



**Ministry of Industry, Employment and  
Communications**

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**SWEDEN'S NATIONAL ALLOCATION PLAN**

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**Introduction**

EU Directive 2003/87/EC provides for the establishment of a greenhouse gas emission allowance trading scheme by 1 January 2005. For the time being, the trading scheme covers emissions from heat and power production and energy-intensive industry. The Directive stipulates that every Member State is to submit a national allocation plan to the European Commission by 31 March 2004. This plan states the number of allowances that Sweden intends to allocate during the trading period 2005 to 2007 and the principles according to which these allowances are to be allocated to the installations covered by the trading scheme. The plan also specifies a preliminary allocation to each installation in the scheme. The installations concerned will be able to apply for allocation of allowances at the Swedish Environmental Protection Agency. After consideration, the Swedish Environmental Protection Agency is to decide by 30 September 2004 at the latest on the final allocation of allowances to each installation.

**1. Determination of the total quantity of allowances**

**1.1 Sweden's commitment to limit emissions of greenhouse gases**

By ratification of the Kyoto Protocol, the EU and its Member States have undertaken, on average during the first commitment period of the Protocol 2008 to 2012, to reduce their emissions by an average of eight per cent compared to emissions in 1990. This common commitment for the whole of the EU has been allocated between Member States after negotiations, in an internal burden sharing (Council Decision 2002/358/EC). For Sweden, the agreement means that emissions of the

Kyoto Protocol's greenhouse gases are to be limited to 104 per cent compared to the 1990 level.

The Swedish emission statistics are continuously revised. Sweden reports its emissions of greenhouse gases to the European Commission annually pursuant to Decision 93/389/EEC (now replaced by Decision 280/2004/EC). According to the most recent summary of reporting by Member States made by the Commission (KOM(2003)735 final), emissions of greenhouse gases in Sweden in 2001 totalled 70.5 million tonnes of carbon dioxide equivalent which is to be compared with emissions in 1990 of 72.9 million tonnes. Emissions have thus decreased by 3.3 per cent since 1990.

Under the guidelines of the Kyoto Protocol, historic emissions data may be adjusted until 2007. The most recent Swedish adjustment was made in the annual report to the Commission pursuant to Decision 93/389/EEC in March 2004. The most recent information means that emissions in 1990 totalled 72.1 million tonnes carbon dioxide equivalent and accordingly means some downward adjustment of the base year emissions level. According to these updated statistics, Sweden's share of EU's common undertaking permits net emissions to total at most 75.0 million tonnes carbon dioxide equivalent per year on average during the first commitment period of the Protocol (2008 to 2012).

The Kyoto Protocol and the Marrakech Accords also enable the parties to include removal of carbon dioxide in carbon sinks. Each Party is obliged to include removal and emissions of carbon dioxide pursuant to Article 3.3 of the Protocol due to changed land use (for instance, from forest land to built-up area and vice versa). Furthermore, the Parties may include removal of carbon dioxide from ongoing land use. Under Article 3.4 of the Kyoto Protocol and the Marrakech Accords, Sweden can be credited with an additional 2.13 million tonnes carbon dioxide removal from growing forest and forested land. If Sweden decides to include carbon sinks in forested land pursuant to Article 3.4 of the Kyoto Protocol, the commitment in accordance with the burden sharing means that the actual emissions may amount to at most 77.1 million tonnes. In addition, there may be removal in agricultural land. Sweden has not yet taken a position on whether to make use of Article 3.4 of the Kyoto Protocol.

#### 1.2 Method to calculate the total quantity of allowances allocated

The Parliament decided on 10 March 2004 to authorise the Government to draft and submit to the European Commission a plan based on the principles and considerations that the Government presented in its Guideline Bill (Government Bill 2003/04:31). The criteria in Annex 3 of the Directive have served as a basis when determining the total quantity allocated to the trading sector. Furthermore, a number of national

criteria have been used (see Chapter 6). The recommendations, data and analyses presented by the parliamentary FlexMex2 Commission in the interim report *Handla för bättre klimat* (SOU 2003:60) [Take action for a better climate, in Swedish] have been used as a basis for this plan. The points of view of the referral bodies on the Commission's report have also been taken into consideration (N2002/4470/ESB). Further material has been obtained from Swedish authorities and consultancy reports in early 2004.

