REPORT

Lessons learned from the National Allocation of Allowances - The case of Sweden

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Summary
In 2005, the Fondazione Eni Enrico Mattei (FEEM), in co-operation with the European Commission and Massachusetts Institute of Technology organised two workshops on the subject "Lessons learned from the national Allocation of Allowances in the European Emissions Trading Scheme". Ten experts, representing ten different EU member states were asked to produce a country report describing the allocation process in their country. This report is the resulting country paper for Sweden.

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Table of contents

Introduction

In 2005, the Fondazione Eni Enrico Mattei (FEEM), in co-operation with the European Commission and Massachusetts Institute of Technology organised two workshops on the subject "Lessons learned from the national Allocation of Allowances in the European Emissions Trading Scheme". Ten experts, representing ten different EU member states were asked to produce a country report describing the allocation process in their country. This report is the resulting country paper for Sweden. A full report from the FEEM project has been accepted for publishing by Cambridge University Press.

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1. The development of Swedish Energy use and Climate policy

Important change in energy use since the 1970'ies

The energy supply in Sweden has changed dramatically since the 1970'ies. The major change has been the decrease in oil from 77% of the total energy supply in 1970 to 33% in 1997. This change was made possible mainly thanks to the development of hydro power and the nuclear programme. Also, the use of bio-fuels and peat has increased from 9% of the total supply in 1970 to 15% in 1998. The energy consumption has been reduced in the industry and housing sectors and increased within transportation between 1970 and 1998. It is mainly the use if oil that has been reduced in the industry and housing, and increased in transports. The use of electricity has increased considerably within industry and housing (SOU 2000:23).

High use of energy
Sweden has a relatively high energy use per capita in comparison with other OECD-countries. In 1997 the average energy use per capita was 17 000 kWh/capita as compared to 7500 kWh in OECD. This can mainly be contributed to the fact that Sweden has natural resources such as forest, iron ore and hydropower, which in turn has resulted in a large share of energy intensive industry. The geographical position and low population density has contributed to Sweden having a large heating needs and long transportation distances. Sweden is a country with a high share of hydro and nuclear in its power production. In 1997, only 4.5 % of the electricity production was based on fossil fuels (SOU 2000:23).

Carbon dioxide emissions
Even if energy use is high in Sweden, the CO_2-emissions per capita are low, thanks to a large share of hydro, nuclear and bio-fuels. The CO_2-emissions in 1997 were 6.6 ton/capita in Sweden. This can be compared to ca 8.5 ton/capita in EU15 and ca 12 ton/capita in OECD (STEM, 1999). Since the early 1970ies the CO2-emissions have been reduced by almost 50%, mainly due to the conversion from oil to electricity and bio-fuels used for heating (Prop 2003/04:31).

In the trading sector, the CO_2-emissions were 20.2 Mt as an average over the years 1998-2001. This is ca 29 % of the total greenhouse gas emissions in Sweden, if all six Kyoto gases are included. This is a considerably higher share than in 1990, when the share from the trading sector was only 20% of the total emissions. There are several reasons why the share of the trading sector is increasing. Firstly, emissions from individual house heating have "moved" to district heating, thus being transferred into the trading sector. Secondly, the heavy industry has experienced a production growth throughout the 90'ies from the recessional period of the early 1990'ies. The heavy industry represents a large share of the total industry in Sweden. Finally, increased emissions in the refinery sector can partly be explained by the development of low sulphur gasoline processes, but will be compensated by lower CO_2-emissions in the transport sector (SOU 2003:60).

CO_2-taxes in Sweden
In 1991, Sweden introduced a tax on CO_2-emissions corresponding to 0.25 SEK per kg CO_2 (ca 26 Euro per ton CO_2). This tax has been continuously increased and is today 0.91 SEK/kg, which corresponds to ca 95 Euro per ton CO_2. As a general rule, this tax is paid on all fuels except bio-fuels and peat. There are however several important exceptions from this rule. CO_2-emissions from

industrial processes, such as coke ovens, blast furnaces, lime kilns, cement production, refineries and the use of carbon electrodes are exempt from tax. Industrial use of fuels for heating and transportation pay 25% of the tax, i.e. 0.21 SEK per kg CO_2. Before 1 January 2004 fossil fuels used for electricity production were also totally exempt from CO_2-tax. So, in fact, the large industrial CO_2-emitters are either exempt from tax or pays a fraction of the full tax. The main sectors left that are paying full CO_2-tax are transportation, housing (private and public) and heat production (Prop 2003/04:31 and SOU 2003:60).

There has been a discussion if the CO_2-tax should be kept or not when emission trading starts. If the tax is omitted, the loss of tax revenues from the trading sector has been estimated to between 600 and 1200 million SEK net (SOU 2003:60), corresponding to ca 70-130 million euro. These tax revenues come from non-process CO_2-emissions, largely the use of oil and gas for heating within pulp- and paper, iron and steel, cement and energy sectors. This does not include the large process emissions from the trading sector, mainly from coke and steel production, cement production and refineries. The total tax revenues can be compared to the total value of allocated allowances, 22.9 Mt, which assuming a price of 20 euro per ton totals 460 million euro. As we now have entered the trading period Sweden has kept the CO_2-tax on the trading sector, so some sources both need to pay the old CO_2-tax and in addition they will need allowances. But it should be noted that there are currently discussions to reform the CO_2-tax rules for the trading sector.

