Developing the EU Emissions Trading Scheme

– an Analysis of Key Issues for the Nordic Countries

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Nordic Council of Ministers
Store Strandstræde 18
DK-1255 Copenhagen K
Phone (+45) 3396 0200
Fax (+45) 3396 0202

Nordic Council
Store Strandstræde 18
DK-1255 Copenhagen K
Phone (+45) 3396 0400
Fax (+45) 3311 1870

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Content

Preface

The EU Commission has established a working group for reviewing and reforming the EU ETS, under the framework of the second European Climate Change Programme (ECCP). Among other items the review will cover auctioning of emission allowances, simplification of rules for small installations and the exclusion of certain small installations from the scope of the EU ETS, on the ground of excessive administrative costs. This report explores the pros and cons of different ways of auctioning emission allowances, the impact of various emission thresholds for participating in the EU ETS, costs of participating the EU ETS and what consequences of redefining district heating network as one installation would have. All the topics are analysed from the perspective of the Nordic countries.

The report was commissioned by the Climate Change Policy Working Group and the Environment and Finance Working Group of the Nordic Council of Ministers in June 2007 (climate project no. 132). The project leader in the Council was Mr. Bent Andersen from Denmark's Miljøundersøgelser.

The report is based on a literature review, interviews of selected companies and organisations and market expertise of the GreenStream Network Ltd. All the conclusions are however those of the authors (see below).

The report has been prepared by Mr. Juha Ruokonen, Mr. Juha Ollikainen, Mr. Roland Magnusson and Mr. Kari Aarnos at GreenStream Network Ltd during June 2007 – October 2007.

The Climate Change Policy Working Group and the Environment and Finance Working Group does not necessarily share the views and conclusions of the report, but looks at it as a contribution to our knowledge about developing the EU Emissions Trading Scheme.

Oslo, December 2007

Jon D. Engebretsen
Chairman
Climate Change Policy
Working Group

Copenhagen, December 2007

Jørgen Schou
Chairman
Environment and Finance
Working Group

Summary

The EU Commission is currently review the EU Emissions Trading Scheme. From the areas covered by the review, three are of special interest for the Nordic countries: a*uctioning of emissions allowances, simplification of the rules for small installations, and the exclusion of certain small installations from the scope of the EU ETS, on the ground of excessive administrative costs*. The last two are of special interest because of the large number of small district heating plants in the Nordic countries, compared to the rest of Europe.

Auctioning

Allocation of allowances by auctioning, in general, is considered to improve the functioning of allowance market compared to free allocation. It would give a clear price signal to secondary market of allowances, reduce market distortions and create revenues that could be used to improve the overall efficiency of the economy. The auctioning design has a significant impact on the attractiveness of participation to auction. If the objective is only to distribute allowances to the market, a simple approach such as uniform price single-round auction would be attractive from the Nordic perspective, as there are many relatively small companies in the market that would not be able to participate in auctions with high transaction costs.

Harmonisation of level of auctioning and revenue distribution is important. Especially in the markets such as Nordic wholesale power market harmonisation reduces competitive distortions as the companies (including new companies entering market) from different countries would be treated similarly. Moreover harmonisation and coordination is required how, when and by whom the auctions are organised.

A significant share of the industry included in the EU ETS in the Nordic countries competes in the global market, and it would be beneficial to consider the possibility to allocate most of the allowances free of charge to these sectors. However, one should always take into account that emission allowances received free of charge have an opportunity cost e.g. companies can always sell the allowances to the market which means than emissions trading in general reduces competitiveness of the companies compared to their rivals without similar emission related burden. The effect on competitiveness would be small if companies outside Europe would face similar emission constrains and greenhouse gas emissions related costs.

Emission thresholds

In the Nordic countries the thresholds for participation (10,000 tonnes, 25,000 tonnes and 50,000 tonnes of CO2 per year) in the EU ETS would exclude primarily heat stations from the EU ETS. Typically, this should not create competitive distortions, due to fact that heat generators are often natural monopolies in their supply area. However, in several other industries, significant numbers of installations would be also excluded from the scheme, and this could lead to negative impacts on competition.

The reason for introducing a new threshold would be lowering the administrative costs caused by the EU ETS for small installations. However, also the emissions of the installations falling below the limit should be measured somehow in order to judge whether they are to be included into the scheme or not. Thus, the EU ETS would cause at least some administrative costs to small installations, even if they were excluded from the scheme by a new threshold. This would be challenging from the administrative perspective. The administrative costs of small installations can be, however, reduced by loosening the requirements for emisson monitoring and reporting. The revised guidelines for monitoring and reporting, entering to force in the beginning of 2008, are meant to be more cost effective especially for small emitters (producing less than 25,000 tCO_2 per year) than the current ones, and they will probably reduce, for their part, administrative costs caused by EU ETS to small installations.

Cost for participation in the EU ETS

The results of conducted survey show that costs for participating in the EU ETS vary in a large range. Most of the costs are not proportional to the size of the emission or the size of the allocation, why participating in the EU ETS is particularly burdensome for small emitters.

District heating networks are common in the Nordic countries and have their own characteristics in the EU ETS. Finland and Sweden have decided to opt-in small district heating installations which increased the number of installations within the scheme significantly in these countries. We have explored possibilities to reduce the administrative cost by treating district heating network as one single installation and/or by utilising pooling. Analysis shows that efforts cannot be reduced by changing the definition of an installation in the Emissions Trading Directive or by treating district heating network as single large installation instead of multiple small installations. In some cases, the change of definition could create new problems, because it would force some companies to act under a similar kind of procedure than pooling.

1. Introduction

1.1 Background

The European Union Emissions Trading Scheme (the EU ETS) established by the Directive (2003/87/EC) is the key environmental instrument in achieving EU Member States Kyoto targets for greenhouse gas emissions. The EU ETS started in 2005 and the second phase of the scheme will start in 2008.

The EU Commission has established a working group for reviewing and reforming the EU ETS, under the framework of the second European Climate Change Programme (ECCP). The main areas that the working group will concentrate are:

- the scope of the Directive e.g. included installations, sectors and gases
- further harmonization of the implementation of the emissions trading directive between Member States and improving predictability of the scheme
- robust compliance and enforcement
- links to other trading schemes in third countries, and appropriate means to involve developing countries (CDM) and countries in economic transition (JI)

The Commission has listed a number of issues in the Terms of Reference of the Working Group that the group should consider. Three of these are of special interest for the Nordic countries: *auctioning of emissions allowances, simplification of the rules for small installations, and the exclusion of certain small installations from the scope of the EU ETS*, on the ground of excessive administrative costs. The last two are of special interest because of the large number of small district heating plants in the Nordic countries, compared to the rest of Europe.

1.2 Objective of the Report

The objective of this report is to:

- explore how auctioning of emission allowances impact on the Nordic countries. Pros and cons of auctioning;
- examine how emission thresholds for participating in the EU ETS would affect Nordic industry and energy producers;

- estimate the costs for Nordic companies participating in the EU ETS; and
- examine the impact of redefining district heating networks as single installations in the emissions trading directive in the Nordic countries.

1.3 Contents of the Report

This report is divided in four main sections. Chapter 2 examines auctioning of emission allowances from the Nordic perspective. Chapter 3 explores how various emission threshold levels would impact the installations included in the EU ETS the Nordic countries. In chapter 4, the cost for participating the EU ETS is evaluated and impact of defining district heating network as single installation and possibility to use pooling is covered in chapter 5. All the sections have their own conclusions and overall conclusions are presented in chapter 6.

2. Auctioning

2.1 Background

The decision how the emissions allowances are distributed to the emissions trading market is one of the most important design issues of the emissions trading schemes. There are three basic approaches that can be used:

- Grandfathering e.g. distributing the allowances free of charge typically based on historical emissions
- Benchmarking e.g. allocation is based on for example emission rate (per unit of input or output)
- Auctioning e.g. selling the allowances to the market by auctions or directly.

In theory, how the allowances are distributed to the market does not affect the efficiency nor the market price of the allowances. However, in practise there are several issues that the allocation type could have an impact. As the emissions trading markets are local, the extra financial burden put on the emissions might lead to “leakage” when the production would be reduced in the installation included in the scheme and increase in other countries outside the scheme or installations not included in the scheme. Free allocation can be considered as compensation of the increased costs due the emissions trading scheme but it is difficult to estimate the costs caused by the trading scheme. Consequently, it is challenging to determine what is a “fair” free allocation to the affected sectors. By and large, free allocation improves the *profitability* of the companies but do not improve the *competitiveness* of the production when the competitiveness is evaluated from the production costs.

In the EU ETS, Member States can auction 5% of the allowances in 2005–2007 and 10% 2008-2012 if they wish to do so. Moreover, Norway has indicated that it will auction significant share of allowances in 2008-2012. The share of auctioning in the trading periods after 2012 is likely to higher than currently.

2.2 Auctioning formats

There are two main types of auctioning formats, static auction and dynamic auction. In the static auction there is only one auction round and the bids are sealed. Dynamic auctions are multi-round auctions and the

bids are ascending in each round. Here we discuss three formats for auctioning of allowances that are used in similar auctions; two static auctions, Discriminatory Price and Uniform Price and a dynamic auction Ascending Clock. The characteristics of these auction formats are show in Table 1.

Uniform price auction is a single-round, sealed-bid auction in which bidders can submit multiple bids at different prices, but the price paid by all bidders with the highest bids for the allowances is equal to the highest rejected bid. Uniform price auctioning is the most common approach in sealed-bid auctions for a homogeneous, divisible good such as emission allowances. It is considered to be transparent and easy to conduct. If no individual bidder is able to influence the market price, his pricing mechanism is efficient and the bidders who place the highest value on allowances get the allowances. An inefficient outcome is possible when bidders with market power participate in the bidding. These bidders may bid below their true marginal value in an attempt to use their influence to lower the market price. This price reduction also benefits the smaller bidders as they pay the same clearing price. Uniform price auctioning is strategically simple for small bidders and this encourages them to participate. The seller may be disappointed if there have been very high bids with much lower clearing price. This may leave the seller open to criticism that buyers obtained goods at prices substantially below what they were willing to pay. Ireland used this format when it auctioned emission allowances in 2006.

Discriminatory price auction is also a single-round, sealed-bid auction in which the bidders can submit multiple bids at different prices and each winning bid will pay the price of that bid. The auction is “discriminatory” because the price paid varies among bidders, in relation to their bid price. Discriminatory price auction is very simple auction to conduct and understand as each winner pays against the price of its bids. Under this auctioning format, optimal bids relate more to the best guess of the clearing price, rather than bidders' marginal value. This increases the potential for an economically inefficient allocation – the allowances are not necessarily won by the bidders who value the allowances most highly but by the bidders who most accurately estimate the clearing price. Small bidders are exposed to strategic risks, since they may be less able to gauge the probable level of the clearing price. Thus a discriminatory price auction tends to discriminate against smaller players. This auctioning format has been used in the USA for SO_2 allowances under Title IV of the Clean Air Act Amendments i.e. The Acid Rain Programme.

Ascending Clock auction is a dynamic multi-round auction in which auctioneer posts a sequence of increasing prices, usually at regular time intervals, and bidders state the quantity they are willing to buy at the given price. The price in the first round is low enough so that the quantity demanded is greater than the amount auctioneer has to sell. In each round

the price will rise until the demand falls below the amount offered to sale and the auction stops. Ascending Clock auctions are generally regarded as more transparent and open processes than sealed-bid auctions. A primary advantage of this format is its reliable process of price discovery which reduces common-value uncertainty and fear of the "winner's curse"[1]. Ascending Clock is slightly more expensive to implement and administer than static sealed-bid auctions. However, clock auctions also tend to generate higher revenues than sealed-bid auctions as bidders will continue bidding until their marginal value. As this auction format is more complex than sealed bid auctions it is more suitable for less frequent auctioning. The UK Emissions Trading Scheme Auction in 2002 used a clock auction for GHG emission reduction incentives, and the Clear Skies legislation in the US proposes a clock auction for SO_2, NO_x, and mercury emission allowances.

Table 1. Characteristics of Auction Formats Identified in Previous Studies: 'Yes' indicates an achievement of desired goal. (Burtraw, 2007)

	Single-Round Auctions		Multi-Round Auctions
	Uniform Price	Discriminatory	Ascending Clock
Round by round price discovery feedback information	No	No	Yes
Avoids bidder regret for paying too much	Yes	No	Yes
Avoids seller regret for getting less than the highest bid	No	Yes	Yes
Prevents "demand reduction" price manipulation	No	Yes	No
Deters collusion among bidders	Yes	Yes	?
Prevents surprise power play to corner market	Yes	No	Yes
Promotes entry	Yes	Yes	No
Revenue maximization	Indeterminate		

It is worth mentioning that emission allowances can also be sold directly to the market trough market intermediaries and exchanges. In stead or auctioning allowances to the market, Denmark contracted two trustees (GreenStream Network and Cargill) to sell allowances to the market. The advantages of this approach are:

- timing, sales transactions can be distributed over time and consequently the market price risk is reduced by temporal diversification. In addition, the sold quantities can be varied and adjusted over time.
- auctions have transaction costs and consequently participating auctions is not attractive to all companies. This could lead to lower settlement price in the auction compared to (secondary) market price. By and large, direct sales of allowances could reach more liquid market.

[1] The winner's curse means that the winner will tend to overpay in common value auctions.

2.3 Pros and cons of different schedules for auctioning

Since in the EU ETS the auction is used in conjunction with free allowance distribution, the preferred frequency also depends on whether the auction is set up with a specific purpose. In the case where the aim is only to provide a price signal to the EU ETS participants, only one auction needs to be held at the start of the trading period. In the case where the auction is mainly aimed at generating revenues, several auctions throughout the trading period may be more effective.