The total quantity allocated has been determined on the basis of an assessment of what is appropriate taking into account a strict application of the criteria in Annex 3 of the Directive. It has been of fundamental importance that statistics on historic emissions are available and the allocation method should be simple, transparent, non-bureaucratic and predictable. The Government therefore considers that the basic principle for allocation to existing installations is to be the average historic emissions during the period 1998 to 2001 (see also section 2.1) although with certain adaptations relating to raw material or process related emissions<sup>1</sup> and adaptations ensuing from energy policy considerations, taking into account the principles in Annex 3 of the Directive. The basic principle for allocation to new entrants is benchmarking or best available technology.

### 1.3 The total quantity of allowances allocated

The planned total quantity of allowances allocated under this plan amount on average to 22.9 million tonnes per year in the period 2005 to 2007.

On the basis of the documentation of the FlexMex2 Commission and the projections provided in the third national report to the UN Climate Change Convention, the Government has previously reported its assessment to the Riksdag that the trading sector's allocation for existing installations should total at most to approximately 17 to 18 million tonnes carbon dioxide per year on average (Government Bill 2003/04:31). One starting point was the calculation by the Flexmex2 Commission that this average was 18.3 million tonnes, although considerable statistical uncertainty was said to be attached to this. These estimates were then based on the available data and the interpretation of the Directive at the time. The Government pointed out, *inter alia*, that the number of installations covered by the Emissions Trading Directive (calculated by the Commission as being approximately 300 and approximately 450 at a later stage) could change in connection with the final allocation of allowances. In addition, the Government noted that there were considerable deficiencies in the statistical documentation, which could affect the exact number of allowances to be allocated.

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<sup>1</sup> See section 2.1 for definition

With the intention of improving the existing basis of available data, the Swedish Environmental Protection Agency has, at the request of the Government, carried out a survey study directed at companies covered by emission trading. The result shows that 500 installations are covered by the Emissions Trading Directive rather than the approximately 400-450 that the assessments in the Bill were based on. A large number of additional installations that were previously unknown have been identified. Emissions from these have been estimated at approximately 1.3 million tonnes per year on average between 1998 and 2001. Certain process emissions were identified in the supplement, which had not previously been reported in Sweden's official report to the UN Climate Change Convention and pursuant to Decision 93/389/EEC and which were not included in the basis for the above-mentioned Bill, corresponding to approximately 0.4 million tonnes per year. Furthermore, the study showed that emissions from peat-fired installations were 0.2 million tonnes greater than previously calculated. The total average emissions from the installations in the trading sector in the years 1998 to 2001 were calculated after these revisions to be approximately 20.2 million tonnes. An allocation corresponding to 19.3 million tonnes per year is planned for these, which is slightly below the average emissions now calculated. Furthermore, an increase is anticipated of the raw-material related emissions in the period 2005 to 2007 due to increased capacity utilisation, which is planned to lead to an allocation corresponding to 1.8 million tonnes per year. The allocation to these categories is now planned to total 21.2 million tonnes. The principles for allocation to existing installations and increased capacity utilisation are described in Chapter 2.1. At most approximately 1.0 million tonnes per year will be allocated for new installations and expansion of existing installations. In addition, a reserve is set aside totalling 0.8 million tonnes for installations that lack an environmental permit on 31 March or which have not been identified in the list of installations concerned for other reasons. The principles for allocation to the two latter categories are described in section 4.2. The total quantity of allowances allocated will thus be 22.9 million tonnes.

The consistency with criteria 1 and 2 is described below while energy policy considerations are described in section 1.6. That section also describes how the total planned quantity allocated complies with the national climate strategy.

1.4 The total quantity of allowances allocated in relation to Sweden's commitment and in relation to historic and future emission volumes

The total allocation of allowances should reflect the national prerequisites in a proper way. According to criteria 1 in Annex 3 of the Emissions Trading Directive, the total quantity of allowances allocated

for a period should be consistent with the Member State's obligation to limit its emissions pursuant to Decision 2002/358/EC and the Kyoto Protocol taking into account, on the one hand, the proportion of overall emissions that these allowances represent in comparison with emissions from sources not covered by this Directive and, on the other hand, national energy policies, and should be consistent with the national climate change programme.

According to criteria 2 in Annex 3 of the Emissions Trading Directive, the total quantity of allowances to be allocated shall furthermore be consistent with the assessments of actual and projected progress towards fulfilling the Member States' contributions to the Communities' commitment pursuant to Decision 93/389/EEC.

#### *1.4.1 Consistency with the obligation to limit emissions under the Kyoto Protocol and EU burden sharing*

According to the projection produced as a basis for the FlexMex2-Commission's report *Handla för bättre klimat* (SOU 2003:60), the total emissions of greenhouse gases will amount to 98 per cent of 1990's emissions in 2010, which can be compared with Sweden's commitment in accordance with the EU burden sharing of 104 per cent. Certain updates have been made compared to the projection for the third national report<sup>2</sup>. Altogether this means that total emissions in 2010 are expected to be slightly less than the amount reported in Sweden's third national report<sup>3</sup>.