Swedish Energy policy
Swedish energy policy states that the objectives are to safeguard the supply of electricity and other energy carriers in a short and long time perspective at internationally competitive prices. The energy policy shall create conditions for an efficient and sustainable energy use and a cost-efficient Swedish energy supply with low impacts on health, environment and climate as well as facilitating the transition to an ecologically sustainable society. The energy policy shall consider the Swedish environmental and climate targets (Prop 2003/04:31). Nuclear energy corresponds to ca 46 % of the Swedish electricity production in 2003 (Energiläget 2004). The energy policy says that nuclear energy is to be replaced through increased efficiency in energy use, conversion to renewables and to environmentally acceptable electricity production technologies. See also section 1.3.1 on how Swedish nuclear policy influenced the allocation.

Swedish Climate Policy
According to the EU burden sharing agreement of the Kyoto protocol, Sweden's emissions 2008-2012 may increase by 4% compared to 1990 years level. This is in contrast to the EU Kyoto commitment of minus 8%. The reason why Sweden could negotiate an increase in their emissions can largely be explained by the fact that Sweden after the oil crises in 1973 and 1979 undertook measures to reduce the dependency on fossil fuels, mainly through a nuclear programme. Sweden is therefore in a position where further reductions would be more costly than in other states.

However, the Swedish parliament decided in 2002 that the Swedish emissions for the period 2008-2012 shall be at least 4% lower than 1990. This target shall be reached without using flexible mechanisms or uptake in carbon sinks. However, if the emission trends turn out to be less favourable or if the reduction measures are not as effective as anticipated, the government can suggest additional measures and/or re-assess the target. The government should here consider consequences for Swedish industry and the international competition (Prop 2003/04:31). At the very least, the government is faced with the potential consequences of participating in an international emissions trading system through which allowances may be imported into Sweden to cover emissions in excess of the allowances allocated to the trading sector. This ought not to be a problem since corresponding emission reductions are realised elsewhere in the EU, but it poses an

obvious threat for a target that is limited to Sweden. There is currently a debate in Sweden whether the national target should be kept or revised.

The climate policy from 2002 also includes a long term target. Sweden shall try to direct the international climate work towards the objective to stabilise the atmospheric concentrations at 550 ppm. In the year of 2050 the Swedish emissions shall be lower than 4.5 ton/capita and year and thereafter decrease further. In order to accomplish this target, international co-operation and measures in other countries will be necessary (Prop 2003/04:31).

2. Description of the NAP process

2.1 Phases, time tables and actors

March 1999: The FlexMex-commission is appointed by the Swedish government to investigate ways to implement the Kyoto flexible mechanisms. The commission presents a proposal in April 2000. In March 2000 the EU presents it's green book on emission trading, proposing that the emission trading system should include CO_2 from 6 industrial sectors: electricity and heat production, iron and steel, refineries, pulp and paper, chemical and cement, glass and ceramics. Kjell Jansson, heading the FlexMex investgation, recommends that Sweden should develop an emission trading system in collaboration with other EU member states. But in contrast to the EU green book, Sweden proposes that the emission trading system should be widened to include all sectors that today pay CO_2-tax in Sweden, namely emissions from transportation and housing. Moreover, process emissions should not be included initially at the start in 2005 due to international competition, but could be included from 2008. From 2008 other greenhouse gases should be included. Kjell Jansson proposes that the allowances should be auctioned; following the polluter pays principle and also giving new installations and incumbent installations equal conditions (SOU 2000:45).

Spring 2002: A new Parliamentary commission is appointed by the government, FlexMex2, to deliver a proposal for a Swedish emission trading system. The commission, also chaired by Kjell Jansson, consists of members of parliament representing all parties, but also representatives from industry. The purpose is to achieve a high level of acceptance for the coming propositions and parliament bill so it will easily pass through parliament. The scope of the commission changes as EU emission trading system evolves. Since Sweden must follow the EU legislation the work of the commission is directed towards implementing the EU emission trading system for Sweden (SOU 2003:60).

May 2003: The FlexMex2 commission presents a report to government on principles for allocation within the EU emission trading system. These principles have been developed through analyses of different allocation methods on sector level, using currently available emission data for ca 450 installations (corresponding to ca 90% of the emission volume in the Swedish nap). In this proposal, allocation is based on historic emissions. For process emissions (metallurgy, cement, catalytic cracker), the projected increases are added to the allocation. An allocation scheme based on these principles is presented on sector level (SOU 2003:60).

October 2003. The EU commission and the EU parliament present the directive on the EU emission trading system.

4 December 2003: After the FlexMex2-commission has presented its proposal on principles to the government, the Ministry of Industry and Trade is requested to develop a government bill on allocation. This bill largely follows the same principles as earlier, but after political negotiations the cap is reduced from 25 Mt to 19-22 Mt. This bill does not present a final nap (Prop 2003/04:31).

10 March 2004. The bill is passed by the Swedish Parliament.

22 April 2004. Sweden's nap is delivered to the EU commission.

7 July 2004. The Swedish Nap is approved by the EU commission.

1 August 2004 and 1 January 2005. The Swedish laws regulating the allocation and emission trading enters into force (SOU 2005:10).

The current organisation
Swedish EPA (Naturvårdsverket) is responsible for allocation, sanctions and certain tasks concerning verification and control.