Large infrequent auctions would minimize both governments' and market participants' administrative and transaction costs and at the start of a new trading period it would give a clear price signal for the secondary market. Less frequent auctions would also allow the use of a wider range of auction formats. The use of more complex auction formats would increase the costs of smaller companies as the preparation of bids would require more consideration. An infrequent auction with large share of allocated allowances e.g. the number or allowances sold in the auction would be high, to sell could require large investments from companies which could put smaller companies at a disadvantage as their investment could be relatively high. Thus the high initial investment may lead to a smaller number of participants than would otherwise be interested as small companies would prefer to purchase allowances from the secondary market, which may result in a clearing price that is below the market price. If large auctions are held in middle of the trading period the market participants may focus on the auction, and this may distract and reduce the liquidity in the secondary markets. (Ecofys (2006a), Neuhoff (2007)).

Smaller and more frequent auctions would limit the impact of any individual auction on the prices of the emission allowances in the secondary markets. In addition, the volume of allowances in individual auctions would be smaller. This would require smaller investments and would more likely encourage participation by smaller bidders. With high frequency of auctions it is also easier to emitters to find an auction close to the time of their demand for allowances, which could limit the risk exposure of smaller companies. Furthermore, smaller auctions reduce concern that participants with market power would buy large fractions of the allowances and subsequently extract oligopoly rents on the secondary market. Multiple auctions would allow other players to adjust their bids in later auctions in response to any initial strategic purchasing by large players using market power. Downside of more frequent auctions is the increase of transaction costs as number of auctions gets larger.

If allowances are allocated in repeated auctions, this raises the question on how allowance budget should be distributed across these auctions. One option is to allocate allowances equally across all auctions. Neuhoff (2007) suggests that there could also be a larger initial auction or on the other hand larger auctions on later auction rounds if the market partici-

pants want to wait to make their purchases. Industry consultation on the subject might be beneficial.

Careful qualification process of participants is essential for credible auction. This process could include that each participant would be required to pledge a collateral or bank guarantees prior to auction. This would secure that a participant will be able to pay its bids. It would be likely that small bidders would find transaction costs too high to participate directly to auctions. Instead they might prefer to use brokers or banks to bid on their behalf and avoid some of the transaction costs. Allowing the use of market intermediaries in the auctions would increase the number of eligible bidders and could lead to greater competition and higher revenues. Characteristics of different schedules are presented in Table 2.

Table 2. Characteristics of more and less frequent auctions. '+' indicates positive impact.

	More frequent auctions	Less frequent auctions
Transaction costs	-	+
Impact on market price	+ (lower price)	-
Participation of smaller companies	+	-
Concern about market power	+	-

2.4 EU wide auctioning vs. national auctioning

Currently, if a Member State decides to hold a national auction it can choose what kind of auction design best suits its objectives. National auctioning also makes it possible to estimate what would be the optimal time to sell the allowances. Governments might be tempted to restrict the participation in the auction, in order to lower the clearing price under the market price and lower the emissions costs for the domestic industries. This kind of subsidy raises a question about the state aid issued and could reduce the possibility to organise closed auctions (Box 1). However, as the secondary emission allowance market gives a price signal it is likely that the clearing price in the closed auctions would be at least near the secondary market price. Market power could be a problem with especially smaller Member States that have limited amount of allowances to sell. Smaller auctions are more vulnerable to enable large players to influence the outcome. Also the transaction costs would be higher compared to EU-wide auctioning. Table 3 display positive and negative characteristics of EU-wide and national auctions.

Box 1. Restrictions on Auctioning

With the approval process for the NAP2 almost complete it is clear than further auctioning will occur in Phase II of the EU ETS and that Member States will make increasing use of the 10% threshold in the Directive. It is appropriate at this stage to consider the legal framework on this important allocation methodology and the ability of Member States to restrict participation in auctions by sector, nationality or scale.

The recent Directives on Public Procurement (Directives 2004/18/EC and 2004/17/EC) provide an essential starting point for the consideration of EU ETS auctions. Article 54 of Directive 2004/18/EC provides detailed guidance on the use of electronic auctions, in particular:

- auctions may be used in relation to open, restricted and negotiated procedures;
- auctions may be based solely on price or a combination of price and other values;
- all relevant information must be provided by the Contracting authority;
- a full initial evaluation of each participant should be conducted before the auction commences; and
- the contracting authority is required to keep all participants informed of their respective rankings in the auction.

The Directive imposes financial thresholds[2] and exempts various contracts[3] from being subject to its provisions. One of the relevant exclusions is the exclusion of contracts for financial services in connection with the sale of securities. Accordingly, where a Member State defines allowances as a financial instrument (for example Sweden) it may be possible to argue that the Procurement Directive 2004/18/EC does not apply.

In relation to the issue of restricting participation, Article 54 goes on to explicitly state that:

Contracting authorities may not have improper recourse to electronic auctions nor may they use them in such a way as to prevent, restrict of distort competition….

This principle is reinforced by Article 2 of the Directive which requires Contracting authorities to treat economic operators equally and non-discriminatorily and Contracting authorities should act in a transparent way. These specific provisions must be transposed by Member States and are supplemental to the primary EU law contained in the EC Treaty: in particular Article 56 (the free movement of capital and payments), Article 81 (protect of the common market from restriction and distortion of competition) and Articles 87/88 (the prohibition of state aid).

This complex legal framework ensures that any proposed restriction (or de facto restriction) by a Member State as part of an EU ETS auction will be subject to substantial scrutiny so as to ensure the efficient and effective functioning of the emissions market. Consequently it is likely that also future allowance auctions will be open with wide participation but can require initial evaluation and approval of each auction participants.

[2] Article 7: the standard threshold is 162,000 euro.

[3] Including contracts for water, energy, telecommunications and postal sectors covered by Directive 2004/17/EC.

Some level of coordination is required between Member States on volumes and frequency even if they want to run their auctions independently. If all Member States would organise annual national auctions, this could mean that there is an auction somewhere every two weeks. There is also question of how the different national auctions might affect each others. This could potentially lead to a kind of "auction competition" where governments would judge the timing and volume of auctions in relation to market projections, including expectations about the auction decisions of other Member States. This kind of behaviour could lead to conflict of interest. For these reasons Member States might consider "pooling" auction under the same rules. In particular Member States with fewer allowances to sell might decide to hold joint auctions and to divide the revenue according to their share of supply of the sold allowances.

The feedback most market participants and policy-makers have given about the first experiences with the EU ETS is that more harmonisation would make everyone's life easier and avoid market distortions (EFET (2007), European Commission (2005), IETA (2007)).

EU-wide auctioning where all Member States would pool their auction together has many benefits. The EU could set up an allowance auction platform in which the allowances to be auctioned of all Member States are auctioned. This way auction volumes and frequency would be easily coordinated. Setting up only one auction platform would mean that transaction costs of auctioning would be reduced compared to multiple national auctions. Transaction costs of auction are mainly determined by initial set up and registration costs and cost per bid. Ecofys (2006a) argues that setting up only one platform would reduce setting up costs and the market participants would save on registration costs by avoiding registering in multiple auctions and registering only once. As only one auctioning design would be used the market participants need not learn but one design instead of many, thus reducing their costs.

Table 3 Characteristics of EU-wide and national auctions. '+' indicates positive impact.

	EU-wide auctioning	National auctioning
Complexity	+	-
Transaction costs	+	-
Coordination of timing and volumes	+	-
National preferences of auction design	-	+
Concern about market power	+	-

Institutional arrangements

In principle several institutions can serve as the host for the auctions. The Irish Environment Protection Agency executed their national auction in 2006 and Vertis group managed the Hungarian allowance auctions in 2006 and 2007. Treasury departments have experience with bond auc-

tions and various trading platforms have developed credibility in the market.

There are several criteria that the host of an auction should satisfy. The host should be independent from individual trading participants and be able to create credibility that bids are monitored and judged fairly in case of difficulties. The financial credibility of the host should be good. The ability to handle large volumes of bids from emitters across Europe in a short time frame is essential to minimise the uncertainty for market partners. Also the use of existing infrastructure would minimise set up costs and learning requirements for auction place and market participants (Neuhoff 2007).

Potential candidates to host the EU-wide auctioning could be new governmental body, an organisation build on treasury bond auction experience or a commission to institution with existing operations like CO2 trading, power exchanges or financial market places. A specialised EU auctioning agency or authority might not be needed if tasks of coordination of frequency and volume of auctions and the returning of the auction revenue to Member States could be done by existing bodies of EU (Neuhoff 2007).

European Central Bank (ECB) could be one suitable institution for hosting EU-wide auction as it uses auctions as an integral role in the implementation in its monetary policy. In these auctions (refinancing operations) European banks can submit bids for borrowing central banks funds and it helps ECB to control the amount of reservable funds in the banking sector. ECB's experience of EU-level auctioning and its existing infrastructure could be used in building an auctioning platform for allowances.

Instead of using EU-related organisations also private companies or company such as exchanges or financial institutions could be considered. This would require tendering procedures but could promote lowering the administrative costs of organising auctions.

Harmonised minimum

The share of allowances that will be auctioned needs to be subtracted from the total amount of allowances to be allocated to installations for free. Companies in countries with higher level of auctioning would have to purchase more allowances on the market or at the auctions than companies in countries that have lower level of auctioning. This could create distortions of competition. Ecofys (2006a) recommends that there should be harmonisation of auctioning levels as the impact of these distortions would be smallest when the level of auctioning is equal in all Member States. Harmonisation is especially important when the level of auctioning is high. If there is going to be a harmonised minimum of auctioning the size of it is believed to be larger in future than the maximum levels of the first two trading periods. The emission trading program Regional

Greenhouse Gas Initiative (RGGI) in the USA is setting a minimum of 25% of allowances to be budgeted to auction. The revenues from the auctions will be used to consumer benefit and to promote energy efficiency and low-carbon-emitting energy technologies (Burtraw 2007).

The level of auctioning could vary between sectors. If the level of auctioning varies, the amount of allowances allocated for free would vary too. The level of auctioning could be higher in sectors that are able to pass on the costs of the allowances to their customers (e.g. energy sector) better than in those sectors that cannot as easily pass on the costs of auctioning to customers. Harmonisation of the auctions between the countries at sectoral levels would be important. If for instance, if the level of auctioning for energy sector would be 50% in Finland and in Sweden only 25%, the increase of costs for Finnish energy companies would be more than for the Swedish companies which would disturb the competition, as the companies compete on the Nordic power market. The harmonised level of auctioning between sectors in different countries could minimize this distortion.

The most suitable sectors for auctioning would be those that are less exposed to competition outside the EU. Sectors that compete in the global markets (e.g. metal industry and pulp and paper industry) would become less competitive as their costs would increase. To minimize these competitive distortions the allocation for these sectors could mostly be free of charge. However development of the climate policies outside the Europe is developing which could reduce the competitive distortions if the costs associated with the emissions are in the same magnitude as in Europe.

2.5 Distribution of proceedings from EU wide auctioning

The issue how the revenues from the EU wide auctioning are distributed is an important topic and it would require careful consideration. One alternative would be that the proceeds from auctions would be returned to the Member States according to their share of supply of allowances. With larger share of allowances to be sold in auctions, there should be some level of harmonisation on how the revenues will be spent. Large differences in distribution of revenues within Member States could lead to competitive distortions. This should be avoided and the revenues should rather be used removing existing market distortions than introducing new ones.

With limited volumes auctioned in the first two trading periods the Member States can use the revenues as they see best. The two Member States that have already held the first phase allowance auctions have used the revenues in different ways. The revenues from the Irish auction will be used to cover the costs of administering the EU ETS scheme and Hungary has directed its auction revenues to the general treasury.

Different models

There are several proposals in on how the revenues could be distributed. The revenues could be simply directed to genereal treasure or they could be earmarked for some special purpose. The two most potential models covered in the literature for using the auction revenues are redistribution of revenues back to bidders and using the revenues to reduce distortionary taxes.

The redistribution of revenues back to the participants of the auction would reduce the compliance costs of the bidders. This could be done by a chosen distribution key. This key could be for example benchmarked on energy efficiency or carbon intensity or the share in emissions, share in production, share in value added or share in employment. In principle, the mechanisms used to determine the amount of revenues to be recycled to individual firms could be identical to the mechanisms considered for allowance grandfathering By and large, this would sift the lobbying from allowance allocation on how to distribute the revenues. The redistribution of revenues would also reduce economic efficiency of auctioning compared to grandfathering as it would still allow windfall profits. In this kind of revenue distribution the differences between Member States' methods can easily lead to market distortions. The revenues would only benefit bidders and not sectors that suffer from high electricity prices. Redistributing auction revenues may be politically contentious and may conflict with European state aid restrictions, depending on the way it is carried out (Nera 2002, Ecofys 2006b).

The use of the auction revenues to reduce taxes, such as income or sales taxes, would benefit the overall economy. Reducing the distortionary taxes would improve efficiency in the economy and produce a welfare gain. It would also lower the net cost to the economy of reducing emissions. NERA (2002) recommends this kind of revenue recycling to benefit consumers and affected labour forces directly. Putting the auctioning proceeds to general revenues and using it to reduce public debt would benefit consumers by reducing future tax payments but would also encourage to energy saving as the energy prices would remain high. Using the revenues to reduce taxes or public debt would be relatively good to consumers and tax payers but it would be harmful to participating sectors.

It could also be possible to use combination of the two above mentioned models. But, as there is a need for harmonisation also in revenue recycling, it would require additional negotiations and it would be more difficult to find a solution with suitable combination that would satisfy all Member State.

With both of the revenue distribution models some of the revenues could be directed to research and development of environmental technologies. In the public discussion, also directing auction revenues to promote renewable energy sources or CDM/JI purchases are mentioned. Research on low-carbon technologies would benefit consumers and in-

dustry. One conceivable option would be using the revenues for research on carbon capture and storage technology for coal-fired power stations (Deutsche Bank 2007). Also directing funds to research and development on energy-saving and energy efficiency technologies could lead to beneficial improvements. Nevertheless, the decision how to distribute revenues from EU level auctioning is a challenging. If the free allocation is not harmonised in the EU level, the Member States might be more competent to decide how to recycle auction revenues back to the bidders or which tax changes would generate the best outcome if the objective for using revenues would be removing distortionary taxes.