The total planned quantity of allowances allocated according to this plan is equivalent to 22.9 million tonnes of carbon dioxide per year. An estimate of the emissions by the non-trading sector that was available when the FlexMex2 Commission made its assessments was that these will total 49.6 million tonnes of carbon dioxide per year during the years 2005 to 2007. This figure has been adjusted downwards for this plan by approximately 1.9 million tonnes in accordance with the revision made in winter 2004 based on new data produced by a questionnaire that was sent out to companies covered by the scheme<sup>4</sup>. The projection for the non-

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<sup>2</sup> Some statistics were updated compared to the projection for the third national report. Emissions from refineries were increased due to future investment in a hydrogen gas installation. The biggest explanation for the discrepancy is, however, a downward adjustment of the projection for the emissions of greenhouse gases in the agricultural sector. The total historic emissions for 1990 and onward were also adjusted compared to the emissions in Sweden's annual report to the Commission, inter alia, due to quality assurance of the statistics for the iron and steel industry.

<sup>3</sup> According to Sweden's third national report, the total emissions of greenhouse gases were estimated to be largely unchanged up to 2010 in comparison with 1990

<sup>4</sup> Through a more careful survey after the projection was made, installations in the non-trading sector have been transferred to the trading sector. Furthermore, certain process

trading sector, adjusted and allocation-based in this way, will accordingly be 47.7 million tonnes on average for the first period 2005-2007. Altogether, the planned quantity for the trading sector and the emission projected from non-trading sector for the period 2005 to 2007 total 70.7 million tonnes.

**Table 1:** *Emissions, burden sharing and allocated quantity, million tonnes carbon dioxide equivalent.*<sup>5</sup>

	1990	Average 1998 to 2001	Burden sharing <sup>6</sup>  Projection 2005 to 2007 for non-trading sector  Remaining for trading sector
<i>Total</i>	71.4 <sup>7</sup>	69.3	74.3
<i>Other</i>	56.7	49.1	47.7
<i>Trading sector</i>	14.7 <sup>8</sup>	20.2	26.6

The planned total allocation for 2005-2007 of 22.9 million tonnes is thus in line with, and a step towards, compliance with Sweden's commitment in accordance with the burden sharing (74.3 million tonnes) to the extent that commitment can be calculated here with comparable information. The burden sharing commitment according to Sweden's most recent report pursuant to Council Decision 280/2004/EC of 31 March 2004 amounts to 75 million tonnes. Both these estimates exclude additions for sinks.

Sweden has no national quantified limitation targets or quantified commitments for the first period of the trading scheme (2005-2007). However, under the Kyoto Protocol, the parties are to report by 2005 that they have made demonstrable progress towards achieving their commitments and under Annex 3 of the Directive, criteria 1, the allocated quantity is to be consistent before 2008 with the path towards achieving or over-achieving the target pursuant to Decision 2002/358/EC.

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activity emissions have been identified which had not previously been reported to the Climate Convention.

<sup>5</sup> Estimate based on projection to the FlexMex2 Commission (SOU 2003:60) and updates in accordance with the new data that emerged in the questionnaire to the companies covered by the scheme in winter 2004.

<sup>6</sup> Excluding sinks

<sup>7</sup> The figure has been taken from the documentation for the FlexMex2 Commission and the best available estimate at the time the projection was made (spring 2003).

<sup>8</sup> Information not comparable with data for 1998 to 2001

Based on the projection made by the FlexMex2 Commission and taking into account transfers between the trading sector and other sectors occasioned by the new information obtained in the above-mentioned survey study, it is estimated that the total emissions for the period 2008 to 2012 will be 69.4 million tonnes. The emissions of the non-trading sector are estimated to amount to 49.2 million tonnes and the trading sectors to 20.2 million tonnes. However, it should be noted that the transfers made entail a comparison between statistical data originating from different sources and that the accuracy of the underlying projection can be affected by changing conditions over time. Taking these reservations into account, it can still be noted that the allocation is compatible with compliance with the commitment according to the EU burden sharing agreement.

The above account shows that the allocation complies with the assessment of actual and planned progress as regards limiting emissions and that it is consistent with criteria 2 in Annex 3.