A council represented by the Environmental Protection Agency (Naturvårdsverket), The Swedish Energy authority (STEM) and The Swedish Business Development Agency (NUTEK) prepares the applications from installations for permits and allowances.

The regional authorities (Länsstyrelser) issue permits to installations. The Länsstyrelser are chosen since they are normally the authority responsible for issuing environmental permits to industrial installations.

The Swedish Energy Agency (STEM) is responsible for developing and running the national register.

2.2 Political dimensions, lobbying, turf battles

Government changes the cap and overrules the parliamentary FlexMex2 commission
The proposal from the FlexMex2-commision of May 2003 had the necessary political support, through the commission delegates, to pass through parliament. This was one of the purposes of creating a parliamentary commission in the first place. After the FlexMex2-commission presented its proposal, the issue is moved over to the Ministry of Industry and Trade who in December 2003 presented a bill to the Parliament. In this bill, the allocation principles are somewhat changed and more notably also the total cap which is reduced to 19-22 Mt from the FlexMex2 proposed 25 Mt. This is a result of consultations at a higher political level between the governing Social democrats and the Green Party (Miljöpartiet). In Sweden, the Social democratic government runs a minority government, and normally seeks parliamentary support from the Left Party and the Green Party. These parties are referred to as collaboration partners to the government. Through this political agreement, the Greens could put pressure on the Social democrats to change the cap that was originally recommended by the FlexMex2-commission. Hence, the proposal from FlexMex2 from June 2003 was de facto overruled and as a consequence, the mandate of the FlexMex2 was thereafter undermined.

Interaction with industry
There is a tradition in Sweden to try and include industry in the process of investigating environmental issues and developing abatement strategies for pollutants. When government bills are prepared, industry, environmental organisations, research organisations and public are normally invited to deliver their views and propose alternative solutions. In the case of the process of developing a Swedish nap, the participation of industry was even stronger. Industry had three permanent representatives in the FlexMex2-commission coming from different industry sectors: the energy sector (represented by Svensk Energy), the refineries sector (represented by Svenska Petroleuminstitutet) and from the Confederation of Swedish Enterprise (Svensk Näringsliv). Information has also been delivered continuously from different sector and lobby organisations in Sweden and assessed by the FlexMex2-commission. In February 2003 industry was invited to participate in a hearing on principles for the allocation of allowances. There have been a number of bilateral meetings between the FlexMex2-commission and Industry. After the FlexMex2-proposal was presented in May 2003, industry, environmental organisations, research organisations and government authorities were asked to submit written reports presenting their views. After May 2003, the responsibility for allocation was moved over to the Ministry of Industry and Trade. The Ministry of Industry later considered these reports when developing the bill on allocation. The interaction with industry continued throughout this process and up until the nap was presented, industry was very active in informing the government in their views on the allocation.

Lobbying from industry – the battles
The lobbying mainly came from sector organisations, rather than from individual companies. The lobbying was normally done by presenting technical facts to the FlexMex2-commisison or the government at bilateral meetings, hearings or by sending reports. The tone at these meetings was in general friendly. My impression is that there is basically an understanding within Swedish industry for the needs to reduce CO_2-emissions and a positive view on emission trading. The main concerns within industry were connected to the issues of fairness, competition and uncertainty. Within the government and the involved authorities there was also an understanding for the concerns put forwards by the industry. However, some specific lobby campaigns can be worth mentioning:

Steel industry: They claimed that the "CO_2-emissions from blast furnaces was close to the physical limit". However, this is far from true. In blast furnaces in Sweden the input of metallurgical carbon and consequent CO_2-emissions are ca 470-480 kg carbon per ton pig iron, which is ca three times higher than the chemical limit (Zetterberg, internal IVL material). Moreover, they strongly lobbied for the introduction of international benchmarks and to increase the Swedish cap accordingly. Besides submitting technical documents they were the sector that was most visible in media, threatening that jobs would disappear. These tactics most probably had an effect, since they were given a generous allocation based on projected production increases.

Energy: At first, their concern was on the selection of base years. The base years used in the Swedish nap represents years with warm winters, high hydropower capacity and consequently low emissions. They also argued that many emission reductions had been realised in the early 1990'ies (early actions) and that they hadn't been given credit for in the allocation plan. When details came on the nap, the sector was very concerned about the downscaling of the allocation to 80% of historic emissions. Moreover the sector was upset about the considerable asymmetries between member states in allocation rules for new entrants and the preservation of the CO_2-tax for installations participating in the emission trading system. The arguments were well formulated, but they lost the battle.

Refineries: Refineries lobbied that the emissions from the catalytic crackers are needed for the production of low sulphur gasoline and should thereby be considered as process emissions. This in turn meant that they should be subject to allocation based on projected emissions. They submitted technical documents, maintained a low profile and received the allocation they suggested.

Cement: The cement industry lobbied for process emissions and won this fairly easy case. However, they also lobbied that the use of shredded rubber tires as a fuel in cement kilns should be considered process emissions, but this argument was turned away.

Pulp and paper: This sector did little lobbying. Allocation was not considered as important as the expected increase in electricity price. There was a certain concern for the allocation to industrial electricity and heat production. They won this battle since industrial power units received 100% of historic emissions, in contrast to the other energy units receiving 80%. The sector was content with the result.