2.6 Auctions from the Nordic perspective

The profile of the EU ETS sectors in the Nordic countries differs in some extent from the average European profile. While in the EU25 71% of the average emissions of 2005-2006 in the EU ETS were in from the combustion installations, only 65% of the Nordic emissions were emitted by the combustion installations (Table 4, Appendix 2). By and large, the share of the industry's emissions (35%) in the Nordic countries is largest compared to other reference groups.

Table 4. The share of sectors of average emissions in 2005-2006 within the EU ETS.

	Combustion installations	Industry
EU25	71 %	29 %
Nordic (SWE, FIN, DK)	65 %	35 %
EU15	69 %	31 %
EU10	82 %	18 %

From the Nordic perspective this is especially important when considering the harmonisation of the level of auctioning. If for example, minimum of 50% of all allowances would be auctioned to all sectors the impact to the Nordic economies would be different from EU average as the share of industry's emissions in the Nordic countries is higher than most of the other countries.

If the objective is only to distribute allowances to the market, a simple approach such as uniform price single-round auction would be attractive from the Nordic perspective, as there are many relatively small companies in the market and would not be able participate auctions with high transaction costs. Multiround auction would increase possibilities to adapt to bidding price information and could also be a attractive alternative.

2.7 Conclusions

Allocation of allowances by auctioning, in general, is considered to improve the functioning of allowance market compared to free allocation. It would give a clear price signal to secondary market of allowances, reduce market distortions and create revenues that could be used to improve the overall efficiency of the economy. Consumers and tax payers would be likely to benefit from auctioning, but it would increase the direct compliance costs of the participating sectors. From the authority's point of view, organising auctions could be burdensome and lead high transaction costs but one should take into account that grandfathering approach has also transaction.

The auctioning design has a significant impact on the attractiveness of participation to auction. If the objective is only to distribute allowances to the market, a simple approach such as uniform price single-round auction would be attractive from the Nordic perspective, as there are many relatively small companies in the market and would not be able to participate auctions with high transaction costs.

Harmonisation of level of auctioning and revenue distribution is important. Especially in the markets such as Nordic wholesale power market harmonisation reduces competitive distortions as the companies (including new companies entering market) from different countries would be treated similarly. Moreover harmonisation and coordination is required how, when and by whom the auctions are organised.

A significant share of the industry included in the EU ETS in the Nordic countries competes in the global market, and it would be beneficial to consider the possibility to allocate most of the allowances free of charge to these sectors. Forcing companies in these sectors to buy some share of allowances on the market or at the auctions would increase their direct cost and decrease their profitability. A further analysis is needed on which extent various industry sub-sectors can pass the carbon costs to their end-product in order to evaluate how much free allocation would be needed to compensate the increased costs. However, one should always take into account that emission allowances received free of charge have an opportunity cost e.g. companies can always sell the allowances to the market which means than emissions trading in general reduces competitiveness of the companies compared to their rivals without similar emission related burden. The effect on competitiveness would be small if companies outside Europe would face similar emission constrains and greenhouse gas emissions related costs. How auction design addresses objectives of the auction is summarised in the Appendix 1.

3. Emission thresholds

3.1 Background

Within the review of the EU ETS, EU will consider the cost-effectiveness of including small installations in the scheme. An option under discussion has been defining a new threshold for participation to the EU ETS in order to exclude the smallest installations which cost of participating in the scheme could the exceed the environmental benefits of having those installation included the scheme. The discussed option has been to specify the threshold for participation based on emissions of installation instead of existing capacity based threshold.

A report under the ECCP working group on the review of the EU ETS reviewing project, "Small installations within the EU ETS" , has explored how many installations would be excluded from the EU ETS, if the threshold for participation were 10,000 tCO2, 25,000 tCO2 or 50,000 tCO2 per year. The first of the limits would reduce participants of the EU ETS by 33% (less than 1% of emissions), the second one by about 55% (2.5% of emissions) and the last by 70% (5% of emissions).

This section of the report analyse how many installations and how much of emissions could be affected by each of these discussed thresholds in the Nordic Countries. The analysis also discusses how such threshold would affect the competition in the case where it would lead to exclusion of installations from the EU ETS and the policies and measures applied to the excluded installations would not cause similar cost burden on emissions as the EU ETS.

3.2 Nordic installations in the EU ETS

Currently there are over 1 700 Nordic installations included in the EU ETS of which 420 are so-called opt-in4 installations. These installations

[4] The so-called opt-in procedure is determined in Article 24 of of the Emissions Trading Directive. Paragraph 1 of the directive is as follows:

"From 2008, Member States may apply emission allowance trading in accordance with this Directive to activities, installations and greenhouse gases which are not listed in Annex I, provided that inclusion of such activities, installations and greenhouse gases is approved by the Commission in accordance with the procedure referred to in Article 23(2), taking into account all relevant criteria, in particular effects on the internal market, potential distortions of competition, the environmental integrity of the scheme and reliability of the planned monitoring and reporting system.

From 2005 Member States may under the same conditions apply emissions allowance trading to installations carrying out activities listed in Annex I below the capacity limits referred to in that Annex." Denmark has not applied the opt-in procedure.

Finland has opted-in the combustion installations which are a part of a district heating system, where is an installation with capacity at least 20 MW. Sweden has opted-in the combustion installa-

are from Denmark, Finland and Sweden. Furthermore about 50 Norwegian installations will be included in the EU ETS, when the Norwegian emissions trading scheme is linked to the EU ETS. The Norwegian and the European schemes are intended to be linked in 2008. If the limit for participation were set at (Table 5):

- 10,000 tCO2, 74% of currently included Nordic installations would be excluded from the scheme. On the other hand, excluding them would exclude only relatively small amount (about 2 %) of emissions under influence of the scheme.
- 25,000 tCO2, 84% of the currently included Nordic installations and 5% of the emissions would be removed from the scheme.
- 50,000 tCO2, 88% of the currently included Nordic installations and 8% of emissions would be removed.
- Furthermore, any of the thresholds could extend the scheme on some installations that are not currently on the scheme as the participation is currently based on the capacity of the installations, not emissions.

Table 5. Number of installations and proportion of emissions under the thresholds in the Nordic Countries[5]. The row "total" refers to the aggregated figures of Denmark, Finland and Sweden (a table showing the situation sector by sector is presented in Annex 1).

		< 10,000	< 25,000	< 50,000	All
Denmark	Installations (number of)	246	320	337	388
	Installations (share)	63%	82%	87%	100%
	Emissions	2%	5%	7%	100%
Finland	Installations (number of)	429	488	511	602
	Installations (share)	71%	81%	85%	100%
	Emissions	2%	5%	7%	100%
Sweden	Installations (number of)	595	635	668	730
	Installations (share)	82%	87%	92%	100%
	Emissions	4%	7%	13%	100%
Total	Installations (number of)	1,270	1,443	1,516	1,720
	Installations (share)	74%	84%	88%	100%
	Emissions	2%	5%	8%	100%
Norway	Installations (number of)	28	34	35	49
	Installations (share)	57%	69%	71%	100%
	Emissions	1%	3%	3%	100%

tions with a capacity below 20 MW which are a part of a district heating system, where the total installed capacity amounts to at least 20 MW.

[5] Tables in the Chapter 3, concerning Denmark, Finland and Sweden, are based on verified emissions of the installation in 2005 and 2006, that are currently included in the EU ETS. With regards to Norway, tables bases on emissions in 2006 and in the cases of new installations with no emissions data from 2006, number of quotas allocated for 2007 has been applied instead of emissions data. With regards to Norway, it is worth mentioning that emission don not include of emissions of two large gas fired power stations. These installations have been, however, taken into account in the number of installations as ones with emissions above 50,000 $MtCO_2$/a.

In the Nordic countries, few large emitters produce most of the emissions and thus the thresholds would exclude very significant number of the installations from the EU ETS but not so significant amount of emissions.

If the policies and measures applied to the excluded installations would not cause as large emission related costs on emissions as the EU ETS, excluding installations from the scheme would create competitive distortions in the cases where the excluded and still included installations compete in the same market.

Competitive distortions would be created because the EU ETS causes extra costs for production of an installation. If an installation doesn't receive enough allowances free or charge, it has to reduce emissions or buy more allowances from the market6. Noteworthy is that, in principle, the competitive disadvantage caused by an emissions trading scheme is not even dependent on the number of freely allocated allowances, but every allowance used as an input for production burdens competitiveness of production with its market price. This is due to fact that allowances have an opportunity costs e.g. they can always be sold to the market7. However, this is not exactly true in the EU ETS, where production decisions may, in some cases, affect the allocation a in future (allocation rules for the following periods are not decided until the later part of the present period and closure of an installation leads to returning of allowances).

From the Nordic perspective the new thresholds would affect competitive positions of installations in following ways, if the policy measures applied to the excluded installations would not address as severe cost burden on emissions as the EU ETS:

Excluded installations would benefit compared to the ones, which would be still included in the scheme in the Nordic Countries and elsewhere in Europe.

Compared to non-European installations competitive positions of the excluded installations would improve. The competitive position of the excluded Nordic installations would remain the same compared to the installations, which would be excluded from the scheme elsewhere in Europe (assuming that policy measures applied to excluded installations would be rather similar in Europe).

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[6] In the first trading period of the EU ETS allocations have been rather generous and many companies have benefitted from the EU ETS by selling excess allowances. However, this is probably exceptional situation because in the following trading periods allocation of allowances free or charge will be tightened and scarcity will increase. Furthermore, auctioning will be used more widely than in the first trading period.

[7] . This can be illustrated by an example, where a company has similar installations inside and outside the EU ETS and has possibility to select, which installations are used for production. From the company's perspective, it doesn't matter, which allowances it has received for free and which have been bought from the market: When making the production decision, the company has to take into account the costs of all the allowances used for the production. Allowances can always be sold to the market instead of using them to the production (opportunity cost). E.g. the cost or value of the emission allowances does not depend wheater the company has received the allowance free of charge or bought it from auction or allowance markets.

The Nordic installations, which would still be included in the scheme, would lose competitiveness compared to the installations, which would be excluded from the scheme in the Nordic Countries and elsewhere in Europe.

Competitiveness of the Nordic installations included in the EU ETS because of a new threshold would reduce compared to those installations that would still be out of the scheme (New installations could be included in the scheme due to fact that currently the coverage of the scheme is based on the capacity of the installations, not emissions).

Impact on competition

The magnitude of the competitive disadvantage caused by the EU ETS on an installation (metered for example by Euro per unit produced) depends on carbon intensity of production; price of the allowances; from certain perspectives also on how many free allowances a company receives free of charge compared to its actual need; and the policies applied to the non-EU ETS competitors. The competitive disadvantage varies between installations within an industrial sector and changes continuously along the price movements of an allowance (quantifying the strengths of the competitive distortions created by the EU ETS is not an object to this analysis).

The companies can into some extend adapt for the competitive distortions as every market has more or less barriers for trading and other distortions (product differentiation, transportation costs, import restrictions etc.). Due to these barriers and depending on a market structure, the possibility to transfer the extra burden caused by the EU ETS to the price of the end product varies. However, installations that would be still in the scheme, after some of their competitors would have been excluded from the scheme, would generally have limited possibilities to react by increasing the prices of their products. This is because typically the closer the competing installations are located the weaker are the trade barriers: For example, there are less trade barriers for trade within Europe than there are between Europe and USA. Thus the competitive distortions to be created by the thresholds within Europe would be typically stronger than the ones created by the EU ETS between European installations and their non-European competitors.

In the Nordic countries the thresholds would exclude primarily heat stations from the EU ETS (over 91% of the excluded installations would be combustion installations of over 20MW and also the smaller ones opt-in installations in Finland and Sweden). It is also possible that some back-up and peakload power plants would be excluded from the scheme. Furthermore significant numbers of Nordic installations within the ceramic, iron and steel, pulp and paper, and glass industries would be excluded. In oil refining and cement and lime industry only few Nordic installations would be excluded, even if the largest threshold were applied. None of

the Nordic roasting and sintering installations would be removed from the scheme by any of the thresholds.

Excluding heat stations from the EU ETS shouldn't create competitive distortions in general in energy sector, because competition in heat generation is local and heat generators are often natural monopolies. However, in situations where heat is supplied to industrial installations competitive distortions may arise. Furthermore, if the policy measures applied to the excluded installations didn't burden emissions as the EU ETS, competitiveness of the excluded backup and peakload power generation capacity would increase, but exclusion would concern rather limited number of installations if any. Exclusion of some spare capacity shouldn't have significant impact on the Nordic electricity price. Thus any threshold wouldn't help to remove the burden the EU ETS causes to electricity intensive industries by increasing the electricity price.

In industries that are competing in the global market and where a new threshold for participation would exclude installations from the EU ETS, the competitive situation would be affected by the thresholds, if the excluded installations weren't similarly burdened by other policy measures. For example within iron and steel industry, pulp and paper industry and oil refining, competitive position of excluded installations would improve. But however, after a new limit for participation would be implemented, many of the Nordic installations would be still in the scheme, and competitiveness of these installations would reduce when compared to other European installations, which the new threshold excluded from the scheme. This would be also true in markets where any of the Nordic installations would not be excluded, but at least some of the other European installations would be.

3.3 Impact on sectors

3.3.1 Combustion installations

Majority of the installations which would be excluded from the EU ETS due to implementation of any of the thresholds are combustion installations of which most are heat stations. In the group of over 20MW combustion installations, the lowest threshold would exclude about 70% and the highest about 90% of the installations (Table 6). Furthermore, already the lowest threshold would be enough to remove all of the heat stations which have been opted into the scheme (Table 7).