#### *1.4.2 The size of the allocation in relation to the trading sector's share of the total emissions*

The Member State shall also, according to criteria 1 of Annex 3 of the Emissions Trading Directive, take into account the proportion of the overall emissions that these allocated allowances represent in comparison with emissions from sources not covered by the Emissions Trading Directive. The share of the trading sector of the overall emissions was approximately 20 per cent in 1990 according to available estimates. It has subsequently increased and totalled around 29 per cent on average for the years 1998 to 2001. The proportion was of the same magnitude in 2002. The total allocated quantity of allowances according to this plan corresponds to 22.9 million tonnes of carbon dioxide, which corresponds to approximately 31 per cent of the total forecast emissions for the period 2005 to 2007.

There are a number of reasons why the share of the trading sector is increasing. This partly consists of emissions being "transferred" from the non-trading sector whose share has consequently reduced. A transition from individual to district heating of housing and premises has been stimulated by energy and carbon dioxide taxation. The additional heat and combined heat and power production that can be foreseen is expected to entail some increase in emissions in the trading sector that partly corresponds to reductions in the non-trading sector. Increased emissions from the refinery sector, that ensue due to requirements of other community legislative and policy instruments. (see section 4.3), are also partly balanced by relative reductions in emissions in the transport sector. Furthermore, the development of output of primary industry has been favourable compared to the deep downturn of the early 1990s. Sweden's emissions from electricity and heating production are very low

viewed in a EU-perspective. This fact and the fact that primary industry, compared to the situation in most Member States, makes up a relatively large part of the trading sector in Sweden, means that the upswing that has taken place and the industrial development have had a considerable impact on emissions of carbon dioxide. These trends are expected to persist during the allocation period.

Taking into the account the criteria reported above and on the basis of an assessment of possible measures in other non-trading sectors (see section 1.5), the national allocation plan reflects a well-balanced allocation of allowances to the trading sector compared to the other sectors of society.

#### *1.4.3 Continuous updating of the emission statistics*

The statistics that refer to historic and projected emissions are continuously revised, so that estimates of the trading sector's share of emissions, both the historic and those referring to the future, change over time.

Certain emission data produced for this allocation plan are not at present included in the international reporting nor in previous estimates of 1990's emissions. The planned allocation is based on carefully controlled information for individual installations while the projections specifying the trading sector's share of the total emissions for the years 2005 to 2007 are of macro character and can only take into account certain parts of developments in recent years.

### 1.5 Measures in the non-trading sector

Sweden has applied programs and measures with a view to limiting the emissions of greenhouse gases sedan 1988. Sweden's present climate strategy was adopted by the Riksdag in March 2002 (Government Bill 2001/02:55, bet. 2001/02:MJU10, rskr. 2001/02:163) and is a further development of measures already implemented. The strategy is based on the participation of all stakeholders in society, in all areas of society at all levels. It applies to authorities and local government, as well as business, organisations and individuals.

The effects of the measures will be continuously monitored to be able to assess the need for further measures. Checkpoints have been set for 2004 and 2008.

A number of policy instruments, such as the carbon dioxide tax and the climate investment programme are directed at both the trading and non-trading sector. The effects of the following measures and instruments in



the non-trading sector have not been taken into account when setting the projection on which allocation is based in section 1.4.

### *1.5.1 Cross-sector policy instruments*

#### *Carbon dioxide tax and energy tax*

Energy tax is paid on most fossil fuels and is independent of energy content. Carbon dioxide tax is paid on all fuels except biofuel and peat. The current general carbon dioxide tax amounts to SEK 0.91 per kg carbon dioxide, which is equivalent to approximately 100 Euro per tonne carbon dioxide.

Taxation of energy and carbon dioxide are the financial instruments, which have the greatest effects on emissions of carbon dioxide in Sweden. Due to the taxes, a considerable transfer has taken place from fossil fuels to other types of energy. A clear example of the effect of taxation on choice of energy sources is the increased use of biofuels. During the 1990s, use has increased by 16 TWh or by 45 per cent. Since the projection for Sweden's emissions reported to the FlexMex2 Commission, carbon dioxide tax in nominal terms has increased by approximately 42 per cent and the total amount for energy and carbon dioxide taxes has increased by approximately 30 per cent. These changes together with the continued tax shift reported below can be expected to lead to reductions in emissions, in particular from the housing and service sector. Without exception, biofuels and other renewable sources are favoured above use of fossil fuels. The transition to biofuels often requires considerable investments and the long-term effects are therefore larger than the short-term. A continued conversion to district heating and renewable types of energy can considerably reduce emissions from the housing sector during the first commitment period of the Kyoto Protocol 2008 to 2012. These conversions can lead to some increase in emissions from heat and combined heat and power generation in the trading sector, which, however, is partly offset by reduced emissions from individual housing and premises heating.