3. Deciding the level of the national cap

3.1 Considerations in determining the cap level and Interdependence with allocation to sources

Deciding the level of the Swedish cap was an iterative process in 3 steps:

1) Bottom-up, based on old data of CO_2-emissions on installation level. In the spring of 2003 the FlexMex2-commission investigated different allocation schemes. In (most of) these schemes, allocation were based on historic emissions with adjustments for projected increases in process related emissions. These principles where applied to a dataset giving CO_2-emissions for 450 installations over 12 years, 1990-2001. In the final nap, these 450 installations accounted for ca 90% of the total emissions of all Swedish installations in the EU emission trading system. These data were calculated from existing energy statistics that had been previously delivered by the installations. A complementary dataset was developed showing projected increases in process related emissions for a limited number of installations. The testing included analyses of outcome for different base year periods. In May 2003 the FlexMex2--commission presented a proposal for allocation based on these analyses (see table 1). This data used had not been collected for ETS purposes and contained significant uncertainties. In preparing the final nap, new data would have to be collected from the participating companies. In the FlexMex2-proposal allocation was based on historic emissions 1998-2001 with special provisions for projected increases in process related emissions. A New entrants reserve was set to be 2.0 Mt. 0.6 Mt was added corresponding to CO_2 leakage's from the steel industry. These leakages have not earlier been included in the Swedish report to the UNFCCC. The uncertainty in the data set used was estimated to be ca 20%, possibly as large as +/- 4 Mt. Due to this uncertainty an "uncertainty reserve" of 2.0 Mt was added to the cap, in the case that the new emissions inventory would yield higher total emissions (which it later did). The resulting cap was 25.2 Mt.

2) Top down in a political process with somewhat new principles. After the FlexMex2-commission presented its proposal, the issue is moved over to the Ministry of Industry and

Trade who in December 2003 presented a bill to the Parliament. In this bill, the principles for allocation are changed and consequently, the cap is changed from 25.2 Mt to 19-22 Mt. This is a result of consultations at a higher political level between the governing Social democrats and the Green Party (Miljöpartiet). Allocation is still based on average historic emissions 1998-2001 (17-18 Mt) with special provisions for projected increases of process related emissions. However, the increases in process related emissions plus the new entrant provisions shall be within 2-4 Mt, instead of 4.3 Mt earlier. The uncertainty reserve of 2 Mt is omitted as well as the leakage provisions for the steel industry, 0.6 Mt. The resulting cap is 19-22 Mt.

3) Bottom up based on new data from the participating installations and reductions in the energy sector, and adjusted after political consultations. In preparation of the nap, new data was retrieved from the participating installations in connection to the application of permits. This data inventory increased the average historic emissions 1998-2001 from 18.3 to 20.2 Mt. This was largely due to the fact that the number of identified installations increased, but also due to discrepancies between these data and the older energy statistics on which the earlier allocation schemes were based. Projected increases in process emissions were 1.8 Mt. If the new entrants reserve would remain at 2 Mt, this would add up to a total cap of 24 Mt. This created problems since it meant that the politically agreed cap of max 22 Mt would be overshot by 2 Mt. This situation resulted in new political consultations, which is one of the reasons why the submittal of the Swedish nap was delayed. The result of these consultations was to decrease the allocation from energy installations to 80% of historic emissions, which reduced the cap by 0.9 Mt and in addition limit the new entrants reserve to 1.8 Mt. This rendered a total cap of 22.9 Mt in the final nap that was submitted in April 2004.

The development of the Swedish cap is shown in table 1 below.

Allocation due to	FlexMex2 May 2003	Gvt Bill Dec 2003	NAP Apr 2004
Emissions 1998-01	18.3	17 - 18	20.2
Process em. increase	2.3	2 - 4	1.8
New Entrants	2.0		1.8
Other	0.6		
Uncertainty Reserve	2.0		
Reduction in energy sector			-0.9
TOTAL	**25.2**	**19-22**	**22.9**

Did Swedish nuclear policy influence the allocation?

The energy policy says that nuclear energy is to be replaced through increased efficiency in energy use, conversion to renewables and to environmentally acceptable electricity production technologies. Of Sweden's original 12 nuclear reactors (at four sites), one reactor has been taken out of operation, and there are currently negotiations between the government and the operators to

close a second reactor. So what importance did the phase out of nuclear have for the Swedish cap? There was no open debate on this how the planned nuclear phase out could influence the allocation. There was no debate to re-evaluate the nuclear policy due to the carbon restriction that emission trading introduces.