Table 6 The number of combustion installations (over 20MW) below the thresholds.

	< 10,000	< 25,000	< 50,000	All
Denmark	224	290	307	353
Finland	169	215	231	285
Sweden	390	412	429	453
Total	783	917	967	1,091

Table 7 The number of combustion installations opted into the EU ETS below the thresholds.

	< 10,000	< 25,000	< 50,000	All
Denmark	0	0	0	0
Finland	243	243	243	243
Sweden	177	177	177	177
Total	420	420	420	420

Large number of over 20MW combustion installations would be excluded in all of the three countries. Of the smaller installations, the excluded installations would be mainly in Finland and Sweden as Denmark has not opted-in any installations.

Almost all, if not all, of the excluded combustions installations would be heat stations (it is possible that some back-up and peakload power stations would also be excluded). As mentioned, excluding a heat station from the EU ETS should not create competitive distortions in energy sector, because competition in heat sector is local and, furthermore, heat generators are often natural monopolies in their supply area. However, competition may be affected in other sectors, in the cases, where heat is supplied to industrial installations.

The new thresholds could also include some installations in the scheme. These installations would be under 20MW heat stations with emissions that exceed the threshold(s). Due to above mentioned reasons this should not create impacts on competition.

3.3.2 Metal industry

Many of metal industries markets are among the most vulnerable ones for competitive distortions created by the EU ETS. Their production is generally energy and carbon intensive, and thus the EU ETS causes relatively high impact on the competitiveness of the covered installations. Furthermore, companies have relatively limited possibilities to pass the extra burden to prices of the end products.

The Nordic iron and steel industry competes in the global market, where most significant competitors are located in other regions of Europe as well outside Europe.

Within the iron and steel industry the thresholds would exclude several Nordic installations from the EU ETS (Table 8). In Sweden several facilities would be excluded by any of the thresholds.

Table 8 The number of installations below the thresholds in the iron and steel industry.

	< 10,000	< 25,000	< 50,000	All
Denmark	1	1	1	1
Finland	0	0	0	4
Sweden	6	7	11	15
Total	7	8	12	20

The new thresholds would exclude several Swedish and one Danish installation from the scheme. If the policies applied for these installations would not be as severe as the EU ETS, their competitiveness would improve compared to their non-European rivals. However, many of the Finnish and Swedish installation would still be included in the scheme, and competitiveness of these installations could reduce compared to the exclude installations that produce same products in Nordic countries and elsewhere in Europe.

Within the EU ETS there are only three Nordic roasting and sintering installations, all located in Sweden. The thresholds would not remove any of these installations from the EU ETS (Table 9).

Table 9 The number of roasting and sintering installations below the thresholds.

	< 10,000	< 25,000	< 50,000	All
Denmark	0	0	0	0
Finland	0	0	0	0
Sweden	0	0	0	3
Total	0	0	0	3

Consequently none of the Nordic roasting and sintering installations would benefit if one of the thresholds were implemented, but the thresholds could exclude their competitors from the scheme. This could harm competitiveness of the Nordic installations.

3.3.3 Pulp and paper

The pulp and paper industry can be also considered very vulnerable for competitive distortions caused by emissions trading. In addition to its direct impact, EU ETS burdens pulp and paper industry also indirectly by increasing electricity price.

Within this industry competition is global, and the most significant competitors of the Nordic installations are from regions that are not included in the EU ETS. There are also several pulp and paper installations elsewhere in Europe, for example in Germany.

The thresholds would remove 29%, 53% or 65% of Nordic installations from the EU ETS (Table 10).

Table 10 The number of installations below the thresholds in the pulp and paper industry.

	< 10,000	< 25,000	< 50,000	All
Denmark	2	3	3	3
Finland	13	23	26	49
Sweden	17	32	41	57
Total	32	58	70	109

Mills producing several types of products would be excluded from the scheme by the thresholds at least in the case of the Finland. There seem to be no clear connection between end product of the mill and its emissions. From the perspective of the mill type, typically the excluded mills would mills producing only paper (or board), pulp or mechanical mass or integrated mills producing mechanical mass and paper (or board). Large integrated pulp and paper mills would generally remain in the scheme. For example in Finland, only few integrated pulp and paper mills would be excluded from the scheme, even if the highest threshold were implemented and all the largest ones would remain in the scheme. In the case of Finland, large share of excluded installations would be those, which produce mechanical pulp and paper separately or jointly, and few such mills would remain in the scheme, if the highest threshold were implemented. In addition, relative large share of the Finnish pulp mills that are not integrated with a paper or board mill would be excluded from the scheme at least by the highest threshold. From the perspective of size of an installation, thresholds would exclude mainly small and medium sized mills whereas most of the largest mills would remain into the scheme.

Competitiveness of excluded installations could improve, depending on the policies applied to the excluded installations. However, many of the Finnish and Swedish installations would be still included in the scheme, and exclusion of their competitors in the Nordic Countries and elsewhere in Europe could harm their competitiveness. For example, Germany has many paper mills which would be excluded by the thresholds. The thresholds would not significantly affect the burden the increased electricity price causes to the pulp and paper industry.

3.3.4 Oil refineries

The discussed thresholds would remove only few Nordic refineries from the EU ETS (Table 11). The limit of 25,000 tonnes would remove one Swedish refinery from the scheme and the limit of 50,000 would remove another. The Finnish and Danish refineries would remain in the scheme.

Table 11.The number of the refineries below the thresholds.

	< 10,000	< 25,000	< 50,000	All
Denmark	0	0	0	1
Finland	0	0	0	2
Sweden	0	1	2	12
Total	0	1	2	15

The Nordic refineries compete in the global market. The situation of this sector is quite similar as it is in the cases of the pulp and paper, and the iron and steel industry. In this case, applying a discussed threshold could help one or two Swedish refineries to compete with the non-European installations but it could create competitive distortions between the installations that would be excluded from the scheme in the Nordic countries and elsewhere in Europe, and the installations that would still be under the EU ETS.

3.3.5 Cement and lime

Cement and lime industry is very carbon intensive and thus very vulnerable for competitive distortions created by the EU ETS. However this industry typically competes on local or regional market. Efficient transporting distances of cement and lime are not longer than few hundred kilometres. Thus, the market areas of the Nordic companies don't typically reach outside the Nordic Countries and Baltic Sea region. In their market areas they face competition from other European countries and from North West Russia. Especially in the Nordic market, the Nordic companies should have relative good possibilities to reduce the competitiveness impact of the EU ETS by passing the burden to the prices of the end products in the case where non-EU ETS competition comes from the other European countries or even further. However, cement and lime companies would have lower possibilities to protect themselves against nearly located non-EU ETS competition, possibly created by the discussed thresholds.

Within the cement and lime industries, even the largest threshold would not exclude more than two Nordic installations from the EU ETS. Both of these installations are located in Sweden (Table 12).

Table 12 The number of installations below the thresholds in the group of Cement and Lime.

	< 10,000	< 25,000	< 50,000	All
Denmark	0	0	0	1
Finland	0	0	0	8
Sweden	1	1	2	5
Total	1	1	2	14

Thus, if one of the thresholds would be applied on those one or two Swedish installations could achieve competitive advantage compared to the other installations serving the same market area, and which would be still included in the scheme. Compared to the Russian installations, competitive position of the excluded installations would be returned at the pre-EU ETS level, of course only if stricter policies for excluded installations weren't implemented.

The competitive position of the rest of Nordic installations would be potentially weakened compared to the excluded installations.

3.3.6 Bricks, ceramics and glass

In the group of bricks and ceramics installations the lowest threshold would drop about 70%, the 25,000 tonnes threshold over 90% the sector's installations from the EU ETS. Impacts would specially concern Denmark that has most of these installations. Thresholds would also remove significant proportion of Nordic glass installations from the scheme. However, several installations would still be under influence of the scheme in all of the Nordic countries. Thus, thresholds would probably create competitive distortions especially between the Nordic installations. Products of ceramics and glass industries are widely traded in international market and the excluded companies could benefit compared to their non-European competitors. Competitiveness of the few still included installations could reduce compared to the installations excluded from the EU ETS in the other European countries.

Table 13 The number of installations below the thresholds in the group of Bricks and Ceramics.

	< 10,000	< 25,000	< 50,000	All
Denmark	19	25	25	27
Finland	3	4	5	5
Sweden	3	4	4	4
Total	25	33	34	36

Table 14 The number of installations below the thresholds in glass industry.

	< 10,000	< 25,000	< 50,000	All
Denmark	0	1	1	2
Finland	1	3	6	6
Sweden	1	1	2	4
Total	2	5	9	12

3.3.7 Installations in the Norwegian scheme

In the Norwegian emissions trading scheme there are several sectors with large proportion of installations below the thresholds such as district heat-

ing, forest industry and mineral industry (Table 15). All installations in gas-fired generation, petrochemicals, refineries and steel industry sectors are above the thresholds.

Table 15 The number of installations below the thresholds in the Norwegian scheme.

	<10,000	<25,000	<50,000	All
District heating	6	7	8	8
Gas-fired power generation	0	0	0	3
Forest industry	4	5	5	5
Fish industry	5	6	6	6
Petrochemicals	0	0	0	4
Gas processing and terminals	1	1	2	5
Other activities in energy sector	2	2	3	3
Refineries	0	0	0	2
Steel	0	0	0	1
Mineral	3	6	6	12
Total	21	27	30	49

3.4 Conclusions

In the Nordic countries the thresholds for participation (10,000 tonnes, 25,000 tonnes and 50,000 tonnes of CO2 per year) in the EU ETS would exclude primarily heat stations from the EU ETS. Typically, this should not create competitive distortions, due to fact that heat generators are often natural monopolies in their supply area. However, in several other industries, significant numbers of installations would be also excluded from the scheme, and this could lead to negative impacts on competition.

If the policies and measures applied to the excluded installations didn’t cause as large cost on emissions as the EU ETS, excluding installations from the scheme would create competitive distortions. This occurs in cases where included and excluded installations compete in the same market. Excluded installations would get more equal environment to compete with their non-European competitors, and they would benefit compared to the installations still covered by the scheme. Many of the Nordic installations would be still in the scheme, and their competitiveness would reduce compared to their competitors, which were excluded from the scheme in the Nordic countries and elsewhere in Europe. Any of thresholds should not have a significant impact on the price of electricity.

The reason for introducing a new threshold would be lowering the administrative costs caused by the EU ETS for small installations. However, also the emissions of the installations falling below the limit should be measured somehow in order to judge whether they are to be included into the scheme or not. Thus, the EU ETS would cause at least some ad-

ministrative costs to small installations, even if they were excluded from the scheme by a new threshold.

From the administrative perspective, an emissions-based threshold for participation would most probably be more problematic than the current capacity-based threshold. Difficulties could rice because emissions of an installation are not constant – they rather fluctuate from year to year. Furthermore, emissions based limit could encourage installations with emissions slightly above the threshold to limit their production in a level, where their emissions would fall just below the limit.

4. Cost of participating in the EU ETS

4.1 Background

The savings in compliance costs cost brought about by an emissions trading scheme may, in general, be countered by two types of transaction costs: costs of administrating the scheme and costs of participating in it. Here we focus on the latter. Because a large share of the costs incurred by companies is not dependent on the size of the emissions, we are especially interested in the costs per emitted ton of carbon dioxide for small emitters.

The analysis in this Section is based on interviews with companies and industry associations, and on GreenStream's experience in managing the emission allowance portfolios of both small and large emitters. In total, 12 companies (6 Finnish, 3 Swedish, 1 Danish and 2 Norwegian) and 3 industry organisations were interviewed for the analysis (Table 16.). The companies, presented in Table 16 were chosen to represent both small and large emitters, different activates and, where possible, different Nordic countries. We acknowledge that the small sample size prevents us from generalising the findings. However, the objective of the analysis is not to provide a comprehensive overview, merely to illustrate the differences in costs between small and large emitters in the Nordic countries. Due to the heterogeneous nature of the participating firms, the sample should have been at least 10 companies per country to facilitate comparisons between individual countries.

Table 16 Companies and industry that were interviewed for the analysis in Chapter 4.

Activity	Finland	Sweden	Denmark	Norway
Producers of heat and electricity	*Energiateollisuus ry*, the association of Finnish energy industries A small producer of district heating with a small number of district heating plants A medium-sized emitter with a large number of small installations A large producer of heat and electricity	A small emitter with half a dozen of small district heating plants, all less than 20MW A medium-sized emitter with a several small district heating plants		
Oil refineries	**A oil refiner**			**A oil refiner**
Producers of ferrous metals	A steel producer	*Jernkontoret*, the association of Swedish steel producers		
Producers of pulp and paper	*Metsäteollisuus ry*, the Finnish forest industries federation			
Mineral industry	A producer of limestone based products with EU ETS installations mainly on Finnish and Swedish soil	A producer of lime and related products with EU ETS installations mainly on Swedish soil		A producer of cement with production in Norway and other Scandinavian countries
Other			A producer of food ingredients with production, among others, in Denmark	

Of the 12 companies, 4 have production in more than one country. The number of installations per company varied between 2 and 27. Somewhat surprisingly, the number of installations per company was negatively correlated with the size of the emissions. This is at least in part because of the use of the opt-in provision in Finland and Sweden. In Finland, heat and power installations smaller than $20MW_{th}$ are included if they are part of a district heating system and if one of the installations connected to it has a rated thermal input of more than 20MW. In Sweden, a district heating system and all heat and power installations connected to it are included if the sum of their rated thermal inputs exceeds 20MW.

All respondents, with the exception of one large energy producer, were very cooperative and shared their information without any reluctance. The answers were treated as anonymous, which contributed significantly to the respondents' cooperativeness.

