with customers. If such data is not available estimates can be made based on, for instance, what types of buildings that are connected to the distribution net, their size and standard heat requirement factors per square metre. Since we did not have that detailed information, we assumed that all of the produced heat was delivered to costumers and that the losses in the distribution net will be no higher than 10%. We also assumed, just as for the power plant, that the efficiency of the plant is known. If not a default factor of 85% would be used, resulting in an allocation of 106% instead of the current 98%. Again, the reason for the allocation being slightly lower than 100% is due to (small) differences in the applied emission factor for natural gas.

Lithuania

The Lithuanian allocation to new entrants in the energy sector in phase II has not changed compared to the first allocation period. The allocation is based on fuel neutral but technology specific benchmarks, and installed capacity.

However, a new component in the Lithuanian NAP for phase II, which is linked to new entrants, is the so-called Ignalina-reserve. This is a special set aside created to make allowances available to installations that increase their emissions as a result of the planned closure of the nuclear power station Ignalina in 2009. When Ignalina is closed, Lithuania is projected to become a net importer of electricity, a drastic change compared to the situation today when Lithuania is exporting approximately 7 TWh/year. Since 79 % of all fuel in the Lithuanian energy sector is used in Ignalina, it is clear that closure of the plant will lead to higher emissions if the shortfall in production is to be made up by domestic power generation based on fossil fuels. Existing installations that increase their power generation by more than 38.5 % compared to 2005-2008 can apply for extra allowances from the reserve. The allowances will be allocated ex-post using a benchmark of 0.634 ton/MWh. If the installation has increased its capacity, it may also receive extra allocation as a new entrant.

Poland

The EU Commission required Poland to amend the rules on new entrants in phase I, and we have not been able to get clarification on the outcome of that process. Hence no numbers are presented for phase I. The NAP for phase II does not clearly state what information that the operator must provide in order to receive an allocation, but our understanding is that new entrants will be allocated allowances in the same way as incumbent installations. Consequently, we have calculated the allocation using installed capacity of the installation, estimated number of hours of operation and the fuel specific BAT benchmarks given in the NAP.

It is notable 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 CO_2/MWh electricity whereas the corresponding German value is 365 kg CO_2/MWh electricity, a difference of almost 18%. On the other hand the Polish benchmark for heat in a natural gas fired CHP is 60 kg/GJ, which corresponds to 216 kg CO_2/MWh heat, whereas the German benchmark is 215 kg CO_2/MWh heat, hence very similar. According to our calculations a new natural gas fired power plant would receive 123% of the actual emissions in Poland and a natural gas fired CHP-plant would receive 145% of the actual emissions. The reason for the allocation being higher than 100% is due to the high benchmarks.

Sweden

In Sweden only new CHP-plants will receive free allocation; no allowances are allocated to new condensing plants. This principle is identical to phase I. For CHP plants the reduction factor has changed from 0.8 to 1.0 compared to the allocation rules in the first period, which corresponds to an increase of 25%. In addition the benchmarks both for heat and for electricity have changed from 83 ton CO_2/GWh_{heat} to 118 ton CO_2/GWh_{heat} (increase of 42%) and from 265 ton CO_2/GWh_{el} to 337 ton CO_2/GWh_{el} (increase of 27%) respectively. These changes mean that a new gas fired CHP installation will receive 100% of the actual emissions compared to just over 60% in the first allocation period.

Discussion and Conclusions

Three principal parameters in the allocation methodology to new entrants determine impacts on efficiency and competitiveness: level of harmonization across member states, level of harmonization across fuels and technologies, and stringency of the allocation. The original report showed that phase I allocation plans left significant room for improvement in all areas. This update shows that there is little evidence of progress in phase II.

First, no harmonization of allocation methodologies between member states can be detected. 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 and Denmark are the only member states that significantly reduce 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, 2006; Gagelmann, 2006; Grubb and Neuhoff, 2006; Hepburn et al, 2006; Rogge et al, 2006; Åhman et al, 2006).

It is difficult to predict to what extent the differences in allocation methodologies between member states affect where investments are localised, and what role the allocation can play in the choice of technology at installation level. But although the declining trend in EAU prices has decreased the value of the allocation, it still covers a large proportion of the fixed investment costs in many member states. The additional incentives this provides to firms cannot be dismissed. Furthermore, the German rules, which provide a higher degree of certainty in future allocations, can also be expected to give a competitive advantage over neighbouring member states. In addition, if the price levels on EAUs increases, which we believe is not unlikely at least in the longer term, the importance of the allocation increases proportionally.

We conclude that it is likely that the current allocation methodologies can distort competition between and, fuels, technologies and member states, even at EAU prices around 10 €/to CO_2, and that the recommendations from the original report still hold. That is, a preferred option would

be to remove or significantly reduce free allocation to new entrants in the energy sectors. Further, should free allocation be retained an increased harmonisation is required in order to avoid distorting competition between member states. This means introducing fuel- and technology neutral benchmarks and harmonising allocation methodologies across member states.

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Sammenfattning

Denne rapport er en opdatering af resultaterne i rapporten "Harmonising New Entrant allocation in the Nordic Energy Sectors - Current principles and options for EU ETS phase II" (TemaNord 2006:515; Åhman & Holmgren, 2006).

Den oprindelige rapport viste, at de nationale tildelingsplaner for kvoter til nye aktører i energisektoren i fase I (2005-2008) kunne skævvride konkurrencen mellem brændsler, teknologier og medlemsstater. Denne rapport finder, at der er ringe tegn på fremskridt i fase II[4]. Harmoniseringen mellem medlemsstaterne mangler tilsyneladende stadig. Hovedreglen er fortsat at bruge brændsels- og teknologiberoende benchmarking, mens der ikke kan spores en udvikling mod en mere stringent tildeling af nye kvoter.

Det konkluderes, at konkurrencen i fase II af EUs ETS (kvotehandelssystem) mellem medlemsstater, brændsler og teknologier tilsyneladende bliver skævvredent af tildelingsmetoderne til nye aktører i eneergisektoren. Det anbefales at fjerne eller i det mindste markant reducere de frie (gratis) tildelingerne af kvoter til nye aktører i energisektoren. Hvis de frie tildelinger bliver opretholdt bør det prioteres for at undgå forvirdning af konkurrencen mellem brændsler, teknologier og medlemsstater, at der indføres en brændsels- og teknologineutral benchmarking og at harmoniseringen mellem medlemsstaterne øges.

[4] Der er for alle landene med undtagelse af Danmark benyttet de national tildelingsplaner fra november 2006. For Danmark er der brugt data fra den tildelingsplan (NAP2) der er offenliggjort i i marts 2007.