3.2 The cap in relation to the Swedish Kyoto target

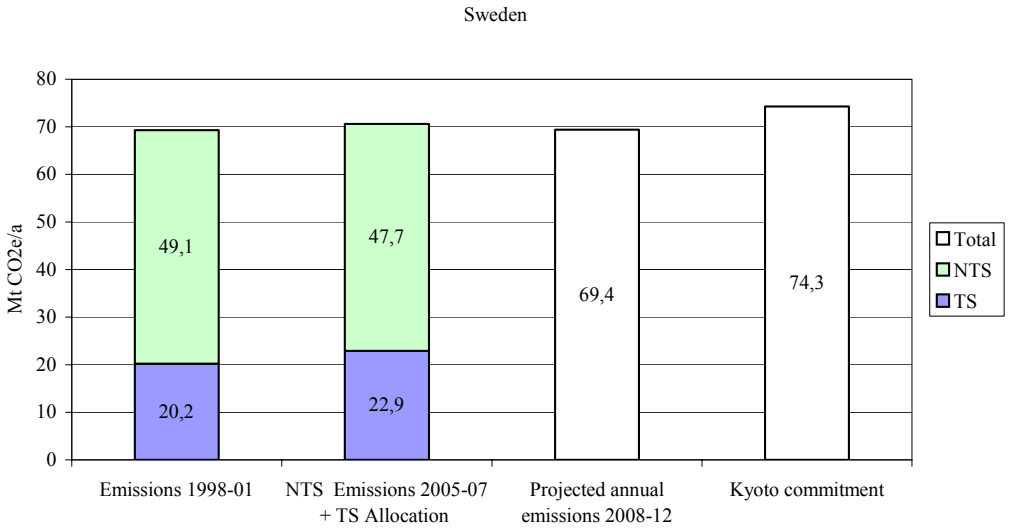

Figure 1. The national greenhouse gas emission budget of Sweden. The first column (from the left) shows how the average emissions 1998-2001 were split between trading (TS) and non-trading (NTS) sectors. Note that the trading sector only includes CO_2 emissions whereas the non-trading sector includes all six greenhouse gases (measured in CO_2 equivalents per year [Mt CO_2e/a]). The second column shows the total emissions of greenhouse gases as projected for 2005-2007. A projection for the non-trading sector is used whereas the allocation is used for the trading sector. The third column shows total greenhouse gas emissions projected for the period 2008-2012 (Kyoto commitment period). The fourth column shows the amount of emissions allowed in accordance to the national commitment according to the EU burden sharing agreement.

If we compare the first column with the fourth, we can see that Sweden can increase its current emissions (69.3 Mt) by 5.0 Mt (equivalent of 7% increase) before Sweden reaches its Kyoto commitment of 74.3 Mt. The second column shows that the sum of allocated allowances to the TS and projected emissions in the non trading sector adds up to 70.6 Mt. Even if this includes an allocation to the trading sector which is 2.7 Mt higher than the emissions 1998-2001, the sum is still well below (3.7 Mt or 4%) Sweden's Kyoto commitment (Zetterberg et al, 2004). Author's comment: There is certain ambiguity in the absolute value of Sweden's Kyoto target. In the council decision of 31 March 2004 (280/2004/EG) the target for Sweden is set at 75 Mt. This figure is based on the estimation that Sweden's emissions 1990 where 72.1 Mt. In the Swedish NAP however, the most recent estimate (from spring 2003) shows that Sweden's emissions 1990 were 71.4 Mt. From this value the NAP concludes that Sweden's target should be 74.3 Mt.

If compared to the Kyoto commitment, Sweden is well on track, even given the relatively generous allocation. However, the Swedish parliament has taken on a more rigorous national emissions target that is 96% of the emissions 1990, or 68.5 Mt in absolute values. According to this target Sweden's allocation in the trading sector plus projected emissions in the non-trading sector, 70.6 Mt,

overshoots this more stringent target by 2.1 Mt or 3 %. Moreover, the parliament decision states that this reduction should not include the use of "flexible mechanisms", which can be very difficult to achieve if emission trading is allowed.

4. The allocation process

4.1 Data availability

1st data set, FlexMex2. May 2003. The data used was delivered to the FlexMex2-commission by the Swedish EPA, whom in turn had ordered the data from the so called SMED-project. SMED is a consortium that consists of The Swedish Environmental Research Institute, IVL, Statistics Sweden and The Swedish Meteorological and Hydrological Institute, SMHI. The project retrieved and composed data from those installations that were known to be included in the emission trading system, at the time 450 installations. The data was taken from currently available Swedish energy statistics. Statistics Sweden had collected data on energy use at installation level from 1990 or earlier through yearly inquiries to all companies. A complementary data set was retrieved from legal environmental reports from the same companies in order to investigate the uncertainty in the data. This uncertainty was estimated to be +/- 20% or larger! This insight was quite surprising to the Swedish authorities and resulted in a separate initiative to make an in-depth overview of the data collection routines for the UNFCCC reporting. A complementary data set was developed showing projected increases in process related emissions for a limited number of installations, mainly from the steel, cement and refinery industries. As this data set became available to the FlexMex2-commission in early 2003, it became an important data source when investigating the consequences of alternative allocation methodologies. The whole data set was not made available to public, only at an aggregated sector level.

2nd data set, nap. Feb 2004. After the proposed allocation principles had been presented by the government in the parliament bill in December 2003, a new data set with data needed to be composed. The first data set consisted of data that originally had been collected for other purposes. This new data set should be collected specifically for the purpose of developing the nap and the companies needed to be aware of this. This was a big challenge, since time was extremely short. The data was collected by sending enquiry forms to all installations, at the time known to be ca 500.

3rd data set, summer 2004. When the legal framework was in place, companies applied for permits to join the EU emission trading system and receive allowances. In connection to this application companies were asked to confirm the data submitted earlier that year in order to give this data a legal foundation. After the application process the number of installations with permits was now close to 700.

The emission data used for the EU emission trading system will be harmonised with national UNFCCC-reporting. This presents some difficulties since sector system boundaries and calculation methods differ.