The interviews were conducted as semi-structured conversations over the telephone. A questionnaire with a total of 13 questions was sent to the corporate interviewees 2 or 3 days before the interview (see Appendix 3). The questionnaire was modified slightly for the Norwegian companies that participate in the domestic cap-and-trade scheme in Norway, which

is in large parts identical with the EU ETS. No questionnaire was sent to the industry organisations.

In the analysis that follows, we employ the following classification:

1. Costs of obtaining emission allowances (excluding the price of the allowances)
2. Costs of monitoring, verifying and reporting emissions
3. Costs of managing the portfolio of allocated emission allowances

The first category includes all the costs related to obtaining the emissions allowances, including the time used for preparing an application for an emissions permit and the time used for preparing a monitoring and reporting plan as an appendix to it. With the exception of the reoccurring fees for using the holding accounts, the costs in the first category accrue only once at the beginning of each trading period whereas the costs in the second and third category accrue annually.

4.2 Costs of obtaining emission allowances

Each installation covered by the EU ETS must apply for an emissions permit, pursuant to which it has the right to emit carbon dioxide into the atmosphere. As an appendix to the application for an emission permit each installation must submit a plan on how it intends to monitor and report emissions. After the permit has been granted, a holding account is opened for the installation in the national emissions trading registry. The account will hold the allowances that the installation must apply for in a process separate to the process of applying an emissions permit. In Finland, for instance, the issuance of emission permits lies with the Energy Market Authority whereas the issuance of emissions allowances lies with the Council of State.

The companies were requested to estimate the number of man-hours they used for obtaining emission allowances for the first trading period of the EU ETS, including the time used for applying an emission permit and preparing a monitoring plan for each of their installations. The results for those companies who were able, and willing, to provide an estimate are presented in Figure 1 and Figure 2.

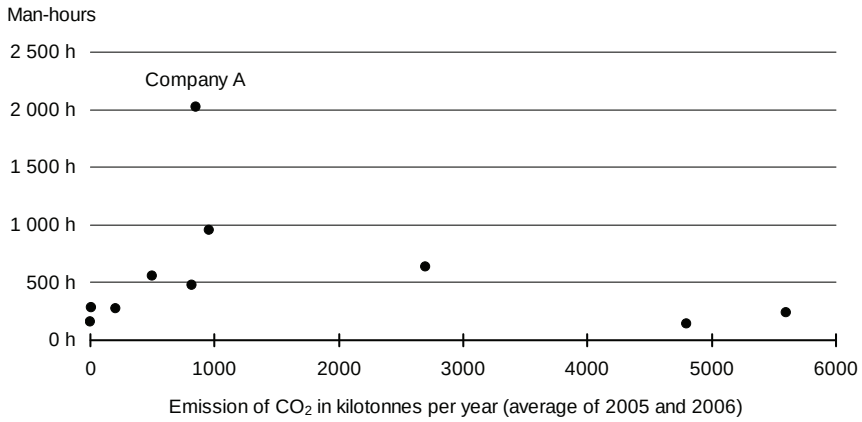

Figure 1 Man-hours used for obtaining emissions allowances for the first trading period as function of yearly emissions. Company A has production in multiple countries.

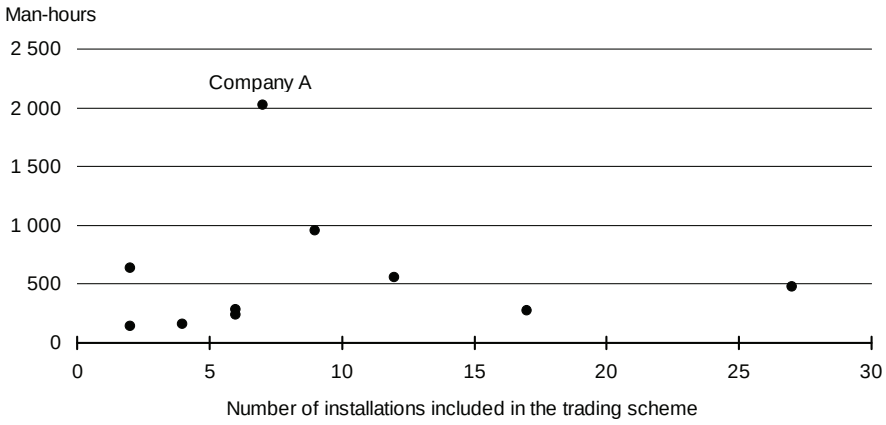

Figure 2 Man-hours used for obtaining emissions allowances for the first trading period as function of the number of installations included in the scheme per company. Company A has production in multiple countries.

The correlation between the number of man-hours and emissions is non-existent (Figure 1), whereas a small correlation can be observed between the number of hours and the number of installations (Figure 2). By calculating the time used to obtain one emission allowance, as we have done in Figure 3, we see that companies with small emissions have invested significantly more time per allowance than large ones.

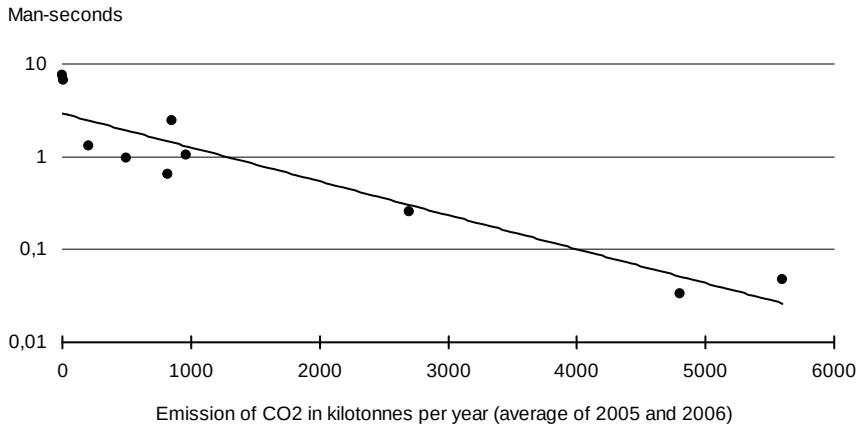

Figure 3 Man-seconds used for obtaining one emission allowance for the first trading period, on a logarithmic scale.

In addition to estimating the number of man-hours, the companies were requested to provide an estimate of the fees and other external costs related to the application of emission allowances for the first trading period. In Finland, the respondents told that they had paid between EUR 500 euros to EUR 4 300 for an emission permit for the first trading period, depending on type of installation. The smallest fee was for small district heating plants and the largest for oil refineries. In addition, the Finnish respondents told that they pay between EUR 50 and EUR 4800 a year for holding accounts, depending number of the allowances in the accounts. In Sweden, there is no cost for issuing emission permits or for using holding accounts. In Denmark, there is a yearly maintenance cost of EUR 0.02 per allowance in the holding account in addition to an on-off issuance fee of EUR 0.02 per allowance. The issuance of emission permits was for free in Denmark.

A recent report from the European Environment Agency (2007) reports similar results. The EEA found that Member States recover at least some of the administrative costs of the trading scheme through fees and charges and that these fees and charges differ substantially between Member States. For example, EEA reports that total fees for creating and maintaining a personal holding account for the first trading period are below EUR 500 in most Member States. In Austria, Belgium and Lithuania individuals have to pay between EUR 1,000 and EUR 1 500 for the three-year period; depending on the allowances held costs could rise up to EUR 3,000 in Finland.

4.3 Monitoring and reporting related costs

Each installation that participates in the EU ETS is required to monitor emissions and to submit a verified emissions report once a year, in accordance with the guidelines in Decision 2004/156/EC of the European

Commission. Half of the interviewed companies told that the guidelines have presented them with new requirements and that they have had to undertake investments in monitoring equipment that wouldn't have been undertaken in the absence of the EU ETS.

The cost of the additional monitoring equipment ranges from EUR 3,000 to EUR 300,000. The lowest cost was for high-accuracy flow meters for measuring the consumption of oil in district heating plants. The mid-range cost was in the range of EUR 30,000 for carbon analysers for steel production. The highest cost was in the range of EUR 300,000 for equipment for measuring and recording the flow of combustion gases from furnaces used in oil refining.

In addition to monitoring equipment, the EU ETS has increased the number of man-hours required for monitoring and reporting emissions in four categories:

1. monitoring and recording carbon dioxide emissions,
2. compiling the monitored data for verification,
3. supporting and assisting the verifier during the verification of the monitored data, and
4. surrendering the corresponding amount of emission allowances for cancellation each year.

The respondents were asked to estimate each of these. The results, presented in Figure 4 and Figure 5, vary along the same lines as the number of man-hours used for obtaining the emission allowances.

The number of additional man-hours in the first category, i.e. for monitoring and recording carbon dioxide emission, varied from approximately 10 man-hours per year for combustion installations whose monitoring procedures required only minor changes to several thousand man-hours per year for lime-works that have been burdened with the resource intensive requirements of analysing the carbon content of the raw material.

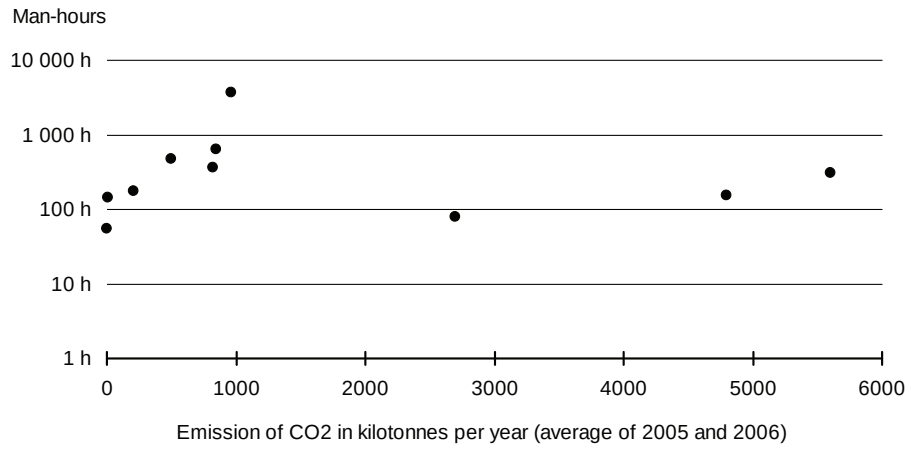

Figure 4. Additional man-hours per year for reporting and monitoring CO_2 emissions because of the EU ETS, on a logarithmic scale.

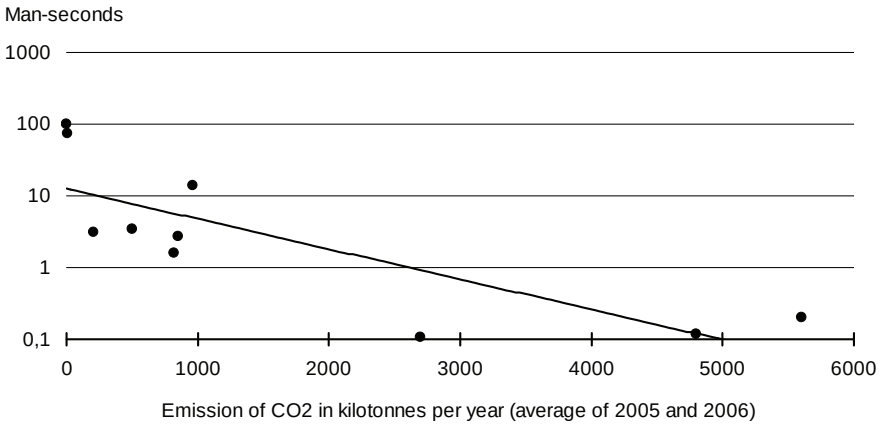

Figure 5. Additional man-seconds for monitoring and reporting because of the EU ETS per ton of CO_2, on a logarithmic scale.

Several interviewees told that the first year, i.e. 2005, was more resource demanding than subsequent years because of, among others, software problems experienced by the emissions registries and unanticipated problems regarding data accuracy. In Denmark, allowances are treated as government grants, which increase the amount of work for preparing tax reports, according to one respondent. This concurs with the findings of the European Environmental Agency (2007). The EEA reported that the legal nature of allowances is not identical in all Member States.

The cost of verification shows similar characteristics as the time invested in monitoring and reporting emissions. The correlation between the cost of verifying a company's yearly emission and the size of emission (

Figure 6) is very week even if we delete the outliers, Companies A, B, C and D, which are likely have higher verification costs because they have production in more than one country. The Norwegian emissions trading scheme differs from the EU ETS in the respect that emissions verification is not mandatory in the Norwegian scheme.

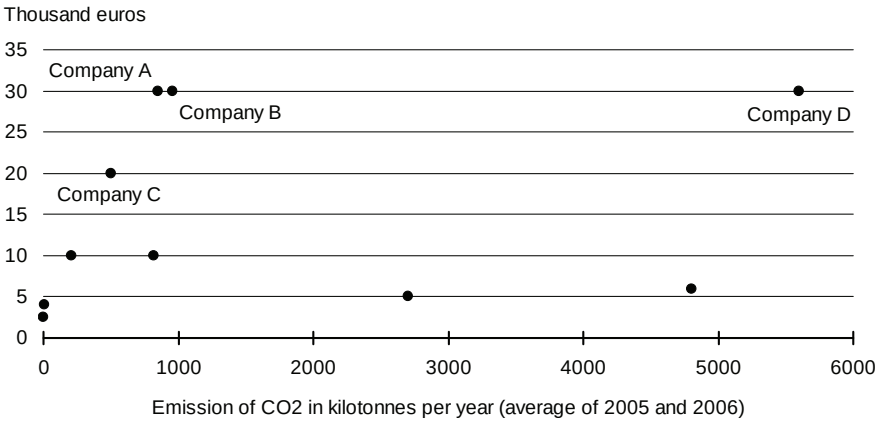

Figure 6 Cost of verifying yearly emission. Companies A, B, C and D are likely have higher total verification costs because they have production in more than one country.

By diving the total cost of verification by the average yearly emissions, as we have done in Figure 7, we see that the verification cost per ton of CO_2 decreases with two orders of a magnitude as the yearly emissions increase. This is because of the fixed nature of verification costs.

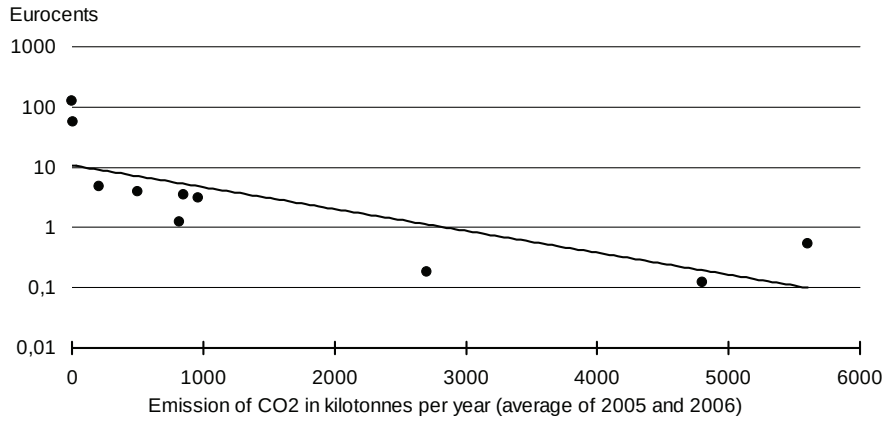

Figure 7 Cost of verifying one ton of emitted carbon dioxide on a logarithmic scale.

The newly published monitoring and reporting guidelines for Phase 2 of the EU ETS will alleviate the monitoring burden for installations with emissions less than 25 kilotonnes per year. Installations below this threshold will be allowed a number of exemptions on, amongst others, the frequency for site visits in the verification audit, proof of compliance with the requirements regarding calibration, requirements against accreditation and the right to choose lower tier approaches for source streams. Since the new guidelines have not yet come into force, there are no experiences of how the exemptions for small emitters will affect costs.

In Sweden, the monitoring burden for small installations has already been alleviated to some extent by allowing installations with emissions less than 2.5 kilotonnes to use a lower tier approach for monitoring than required otherwise. Installations that emit less 0.5 kilotonnes of CO2 per year and installations that use only biofuels have been exempted of all tier requirements in Sweden.

4.4 Portfolio management and trading related costs

With two exceptions, all interviewees told that they manage the portfolio of allocated allowances themselves. The two large emitters who have outsourced their portfolio management pay EUR 15,000 and EUR 25,000 a year, respectively, in fixed fees. In addition to the fixed fees, both pay execution fees based on traded volumes.

The use of internal resources for managing the portfolio of allocated emission allowances is illustrated in Figure 8, both for those who have

retained it in-house and those who have outsourced it. The figure tells us that the man-hours used for portfolio management is in no proportion to the yearly allocation. Thus, if we were to calculate the use of time per allocated unit we would observe the same trend as in the use of resources for obtaining the emission allowances, discussed earlier in this Section.

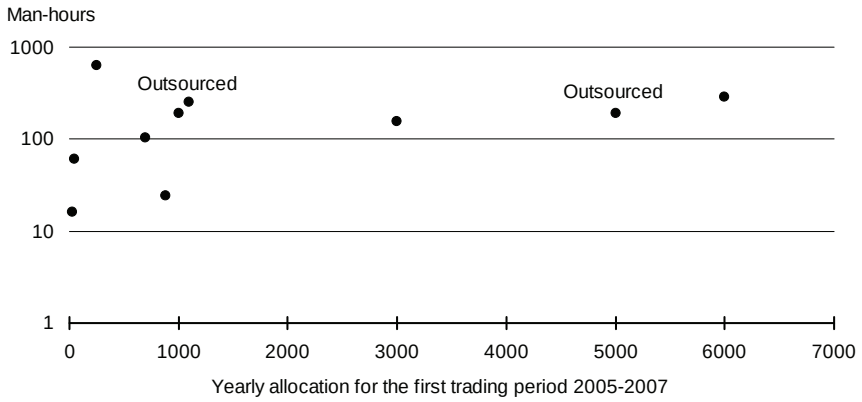

Figure 8. Man-hours per year for managing the portfolio of allocated emission allowances on a logarithmic scale.

In addition to time, managing the balance of emission allowances incurs other costs. Several medium-sized emitters reported that they use between EUR 10,000 and EUR 15,000 a year for acquiring market information, among others, by participating in seminars and by purchasing analyses of the carbon market. One small-emitter told that the only additional cost they have in addition to the 1 or 2 man-weeks a year that they use for portfolio management is the cost of EUR 1 500 for a carbon market newsletter.

Companies that wish to trade emission allowances have three options. They can either access the market by transacting directly with each other, use a broker to facilitate the transaction or use an exchange, such as the ECX, either directly or with the help of a broker. Accessing exchanges directly is typically not an option for small companies because of the high fixed costs and collateral requirements.

The respondents use various channels for accessing the market. One respondent told that they use the same broker for trading emissions allowances as they use for trading oil derivatives. Another told that they employ a bank to facilitate the selling of their excess emission allowances. The bank charges a fixed fee of ÉUR 10,000 a year for this service in addition to an execution fee that is charged per traded allowance.

Because of the multitude of channels for accessing the market, comparing trade execution costs reported by the respondents, Figure 9, may give a distorted picture. For example, in over-the-counter transactions part of the execution cost may be incorporated into the price of the traded commodity. On the other hand, a high execution cost may include addi-

tional services such as market analyses and customer specific recommendations. Consequently, the results should be treated carefully.

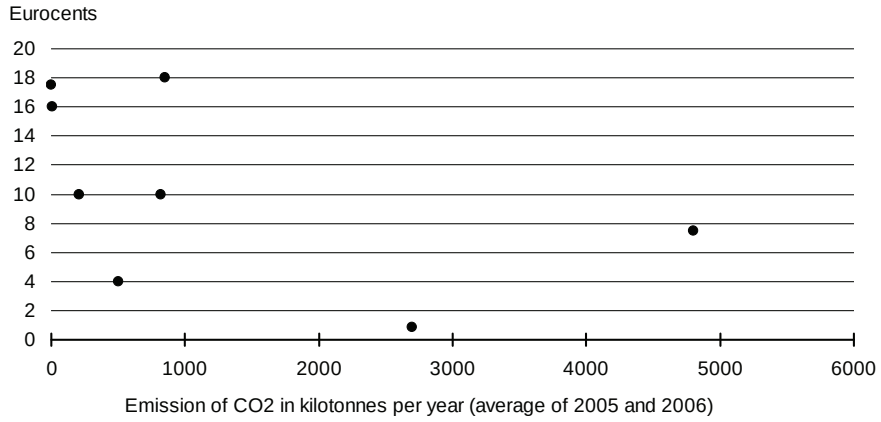

Figure 9 Trade execution cost per allowance.

In bilateral agreements, i.e. transactions directly between two companies without exchanges or brokers, there is no execution cost except for the time invested in negotiating a deal. Of course, the price of the traded allowances may reflect the time invested in negotiating a deal either on behalf of the buyer or the seller.

One third of the interviewed companies told that they have engaged in bilateral deals. For example, one medium-size emitter reported that they have entered long-term agreements with several power plants for disposing of their excess allowances without the use of intermediaries.

4.5 Effect of pooling on costs

The operators of district heating plants were asked whether pooling of plants within the same district heating network in accordance with Article 28 of the Emissions Trading Directive would, in their opinion, increase or reduce the administrative effort for participating in the EU ETS. According to Article 28, Member States may allow operators of installations to form a pool on a voluntary basis.

To form a pool, the operators must nominate a trustee who will be responsible for surrendering allowances equal to the total emissions from installations in the pool. If the pool is established, emissions allowances are allocated for the pool and not for individual installations within the pool. Thus, the decision of how to share the burden is left to the operators.

All corporate interviewees shared the opinion that pooling would not reduce the administrative effort of participating in the EU ETS. *Energiateollisuus ry*, the association of Finnish energy industries, shared this view. According to it *Energiateollisuus ry*, participating in the EU ETS would be equally burdensome with pooling as it is without it. Pooling

would, according to one corporate interviewee with a large number of small district heating plants, reduce the number of emission allowance accounts and thus simplify the pooling of emissions within the company by eliminating the need for transferring allowances from one account to another. However, as several respondents pointed out, pooling would not eliminate the need to monitor, verify and report emissions from each source.

No benefits in extending pooling across company borders were reported. On the contrary, several respondents said that agreeing on the burden sharing within the pool would create a whole new array of problems, especially regarding the price applied to the transfer of allowances within the pool. One respondent feared that the monitoring requirements for individual installations would get stricter as a result of pooling and increase costs. This operator with a small number of district heating plants prefers to have separate allowance accounts for each installation. She said that separate accounts give her better control.

4.6 Conclusions

The results show that costs of participating in the EU ETS vary in a large range. We have divided the costs 3 categories

1. Costs of obtaining emission allowances (excluding the price of the allowances)
2. Costs of monitoring, verifying and reporting emissions
3. Costs of managing the portfolio of allocated emission allowances

Most of them are not proportional to the size of the emission or the size of the allocation which is why participating in the EU ETS is particularly burdensome for small emitters.

Our analysis shows that the cost per tonnes on per allowances varies within two orders of a magnitude. Thus, the unit costs of participating in emissions trading are one hundred times as large for small emitters as they are for large emitters. In addition to facing higher unit costs, small emitters may be in a less favourable position to take advantage of all of the features of the EU ETS. As one respondent said, the company is interested in using CER and JI units for compliance but doesn’t have the expertise or the time required for acquiring it.

Table 17 Summary of the results of the interviews.

Cost category	The use of internal resources	Other than labour costs
Resources used for obtaining emission allowances for the first trading period of the EU ETS	140 - 2020 man-hours (average 570 hours)	Fee for an emission permit: EUR 500 - 4300 per installation in Finland, no fee in Sweden and Denmark
		Costs of holding accounts per year per company: EUR 50 - 4800 in Finland, no cost in Sweden, in Denmark EUR 0.02 per allowance in the holding account
Additional monitoring and reporting costs	56 - 3 700 hours (average 610 hours)	The cost of additional monitoring equipment EUR 3,000 - 300,000
Cost for verifying yearly emissions cost	-	EUR 2 500 – 30,000 (average EUR 15,000)
Resources for managing the portfolio of emissions allowances	16 – 640 hours (average 190 hours) per year	EUR 15,000 - 25,000 per year for portfolio management service
		EUR 1 500 – 15,000 per year for participating in seminars and for purchasing analyses of the carbon market
Trade execution fee	-	EUR 0.01 – 0-18 per traded allowance

The industry organisations that we interviewed for this survey were are all aware of this problem. The opinion of *Energiateollisuus ry*, the association of Finnish energy industries, is that small emitter should not be included in the EU ETS because the costs of including them are larger than the benefits. However, *Energiateollisuus ry* would not want to give up the opt-in provision for district heating plants, because that would, in their option, create the wrong kind of incentives for the operator of district heating networks.

Metsäteollisuus ry, the Finnish forest industries federation, shares the view of *Energiateollisuus ry* that small emitters should be excluded from the scope of the EU ETS. However, *Metsäteollisuus ry* points out that small emitters must face some other regulative requirements if there are exempted from the EU ETS. Otherwise, the competition may be distorted. *Metsäteollisuus ry* and *Jernkontoret*, the association of Swedish steel producers, agree that the requirements for monitoring, reporting and verification are too strict for small emitters. Especially the verification requirements should be less strict for small emitters, is the opinion of *Jernkontoret*.

Based on the interviews with companies and industry organisations, companies with a large number of installations could benefit from simplifying the procedure for pooling installations within company borders. However, no benefits, only large problems were seen in extending pooling across company borders.

For comparison, Table 18 presents costs reported by Ecofys (2007) for participating in the EU ETS for smaller installations. The costs are based on a survey by the Commission among Member States in 2005. The survey revealed that most countries lack information about the administrative costs incurred by companies.

Table 18 Costs of participating in the EU ETS for smaller installations, reported to the Commission by Member States in 2005. Source: Ecofys (2007).

Country	Costs
Germany	EUR 12 500 – 20,000 per year per installation
Netherlands	Total one-off costs per installation EUR 1 700 – 3800, total recurring costs per installation EUR 8 700 – 21 500 per year
Denmark	Total recurring costs per installation EUR 4 300 – 7,000.
Sweden	Total recurring costs per installation EUR 2 100 – 5,000 per year in phase phase 1, and EUR 1 400 – 2 600 € in phase 2.
United Kingdom	Total administrative costs EUR 3 675 – 4 415 per year.

The differences in costs between countries are likely to depend on a large number of factors, of which some are dependent on the implementation of the Emissions Trading Directive and application of the monitoring and reporting guidelines, whereas others, such as the salaries of the employees of the participating companies, are independent of the design of the scheme. In a recent survey among Member States the European Environment Agency (2007) found some variability in the application of the monitoring and reporting guidelines. Amongst others, eleven Member States (Table 19) has deviated from the minimum tiers (methods) listed in the monitoring and reporting guidelines for Phase 1 of the EU ETS, on the grounds of technical infeasibility.

Table 19 Number of installations for which it has not been feasible to use the minimum tiers listed in the reporting and monitoring guidelines for the first phase of the EU ETS. Source: European Environment Agency (2007).