4.2 Criteria for internal allocation of the cap

Basic principle
Allocated allowances = average emissions 1998-2001 with the following corrections:

Amendments
Installations with process related emissions (i.e. metallurgy, cement etc.) receive an addition of allowances corresponding to expected increase in process related emissions from 1998-2001 to 2005-2007. Emissions that are defined as process related are from the following processes:

- Cement and lime
- Manufacturing of glass, glass wool and ceramic products
- Blast furnaces, iron and steel production, coke ovens (including carbon injection and carbon electrodes, but not oil and gas for heating and cutting purposes)
- CO_2 -emisisons from limestone and dolomite in relation to manufacturing of pellets for steel production
- Emissions from the combustion of residual gases from the steel industry, i.e. coke oven gas, LD converter gas and blast furnace gas
- Combustion of coke for the regeneration of catalytic crackers in refineries

These process related emissions account for ca 35% of the total emissions in 1998-2001.

Electricity and heat producing installations will receive 80 % of emissions 1998-2001 with the exception for industrial CHP that will receive 100 % of emissions 1998-2001. Industrial CHP is mainly CHP from the pulp and paper industry, using mainly forest residues for fuels. The reason for the 80% reduction was to limit the total cap. The reason for directing this reduction to the energy sector is that this sector was considered having the lowest reduction costs and best possibility to pass on costs to its clients.

Installations with exceptional events during 1998-2001 leading to at least 10 % lower emissions this particular year than the "normal" years in the period 1998-2001 will receive allowances based on the "normal" years. An exceptional event can for instance be that the operation has been stalled due to rebuilding or operation failure.

New installations that are known of today will receive allowances based on benchmarks and expected production. A total of 1.0 Mt CO_2 was allocated to these known new entrants in the nap. New installations that are unknown today will receive allowances based on benchmarks and expected production up to a maximum of 0.8 Mt CO_2 on a first come – first serve basis. Later on the new entry reserve was adjusted at 2.19 Mt CO_2.

These adjustments were decided on through a political process considering the costs for reductions, ability to pass on costs, needs in the non –trading sector and reaching the Kyoto and national target (Nap, 2004).

4.3 Issues in determining base years

When investigating what base year period to chose, the following effects were identified depending on base year period:

Early base year:

- actors that have done early actions benefit, compared to if a late base year is chosen
- larger problems with new entrants and production changes that have occurred since the base year, compared to if a late base year is chosen
- problems in obtaining reliable data are greater the earlier the base year is

Late base year:

- less problems with new entrants and changes in production that have occurred after the base year
- reduces risks for stranded costs
- less beneficial for actors that have done early actions

In the Swedish nap the period of 1998-2001 is used as base for the allocation. In the FlexMex2 report of May 2003, it was recommended to use a base year period of 1998-2001, where 2001 was the year for which the latest data was available. This was said to best satisfy the balance between satisfying early actions while satisfying the needs for installations with an significant increase in production. However, it can be questioned if this base year period rewards early action at all.

5. Consideration of Harmonisation

5.1 Influence and the role of EU guidance and review

The government was clear towards the EU commission that Sweden did not see the nap guidance as a legal binding document. Nevertheless, the guidance was mainly followed when the nap was written. The suggested structure of the nap, given in an appendix to the guidance, was used. But the nap guidance was made available too late in relation to the Swedish nap process. When the EU nap guidance was published, the government bill had already been presented to the parliament in December 2003. Sweden gave a number of inputs to the draft version of the guidance, as did other member states (Borgström, 2005).

5.2 Influence of signals and rumours from other member states

It was difficult to consider other member states' nap:s since they were to be submitted at the same time as the Swedish nap. There was, however, some information exchange between member states in WG3 and in other informal fora. This did contribute to the result that Sweden decided to have a new entrants reserve, that Sweden did not auction, and that Sweden did not allow for banking between the first and second trading periods (Borgström, 2005).

5.3 Influence of other EU or member states policies

Three EU directives were identified by the government to having influenced the allocation:

A) Directive 1999/32/EG with amendments in directive 93/12/EEC on reduction of sulphur content in certain fuels. Partly as a consequence of this directive a new installation will be

constructed in Lysekil consisting of a hydro cracker and a hydrogen manufacturing unit. The emissions from these installations will be ca 0.8 Mt per year during 2006-2007. These installations are given special treatment in the allocation plan and will be allocated allowances corresponding to their projected emissions for 2006-2007. This is motivated by the fact that emissions from the transport sector is expected to decrease by 1.0 Mt as a direct consequence from using the low sulphur fuel. Most of these reductions will take place abroad, while ca 0.26 Mt of the reductions will be realised in Sweden.

B) Directive 2003/96/EG on restructuring of the common framework for taxation of energy products and electricity. Sweden has a long history of taxing energy and CO_2-emissions. The EU directive isn't likely to change the Swedish emissions, since the minimum taxation rates are already satisfied.

C) Directive 2001/77/EG on promotion of electricity from renewable energy sources. Sweden's strategy is to introduce a system for certificates for electricity from renewables. This system is expected to reduce the future CO_2-emissions (Nap, 2004).

6. Treatment of special features

Auction. Sweden does not use the option to auction allowances.

Sweden's view on auctioning is in general positive. The first FlexMex report (April 2000) proposed that all allowances should be auctioned. In the EU negotiations on the directive Sweden advocated for using auction as a basis for allocation. In the government bill from December 2003 Sweden states a number of advantages of auctioning. Auctioning is consistent with the polluter pays principle. With free allocation, a government may over- or under-allocate. With auction, the installation will buy as many allowances as they need. In free allocation there is an incentive from the operators to exaggerate the need of allowances.