Country	Number of installations
Austria	20
Belgium	13
Finland	9
Germany	451
Ireland	9
Latvia	2
Lithuania	2
Slovenia	1
Spain	1
Sweden	5
United Kingdom	114

5. District heating network, alternatives

5.1 Background

The EU ETS covers combustion installations with a rated thermal input exceeding 20MW. It is typical for many district heating networks that they are served by one or few larger than 20MW boilers and several smaller ones. By and large, the small heat stations are not included in the EU ETS. However, Finland and Sweden have utilised the possibility to include additional installations to the EU ETS, by the so called opt-in procedure[8]. Finland has opted-in small district heating installations in the cases where they are connected to the same heating network that have at least one installations exceeding the threshold of 20MW. Sweden has opted-in the combustion installations with a capacity below 20 MW, which are a part of a district heating system, where the total installed capacity amounts to at least 20 MW. Denmark has not applied the opt-in procedure.

According to Article 28 of the Emissions Trading Directive, Member States may allow operators of installations to form a pool on a voluntary basis. In order to form a pool, the operators must nominate a trustee who will be responsible for surrendering allowances equal to the total emissions from installations in the pool. If the pool is established, emissions allowances are allocated for the pool and not for the individual installations within the pool. Thus, the decision of how to share the burden for emissions reduction mandated by the cap is left to the participants of the pool.

This chapter discusses on the following questions:

- Is it possible to reduce administrative costs for small district heating plants by the provision for pooling?

[8] The so called opt-in procedure is determined in Article 24 of of the Emissions Trading Directive. Paragraph 1 of the directive is as follows:

"From 2008, Member States may apply emission allowance trading in accordance with this Directive to activities, installations and greenhouse gases which are not listed in Annex I, provided that inclusion of such activities, installations and greenhouse gases is approved by the Commission in accordance with the procedure referred to in Article 23(2), taking into account all relevant criteria, in particular effects on the internal market, potential distortions of competition, the environmental integrity of the scheme and reliability of the planned monitoring and reporting system.

From 2005 Member States may under the same conditions apply emissions allowance trading to installations carrying out activities listed in Annex I below the capacity limits referred to in that Annex."

- What would be the consequences of changing definition of an installation in the emissions trading directive to treat district heating as single large installations instead of multiple small installations?

5.2 Pooling

As discussed under the fourth Item 4.5 the operators of district heating plants were questioned, in the conducted survey, whether pooling of installations within the same district heating network would increase or reduce the administrative effort for participating in the EU ETS. As mentioned all interviewees shared the opinion that pooling would not reduce the administrative effort of participating in the EU ETS, because, pooling would not eliminate the need to monitor, verify and report emissions from each source. No benefits in extending pooling across company borders were reported, but on the contrary several respondents told that agreeing on the burden sharing within the pool would create new problems, especially regarding the price applied to transfer of allowances from one company to another within the pool. Figure 10 illustrates impact of pooling on administrative requirements. In this example, a district heating company has two boilers and a pulp mill one boiler feeding the same district heating network. If the companies have not established a pool, allowances are allocated separately to the installations. However, the district heating company can balance accounts of its installations internally before entering the allowance market. If the companies have established a pool allowances are allocated for the pool and the decision of how to share them is left to the companies. Now accounts of installations can balanced within the pool before entering the market. In practice the burden sharing decision may be hard and demand burdensome negotiations and contracts between the companies – it might have been easier, if the government would have decided the allocation on behalf of the companies. Furthermore, there is no guarantee that trading is easier within the pool than in the market. In addition, installation level monitoring and verification of emissions cannot be avoided by pooling.

5.3 District heating network as a single installation

Changing the definition of an installation in the Emissions Trading Directive to treat district heating as single large installation instead of multiple small installations would not bring any other benefits for administration than those, which can be already achieve by centralized management of allowances and voluntary pooling. However, it would affect the coverage of the scheme in some extend. Noteworthy fact is that there are district heating networks where all connected capacity is not owned by a same

company. In such case it may be questionable if a district heating network can be defined as a single installation.

The changing of the definition would not affect the monitoring and verification costs as emissions of every boiler would be followed separately, even if the network were treated as a single installation in the directive.

Costs of trading with emission allowances would not be lower due to fact that most of the companies have already centralized the management of their allowances. In the cases where a network is served by installations of more than one owner, the new definition could be challenging. The owners can already use pooling if they want to centralize the management of the allowances, and the new definition would force also the companies, who have not chosen to apply pooling, under a similar kind of procedure. For example, they would be forced to negotiate how to share allowances within the pool and as mentioned, it is potentially challenging to agree on the burden sharing.

Changing the definition of installation would bring some additional installations to the scheme. The impact would depend on the threshold for the participation of a network. It could be for example 20MW referring to:

1. The rated thermal input of the largest boiler connected to the grid.
2. The summarized rated thermal inputs of the boilers connected to the grid.
3. The maximum consumption of the consumers connected to the grid.

In the first case, new installations could be included in the scheme only in Denmark. In Finland and Sweden, who have already opted-in the small installations, the change of the definition would mean only that the countries could not be able to exclude the small installations from the scheme by stopping appliance of the opt-in procedure. In the second case additional district heating networks could be included to the scheme also in Finland. The third case could affect the coverage of the scheme also in Sweden.

The administrative effort for participating in the EU ETS cannot be significantly reduced by changing the definition of an installation in the Emissions Trading Directive to treat district heating as single large installation instead of multiple small installations. In some cases, the change of definition could even increase the needed efforts. The change could affect the coverage of the scheme, depending on how the threshold of participation of a district heating network would be defined. Probably some additional installations would be included in the scheme.

5.4 Conclusions

The administrative efforts cannot be reduced by changing the definition of an installation in the Emissions Trading Directive to treat district heating as single large installation instead of multiple small installations. In some cases, the change of definition could create new problems because it would force some companies to act under a similar kind of procedure than pooling. The change could also affect the coverage of the scheme, depending on how the threshold of participation of a district heating network would be defined: probably some additional installations would be included in the scheme.

However, lowering the administrative costs is not the only motivation to redefine district heating network as an installation. If the opt-in were't not longer an option after the review of the directive, there could be need to seek other possibilities to include district heating networks as a whole to the scheme. In this situation defining networks as a single installation could offer one solution.

6. General conclusions

This report has explored various topics regarding the developing the EU Emissions Trading scheme in future. The EU ETS is a flagship of the EU's policies aiming to curb greenhouse gas emissions and is currently the most significant emissions trading market globally. The first period (2005-2007) of the scheme have provided useful lessons, market data and improved the understanding of the carbon markets. However, the scheme also has some difficulties, which the Commission is seeking solutions to improve in its review.

Allocation of allowances by auctioning, in general, is considered to improve the functioning of allowance market compared to free allocation. Harmonisations of levels of auctioning and revenue distribution between the Member States are needed at least in the markets such as Nordic power market. Companies (including new companies entering market) from different countries should be treated similarly in order to avoid market distortions. Moreover, harmonisation and coordination is required on how, when and by whom the auctions are organised.

In order to exclude small installations from the EU ETS, various emission thresholds has been discussed. In the Nordic countries the discussed thresholds for participation (10,000 tonnes, 25,000 tonnes and 50,000 tonnes of CO_2 per year) in the EU ETS would exclude primarily heat stations from the EU ETS. Typically, this should not create competitive distortions, due to fact that heat generators are often natural monopolies in their supply area. However, in several other industries, significant numbers of installations would be also excluded from the scheme, and this could lead to negative impacts on competition. The reason for introducing a new threshold would be lowering the administrative costs caused by EU ETS for small installations. Its worth of noting that, if a limit for participation bases on emissions of an installation, also emissions of small installations should be monitored and verified somehow in order to judge whether they are to be included to the scheme or not. Thus, EU ETS would cause at least some costs to the small installations, even if they were excluded from the scheme by a new limit.

The results of conducted survey show that costs for participating in the EU ETS vary in a large range. Most of the costs are not proportional to the size of the emission or the size of the allocation, why participating in the EU ETS is particularly burdensome for small emitters.

District heating networks are common in the Nordic countries and have their own characteristics in the EU ETS. Finland and Sweden have decided to opt-in small district heating installations which increased the number of installations within the scheme significantly in these countries.

We have explored possibilities to reduce the administrative cost by treating district heating network as one single installation and/or by utilising pooling. Analysis shows that efforts cannot be reduced by changing the definition of an installation in the Emissions Trading Directive or by treating district heating network as single large installation instead of multiple small installations. In some cases, the change of definition could create new problems, because it would force some companies to act under a similar kind of procedure than pooling.

The administrative costs of small installations can be, however, reduced by loosening the requirements for emission monitoring and reporting. The revised guidelines for monitoring and reporting, entering to force in the beginning of 2008, are meant to be more cost effective especially for small emitters (producing less than 25,000 tCO_2 per year) than the current ones, and they will probably reduce, for their part, administrative costs caused by EU ETS to small installations.

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Sammendrag

EU kommissionen håller för tillfället på att uppdatera EU:s utsläppshandelssytem. Gällande de olika områdena i den reviderade versionen är det speciellt 3 punkter som intresserar de nordiska länderna: utaktioneringen av utssläppsrätter, förenklingen av reglerna för mindre installationer samt utlämnandet av vissa aktörer utanför EU: s handelssystem för utssläppsrätter, som en följd av överdimensionerade administrativa kostnader. De två senaste utgör ett speciellt intresse p.g.a. det stora antalet små fjärrvärmeverk i de nordiska länderna, jämfört med övriga Europa.

Aktion av utsläppsrätter

Att utdela utsläppsrätter på aktion anses i allmänhet öka funktionsdugligheten på utsläppsmarknaden jämfört med en fri allokering.

Hur som helst, en harmonisering och koordinering gällande hur, när och av vem en aktion genomförs behövs. Det ger en klar pris signal till andrahands marknaden för utssläppsrätter, minskar marknadens snedvridning och skapar inkomster som kan öka hela ekonomins effektivitet och funktion.

Hur en aktion utformas är av stor betydelse på hur intresset för ett deltagande utformas. Ifall målet är att enbart förmedla utsläppsrätter till marknaden utgående från en oförändrad och enkel prisbaserad aktion är det av intresse för de nordiska länderna. Det stora antalet små företag på markanden i de nordiska länderna kunde inte delta i aktioner med höga transaktionskostnader.

En harmonisering av nivåerna på aktionerna och en fördelning av inkomsterna är mycket väsentligt. Speciellt gäller detta den nordiska partimarknad för el där en harmonisering minskar på snedvridning, genom att alla företag (även nya som inträder på marknaden) oberoende av marknadsområde behandlas lika. I allmänhet behövs mera information om vem, när och av vem aktionen är genomförd.

En märkbar andel av industrin i de nordiska länderna, som tar del av den europeiska utsläppshandeln konkurrerar på den globala världsmarknaden. Det kunde vara av avgörande betydelse ifall utsläppsrätterna kunde tilldelas dessa företag kostnadsfritt. Hur som helst bör man komma ihåg att även tilldelade utsläppsrätter utan kostnad ger en alternativ kostnad, där företagen när de säljer rätterna till marknaden, resulterar i minskad konkurrenskraft jämfört med konkurrenterna utan motsvarande utsläppsrelaterade krav. Med tanke på konkurrenskraften skulle inverkan

vara mindre ifall företag utanför Europa också skulle ha motsvarande utsläppsbegränsningar och kostnader relaterade till växthusgasutsläpp.

Utsläppskvoter

Utsläppskvoterna för ett deltagande (10,000 tn, 25,000 tn och 50,000 tn av CO2 per år) i EU: s utsläppshandel i de nordiska länderna skulle utesluta i första hand värmecentraler ur utsläppssystemet. I vanliga fall borde detta inte orsaka tävlande situationer p.g.a. att värmecentralerna ofta är naturliga monopol inom deras verksamhetsområde. Hur som helst, även i flere andra industrigrenar kommer ett stort antal av operatörer att bli uteslutna ur utsläppshandelssystemet. Detta kan leda till negativa följder för den fria konkurrensen.

Målet med att införa ett nytt utsläppskvotsystem är att kunna minska på de administrativa kostnaderna förorsakade av EU:s utsläppshandelssystem för små deltagare. Dessa små deltagare, som faller under nivån för utsläppskvoter skulle dock evalueras och ett avgörande om ett deltagande i utsläppshandelssystemet göras separat. I vilket fall som helst medför utsläppshandelssystemet en del administrativa kostnader för de små deltagarna, även om de nya kvoterna skulle lämna dem utanför systemet. Detta kommer att bli mycket utmanad ur administrativ synvinkel. De administrativa kostnaderna kan för små deltagare minskas genom att lätta på fodringarna av uppföljning och rapportering. De uppdaterade föreskrifterna för uppföljning och rapportering kommer att tas i bruk fr.o.m. början av år 2008. Meningen är att dessa skall medföra kostnadsinbesparingar speciellt för de mindre deltagarna (producenter < 25,000 tCO2/år) jämfört med nuvarande föreskrifter och därmed sänka de administrativa kostnaderna inom EU: s utsläppshandel.

Kostnader för deltagande i EU: s utsläppshandelssystem

Resultatet av en gjord undersökning visar att kostnaderna för att delta i EU:s utsläppshandelsystem varierar stort. Största delen av kostnaderna är inte i proportion till utsläppsmängden eller den allokerade mängden, varför deltagandet i utsläppshandelssystemet är ytterst betungande speciellt för de aktörerna med små utsläpp.

Fjärrvärmeverk är mycket vanliga i de nordiska länderna och de har sin egen särställning inom EU:s utsläppshandelssystem. Finland och Sverige har beslutats om att opt-in små fjärrvärmeanläggningar som ökar antalet aktörer i handelssystemet. Vi har utarbetat en möjlighet att minska på de administrativa kostnaderna genom att behandla ett helt fjärrvärmenätverk som en enda aktör eller en pool av aktörer. Analyser visar att strävan inte kan uppnås genom att ändra på definitionen av en aktör i utsläpps-

handels direktiv eller genom att antaga ett fjärrvärme nätverk som en egen helhet istället för en sammanslutning av flere små enheter. I några fall kan en ändring av definitionen dessvärre resultera i nya problem, eftersom det skulle tvinga företag att verka likt medlemmar i en pool.