When Sweden's nap was submitted it was therefore surprising that Sweden did not use the auctioning option, in spite of the directive allowing up to 5% of the allowances to be auctioned. There are two reasons for this. Firstly, the FlexMex2-commission did not investigate the possibility to auction allowances, since according to the EU commission and EU parliament all allowances should be issued freely. This was different from the final directive where up to 5% of the allowances may be auctioned. Secondly, at the time when the government presented the parliament bill (December 2003) there were no indications that any member state would use the option of auction. At this point, if Sweden single-handed had used the auctioning option this would have put Swedish industry at a disadvantage relative to other member states.

The government thus suggested that Sweden should not use the option of auctioning. In the Parliament bill, the government states that the focus of the first trading period should be to establish a well functioning, trustworthy system. The government further says that it is of high importance to analyse the possibility to use auction in the period 2008-2012. In the final FlexMex2-report from 2005, Sweden suggested that for the period 2008-2012 all member states should auction 10% of the allowances.

New installations. A total of 1.8 Mt CO_2 are reserved for new entrants. 1 Mt is reserved for installations that already have permits according to Swedish law. 0.8 Mt is reserved for installations that do not have permits according to Swedish law or are unknown to the authorities on a first come-first serve basis.

The allocation to new entrants will be based on benchmarks when these are available. When benchmarks are not available, best available technology (BAT) will be the basis for allocation of allowances.

The allocation of allowances to new energy installations shall be restricted to CHP. Neither new hot water plants nor new condensing power plants will receive free emission allowances, which is a unique Swedish rule. Benchmarks have been developed for this purpose. CHP is allocated allowances for both heat and electricity production. For electricity the benchmark is 265 ton CO_2/GWh and for heat production 83 ton CO_2/GWh. These benchmarks have been based on data of actual emissions and production from Swedish CHP, condensing plants, heat boilers and industrial CHP, including both fossil and bio fuels. Since bio fuels are included in the calculation of the benchmark, and bio fuels are a large part of Swedish electricity and heat production, the resulting benchmarks are very low. The allocation to new CHP will be calculated as the projected production times the benchmark times a scale factor of 0.8. For a gas fired CHP, this allocation will satisfy approximately 60% of the total emissions, which is considerably lower than the other Member States' new entrant allocation. The purpose of the restriction to only allocate to CHP is probably to create incentives that new hot water plants are based on bio-fuels. Concerning condensing power plants, there are no plans for building new such installations in Sweden.

There is a problem in having different allocation rules for incumbents and new entrants. For example, new entrants in the energy sector will receive a smaller allocation than the corresponding plants that were built before 2002 (Hansén, pers com).

Opt-in. Sweden has used the possibility to opt-in energy installations below 20 MW in district heating nets where total net capacity is above 20 MW. This means that ca 60 installations have been opted in to the emission trading system. According to the FlexMex2-commission a district heating net can be regarded as one installation even if there are several boilers connected to it. Therefore, the government is of the opinion that the trading sector in Sweden should include boilers with a capacity below 20 MW where the total capacity of the heating net is at least 20 MW. The rationale for this may be that boilers belonging to the same net should be subject to the same allocation rules. Large installations (above 20 MW) should not have a competitive disadvantage compared to small installations (below 20 MW).

No **Opt-out** has been notified. The government does not rule out that an opt-out application may be submitted to the EU commission at later stage, but the nap has not identified such an exception.

Ex post adjustments. No ex-post adjustments will be done. The perhaps most important issue here is the **treatment of closures**. Sweden, along with the Netherlands are the only member states that let the owner of a closed installation keep the allowances that has been allocated previously. In Sweden, if a plant is closed, the emission allowances continue to be the property of the plant owner as long as the owner keeps its permit to emit CO_2. If allowances were to be confiscated when a plant is closed, the allocation could be considered as a production subsidy, since it is conditioned by the fact that production continues. This would in turn create the perverse incentives to keep installations running that are inefficient from a CO_2-emisison point of view. The fact that the plant has been closed can also be seen as a form of reduction of emissions. Moreover, what should be considered a closure? How large does the reduction need to be to be considered a closure? This is clearly difficult question of definition.

Early action.
Sweden has not rewarded emission reduction actions taken before 1998 in the nap. On the other

hand installations that have implemented reduction measures 1998-2001 will be rewarded for these "semi-early actions".

Clean technology: Rewarding CHP. The allocation of allowances to new energy installations shall be restricted to CHP. Neither new hot water plants nor new condensing power plants will receive free emission allowances, which is uniquely a Swedish rule.

The allocation to new entrants will be based on benchmarks when this is available. When benchmarks are not available, best available technology (BAT) will be the basis for allocation of allowances (Nap, 2004).

7. Other comments on the allocation process

- At an early stage the FlexMex2-commission invested a lot of effort in investigating alternative allocation methodologies. In order to assess different option a Swedish list of criteria was created and used as guidance along with the EU guidance document. Different options were discussed with experts, industry and politicians. There was clearly a high ambition to develop the "best possible" allocation principles. It was therefore somewhat of an anticlimax when the final proposal was presented, proposing an allocation methodology that was quite simple with hardly any considerations to CO_2-efficiency.
- It was also apparent that the first cap of 25.2 Mtons (May 2003) was not very ambitious. It was based on historic emissions, with a number of add-ons, like projected increases in process emissions, provisions for data uncertainty and provisions for new entrants. This "generous" cap was later reduced to the final 22.9 tons after political negotiations. The reason for this may have been that the FlexMex2 commission was afraid that a lower cap would put Swedish industry at a disadvantage compared to other member states. In some aspects this turned out to become true. When the other nap:s were presented, Sweden's allocation to the energy sector and especially to new entrants was much stricter than in other member states.
- It was surprising how generous the allocation was to SSAB, the Swedish Steel company that dominates this sector. The allocation corresponded to their projected emissions and was based largely on unverified data that was supplied by SSAB.
- In contrast, allocation to the energy sector (electricity and heat production) allocation was tough. Firstly, the selection of base years is a disadvantage to the sector since emissions, due to climatic reasons, were low these years. Secondly, allocation has been set to 80% of base year emissions. Thirdly, allocation to new entrants in the energy sector is considerably lower than all other member states in the Baltic region. New condense power plants and hot water boilers will receive no allocation at all.
- In total, the allocation to the trading sector is 13% above current emissions. However, Sweden can still increase emissions in the non-trading sector before reaching its Kyoto ceiling.
- There has been very little focus on consequences on the non-trading sector. FlexMex2 commissioned computer simulations to be done and they clearly showed potentially large consequences on the non-trading sector (SOU 2003:60). But in the public debate little attention was given to this issue. This is surprising, since the allocation to the trading sector will have a direct effect on how much pressure needs to be put on the non-trading sector in order to reach compliance with Kyoto.

- In Sweden, there has been a lot of attention on the allocation process rather than on the effects of the emission trading system itself. Some companies argue that if CO_2-efficient companies are not rewarded in the allocation there will be no incentives for abatement. I don't agree with them. It is true that allocation can be a very important revenue. For new entrants, the value of the allocation can be comparable to the annual cost for the investment (Åhman, Holmgren, 2005 forthcoming). But the incentives for abatement are created from the cost for carbon emissions and not from the individual allocation. One can ask if this is what companies really believe or if they were just making noise in order to increase their allocation.
- There is currently a considerable support for using benchmarking in Sweden, both among governments and industry (see for instance SOU 2003:60, SKGS 2004). The main arguments being that benchmarking rewards CO_2-efficiency, it is seen as a driver towards more CO_2-efficient processes and it is perceived as fair. However, experiences to date have shown that benchmarking is often associated with problems concerning data retrieval and the definition of product groups. As the EU ETS moves into its' second and consecutive periods, benchmarking may provide the means of updating the allocation of allowances without introducing incentives for increased emissions.
- The Steel, Refinery and Energy sectors were very active throughout the whole process preceding the Swedish nap. It was therefore surprising how little was heard from the Swedish pulp- and paper industry and from the cement industry in this context. Were they unprepared or did they actively choose to maintain a low profile? The pulp and paper industry says that allocation was not their main concern. They were much more concerned about the effects of the EU ETS on electricity prices.
- The increased electricity prices seemed to have come as a surprise to many and this issue is currently subject to a massive debate.
- In the eyes of public opinion in Sweden, there are a number of factors that have undermined the credibility of the system. Firstly, if the trading sector can increase their emissions according to business as usual and Sweden/Europe still can reach its Kyoto target, then the Kyoto target is probably not stringent enough. Secondly, it is becoming clear to public that the price of electricity and heat will increase due to the price on carbon emissions. In the end, the consumer will pay for this difference. So even if energy producers have received allowances freely, they will be able to increase their revenues and increase their profits. Moreover, over 95% of Swedish electricity production is carbon free, largely based on hydro and nuclear. District heating is also to a large extent CO_2-free. These companies will also increase the price of energy to the same level as the fossil based production and thereby considerably increase their profits, referred to as windfall profits. It's a challenge to explain to public that an increase the price on electricity and heat is a natural consequence of introducing a price on carbon. This will in turn lead to the introduction of CO_2-free energy production and the phase out of fossil production, which is one of the objectives with the EU ETS.
- Historically, CO_2-tax and energy taxes have been very important in reducing CO_2-emissions in Sweden. However, the tax pressure imposed by the state has been unevenly distributed over the Swedish society. While the process-based industry has been exempt from CO_2-tax, a high tax has been introduced in the transportation sector, in industrial heat production, in the housing sector and private consumption. This imbalance in pressure is also reflected in Sweden's allocation plan were the process industry is given a generous allocation, while energy production is given a much tougher allocation.
- Peat is used in Sweden as a fuel in electricity and heat production and corresponds to ca 1.3 Mton CO_2per year. Currently, peat is exempt from CO_2-tax. Moreover, if peat is used

as a fuel for electricity production, the operator will receive green certificates, which can be sold. With the introduction of the EU ETS, operators using peat will need to acquire allowances, which will increase the operators' costs for using peat considerably. Calculations have shown that if allowances prices rise above 20-25 Euros per ton CO_2, operators will shift from peat to alternative fuels, such as coal (cheaper), or natural gas or biofuels (lower emissions). As a result it is possible that the use of peat for energy supply will be significantly reduced.

- The allocation process has demonstrated that some issues may need tighter rules/harmonisation, in particular the transparency of cap-setting and projections calculations, harmonised rules for allocation to new entrants, for the treatment of closures and for the use of auction and requirements on data quality and verification.

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