Utsläppskvoterna för ett deltagande i EU:s utsläppshandelssystem (10000tn, 25000tn och 50000tn/CO2) medför de små värmeverken i de nordiska länderna att de utesluts ur handelssystemet.

Appendix 1, Auction summary

Summary table: how auction designs address auction objectives Neuhoff (2007).

	Maximise revenue	**Minimise transaction costs**	**Increase predictability**	**Include small installations**	**Minimise risk of market manipulation**	**Contribute to market stabilization**
	Higher frequency matches demand profile	Lower frequency reduces transaction costs	Higher frequency makes it 'normal' event	Predictability and auction close to demand time	Higher frequency reduces auction size and impact on secondary market	Price floor stronger implemented at high frequency auction
Auction format	Large number of participants reduces impact of choice	Uniform price auction allows uninformed bidding		Uniform price auction simple		Reserve price in auction
Harmonisation across Europe	Harmonised auction reduces need for arbitrageurs	Lower overall number of auctions and bids	Avoids distortions from national idiosyncratics	Less complexity facilitates participation – international transfers have to be managed	Clear structure reduces manipulation chances, or gaming between countries	Price- floor in auctions requires at least close coordination

Appendix 2, Emissions and sectors

Share of sectors 2005-2006 average emissions in EU25 countries.

Country	Combustion	Refining	Coce ovens	Roasting & Sintering	Iron & Steel	Cement & Lime	Glass	Bricks & Ceramics	Paper	Other
Austria	50%	9%	4%	18%	0%	11%	1%	1%	6%	0%
Belgium	52%	10%	0%	0%	18%	15%	2%	1%	1%	0%
Cyprus	69%	0%	0%	0%	0%	29%	0%	3%	0%	0%
Czech Republic	86%	1%	0%	0%	6%	4%	1%	1%	0%	0%
Denmark	88%	1%	0%	0%	0%	9%	0%	1%	0%	0%
Estonia	99%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Finland	62%a	7%	0%	0%	16%	4%	0%	0%	10%	0%
France	25%	14%	0%	0%	21%	13%	3%	0%	3%	20%
Germany	79%	6%	1%	0%	7%	6%	1%	0%	1%	0%
Greece	75%	6%	0%	1%	1%	16%	0%	1%	0%	0%
Hungary	74%	5%	1%	1%	5%	9%	1%	2%	1%	0%
Ireland	79%	2%	0%	0%	0%	19%	0%	0%	0%	0%
Italy	65%	11%	0%	0%	6%	13%	1%	0%	2%	0%
Latvia	73%	0%	0%	0%	13%	11%	1%	1%	0%	1%
Lithuania	56%	27%	0%	0%	0%	15%	1%	0%	1%	0%
Luxembourg	48%	0%	0%	0%	17%	27%	8%	0%	0%	0%
Malta	39%	0%	0%	0%	0%	0%	0%	0%	0%	61%
Netherlands	73%	15%	0%	0%	8%	1%	1%	0%	2%	0%
Poland	88%	2%	1%	0%	3%	5%	1%	1%	0%	0%
Portugal	66%	9%	0%	0%	1%	20%	2%	2%	1%	0%
Slovak Republic	40%	9%	0%	0%	38%	12%	1%	0%	0%	0%
Slovenia	80%	0%	0%	0%	2%	11%	1%	1%	5%	0%
Spain	64%	8%	0%	0%	4%	16%	1%	3%	2%	0%
Sweden	37%	18%	0%	2%	20%	11%	1%	0%	10%	0%
United Kingdom	82%	7%	5%	0%	3%	3%	0%	0%	0%	0%
EU25	**71%**	**7%**	**1%**	**0%**	**7%**	**9%**	**1%**	**1%**	**1%**	**1%**

a) Includes also combustion plant within industrial processes providing distric heating for Communities. Source: Carbon-marketdata.

Appendix 3, Nordic installations

Table A Number of installations and proportion of emissions under the thresholds in Denmark, Finland and Sweden (basing on average of verified emissions in 2005–2006).

DENMARK, FINLAND AND SWEDEN					
		< 10,000	< 25,000	< 50,000	All
All installations	Nr of installations	1 270	1 443	1 516	1 720
	Emissions of sector total	2%	5%	8%	100%
Bricks & Ceramics	Nr of installations	25	33	34	36
	Emissions of sector total	34%	61%	68%	100%
Cement & Lime	Nr of installations	1	1	2	14
	Emissions of sector total	0%	0%	1%	100%
Combustion (> 20MW)	Nr of installations	783	917	967	1,091
	Emissions of sector total	2%	6%	9%	100%
Glass	Nr of installations	2	5	9	12
	Emissions of sector total	3%	12%	40%	100%
Iron & Steel	Nr of installations	7	8	12	20
	Emissions of sector total	0%	0%	2%	100%
Paper	Nr of installations	32	58	70	109
	Emissions of sector total	2%	10%	17%	100%
Refining	Nr of installations	0	1	2	15
	Emissions of sector total	0%	0%	1%	100%
Roasting & Sintering	Nr of installations	0	0	0	3
	Emissions of sector total	0%	0%	0%	100%
Other (Opt-ins)	Nr of installations	420	420	420	420
	Emissions of sector total	100%	100%	100%	100%

DENMARK

		< 10,000	< 25,000	< 50,000	All
All installations	Nr of installations	246	320	337	388
	Emissions of sector total	2 %	5 %	7 %	100 %
Bricks & Ceramics	Nr of installations	19	25	25	27
	Emissions of sector total	33 %	59 %	59 %	100 %
Cement & Lime	Nr of installations	0	0	0	1
	Emissions of sector total	0 %	0 %	0 %	100 %
Combustion	Nr of installations	224	290	307	353
	Emissions of sector total	1 %	5 %	7 %	100 %
Glass	Nr of installations	0	1	1	2
	Emissions of sector total	0 %	16 %	16 %	100 %
Iron & Steel	Nr of installations	1	1	1	1
	Emissions of sector total	100 %	100 %	100 %	100 %
Paper	Nr of installations	2	3	3	3
	Emissions of sector total	31 %	100 %	100 %	100 %
Refining	Nr of installations	0	0	0	1
	Emissions of sector total	0 %	0 %	0 %	100 %
Roasting & Sintering	Nr of installations	0	0	0	0
	Emissions of sector total	0	0	0	0
Other (Opt-ins)	Nr of installations	0	0	0	0
	Emissions of sector total	0	0	0	0

FINLAND

		< 10,000	< 25,000	< 50,000	All
All installations	Nr of installations	429	488	511	602
	Emissions of sector total	2 %	5 %	7 %	100 %
Bricks & Ceramics	Nr of installations	3	4	5	5
	Emissions of sector total	31 %	48 %	100 %	100 %
Cement & Lime	Nr of installations	0	0	0	8
	Emissions of sector total	0 %	0 %	0 %	100 %
Combustion	Nr of installations	169	215	231	285
	Emissions of sector total	1 %	4 %	6 %	100 %
Glass	Nr of installations	1	3	6	6
	Emissions of sector total	5 %	26 %	100 %	100 %
Iron & Steel	Nr of installations	0	0	0	4
	Emissions of sector total	0 %	0 %	0 %	100 %
Paper	Nr of installations	13	23	26	49
	Emissions of sector total	1 %	5 %	9 %	100 %
Refining	Nr of installations	0	0	0	2
	Emissions of sector total	0 %	0 %	0 %	100 %
Roasting & Sintering	Nr of installations	0	0	0	0
	Emissions of sector total	0	0	0	0
Other	Nr of installations	243	243	243	243
	Emissions of sector total	100 %	100 %	100 %	100 %

		SWEDEN			
		< 10,000	**< 25,000**	**< 50,000**	**All**
All installations	Nr of installations	595	635	668	730
	Emissions of sector total	4 %	7 %	13 %	100 %
Bricks & Ceramics	Nr of installations	3	4	4	4
	Emissions of sector total	42 %	100 %	100 %	100 %
Cement & Lime	Nr of installations	1	1	2	5
	Emissions of sector total	0 %	0 %	2 %	100 %
Combustion	Nr of installations	390	412	429	453
	Emissions of sector total	8 %	13 %	21 %	100 %
Glass	Nr of installations	1	1	2	4
	Emissions of sector total	3 %	3 %	13 %	100 %
Iron & Steel	Nr of installations	6	7	11	15
	Emissions of sector total	0 %	1 %	5 %	100 %
Paper	Nr of installations	17	32	41	57
	Emissions of sector total	4 %	17 %	32 %	100 %
Refining	Nr of installations	0	1	2	12
	Emissions of sector total	0 %	1 %	1 %	100 %
Roasting & Sintering	Nr of installations	0	0	0	3
	Emissions of sector total	0 %	0 %	0 %	100 %
Other	Nr of installations	177	177	177	177
	Emissions of sector total	100 %	100 %	100 %	100 %

Table B. Number of installations and proportion of emissions under the thresholds in Norway (basing on emissions in 2006, and in the cases of new installations with no emissions data from 2006, basing on number of quotas allocated for 2007)[9].

Norway					
		<10,000	**<25,000**	**<50,000**	**All**
District heating	Nr of installations	6	7	8	8
	Emissions of sector total	17%	45%	100%	100%
Gas-fired power generation	Nr of installations	0	0	0	3
	Emissions of sector total	0%	0%	0%	100%
Forest industry	Nr of installations	4	5	5	5
	Emissions of sector total	39%	100%	100%	100%
Fish industry	Nr of installations	5	6	6	6
	Emissions of sector total	40%	100%	100%	100%
Petrochemicals	Nr of installations	0	0	0	4
	Emissions of sector total	0%	0%	0%	100%
Gas processing and terminals	Nr of installations	1	1	2	5
	Emissions of sector total	1%	1%	4%	100%
Other activities in energy sector	Nr of installations	2	2	3	3
	Emissions of sector total	21%	21%	100%	100%
Refineries	Nr of installations	0	0	0	2
	Emissions of sector total	0%	0%	0%	100%
Steel	Nr of installations	0	0	0	1
	Emissions of sector total	0%	0%	0%	100%
Mineral	Nr of installations	3	6	6	12
	Emissions of sector total	1%	4%	4%	100%
Total	Nr of installations	21	27	30	49
	Emissions of sector total	1%	2%	4%	100%

[9] Emission figures don't consist of emissions of 2 large gas fired power stations. These installations have been, however, taken account in the number of installations as ones with emissions above 50,000 $MtCO_2/a$.

Appendix 4, Questionnaire on the costs of participating in the EU ETS

Cover Letter:

Dear XXYY,

GreenStream Network is undertaking a survey on behalf of the Nordic Council of Ministers. The goal of the survey is to map the costs for small and large installations of participating in the EU Emissions Trading Scheme (EU ETS). The survey covers both in-house personnel costs and external costs, but excludes the cost of the emission allowances.

The results of the survey will be used to provide input for the negotiators of the Nordic countries in the upcoming overhaul of the Emissions Trading Directive. Two issues that are of special interest for the Nordic countries are the suggestion to simplify the rules for small installations and the proposal to exclude certain small installations from the EU ETS, on the grounds of excessive administrative costs.

Your answers will be treated as anonymous.

We would be grateful if you would get acquainted with questionnaire (see below) before I contact you by phone at the agreed time, on ZZZZZZ at XX:YY Danish time.

I estimate that the interview will not take more than 30 minutes.

Best regards,

XXXX YYYYYY

GreenStream Network Oy
Erottajankatu 1
FIN-00130 Helsinki, Finland
tel. +358 40 840 8004
fax +358 9 278 2600
web http://www.greenstream.net

Questions

Background

Q1: How many EU ETS installations are administered within the unit that you represent?
Q2: Approximately how large are the CO2 emissions from those installations per year?
Q3: How large were the emissions for those installations in 2005 and 2006 in proportion to the allocation?

Costs related to the Application Procedure

Q4: How much effort is required to prepare an application to the national emissions trading authority for emitting carbon dioxide and for obtaining carbon dioxide allowances?
Q5: How large are the fees, both one-off and reoccurring, charged by the authority for participating in the EU ETS, such as the registration fee and fees for emission allowance accounts, among others?
Q6: How much time and effort are required for preparing a monitoring and reporting plan?

Monitoring and Reporting Related Costs

Q7: How much extra resources, both labour and equipment, are put on monitoring and recording CO2 emissions because of the trading scheme?
Q8: How large is the cost for verification of recorded emission?
Q9: How much effort is put every year into reporting emissions and surrendering a corresponding amount of allowances to the national emissions trading authority?

Portfolio Management and Trading Related Costs

Q10: How large are the costs of portfolio management? If in-house, how much labour resources are used for it? If outsourced, much does it cost per year?
Q11: How large are the trading costs?
Q12: Have you faced challenges in accessing the market for emission allowances? If yes, please describe.

Effect of Pooling on Costs (only for district heating plants)

Q13: For district heating plants, would pooling of installations within the same district heating network increase or reduce administrative efforts for participating in the EU ETS? According to Article 28 of the Emissions Trading, states may allow operators of installations to form a pool on a voluntary basis. To form a pool, the operators must nominate a trustee who will be responsible for surrendering allowances equal to the total emissions from installations in the pool.

Abbreviations

CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide equivalent
COP/MOP	Convention of Parties Serving as Meeting of Parties of the Kyoto Protocol
ECB	European Central Bank
ECCP	European Climate Change Programme
ERU	Emission Reduction Unit
EU ETS	European Union Emission Trading Scheme
GHG	Greenhouse Gas
GSN	GreenStream Network Ltd.
JI	Joint Implementation
MtCO2e	Million tonnes carbon dioxide equivalents
NAP	National Allocation Plan
NAP2	National Allocation Plan for the period 2008-2012
tCO2e	Tonnes of carbon dioxide equivalent
UNFCCC	United Nations Framework Convention on Climate Change