The increases in carbon dioxide and energy tax have taken place since 2001 in the framework of a tax shift decided upon by the Riksdag. Between 2001 and 2010, increased taxes on energy are to be balanced by reduced taxes on work corresponding to SEK 30 billion kronor. When the tax shift from 2004 is included, a shift of SEK 10 billion has been carried out. The result up to and including 2004 has been an over 50 per cent increase in the total taxation for use of fossil fuels. The tax increases have to date only affected households and non-industrial business activity, such as heating offices and premises and energy production such as district heating. These increases have not been taken into consideration in the projection on which allocation is based. At present, no estimates are available on the size of the reductions in emissions that

these tax increases can lead to, but they are considered to have had a considerable impact on emissions.

#### *The Climate Investment Programme (KLIMP)*

KLIMP is a state aid programme intended to stimulate municipalities and other stakeholders to make long-term investments in measures to reduce the emission of greenhouse gases. The trading sector is also covered by the programme and can apply for support for projects. SEK 300 million was set aside in 2003 and SEK 340 million in 2004 for this programme. It is expected to produce a reduction of carbon dioxide emissions of 0.1 million tonnes per year. This has not been taken into account in the projection on which allocation is based.

#### *Measures against emissions of fluorinated gases*

Negotiations are in process on a proposal for a new European regulation on fluorinated gases (KOM(2003)492). Provided that changes proposed by Sweden are implemented, the requirements of the regulation are assessed for Sweden to lead to reduced emissions corresponding to 0.3 million tonnes of carbon dioxide equivalent annually in the period 2008 to 2012.

### *1.5.2 Sector-specific policy instruments*

#### *Changed taxation of combined heat and power generation*

New tax rules apply to combined heating and power production from 1 January 2004. This changes aims to facilitate co-generation. The effect of the changed taxation will be that the total tax level for cogeneration installations will be reduced, which will stimulate the use and installation of combined heating and power production. To the extent that increased cogeneration is based on fossil fuels this will lead to increased emissions in the trading sector. However, this is offset by reduced emissions in the non-trading sector and in other countries due to reduced electricity import to Sweden.

#### *Measures and policy instruments in the transport sector*

Energy tax and carbon dioxide tax are charged on petrol and diesel oil<sup>9</sup>. Vehicle tax on road vehicles is differentiated according to the weight of the vehicles and the fuel they are designed to use. New electric cars and electric hybrid cars are exempted from vehicle tax for five years.

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<sup>9</sup> Since 1 January 2004, these taxes have been SEK 4.79 per litre petrol (environment class 1) and SEK 3.33 per litre diesel (environment class 1). Value-added tax on fuel is 25 per cent.

The central government transport agencies have an explicit responsibility to work for the achievement of the environmental targets set, including the climate. Within the framework of this responsibility, the National Road Administration supports training in Eco-Driving. At the present level of training, Eco-Driving is estimated to lead to an annual reduction of 0.12 million tonnes of carbon dioxide by 2010.

A lower benefit tax is charged on electric cars, electric hybrid cars and cars powered by alcohol or gas than the corresponding conventional cars when they are used as company cars. Company cars, i.e. cars that an employer provides for an employee, account for approximately 25 per cent of new car sales in Sweden.

Biobased alternative fuels are granted a reduction or exemption from energy tax and a general exemption from carbon dioxide tax. An exemption has been granted since 1997 for ethanol and RME, rape methyl ester. The use of biofuels increased from 0.5 per cent of the total domestic use of fuel to 1.5 per cent under 2003. If the whole exempted quantity of ethanol was to be used for low admixture in petrol (as indicated by preliminary figures), the reduction of carbon dioxide emissions from traffic will be in the range of 0.370 million tonnes and the quantity of RME as diesel replacement would lead to 0.2 million tonnes lower carbon dioxide emissions. An ethanol mixture pursuant to the Directive on Alternative Fuels would mean a reduction of emissions by approximately 0.6 million tonnes per year compared to the volumes stated in the projection for emissions on which allocation was based. The Government has submitted a proposal for a five-year tax strategy for alternative fuels to the Commission.

#### *Measures and policy instruments in the field of waste*

To reduce the quantity of landfilled organic waste which gives rise to methane gas production, there has been a ban since 2002 on landfilling sorted combustible waste. From 2005, all organic waste is subject to this ban. The bans are expected to lead to a considerable reduction in methane gas emissions up to 2010 and more thereafter. According to new information received after the projection in the third national report was made, reductions in emissions due to the prohibition on landfilling are even greater than previously stated. Emissions are expected to decrease by an additional 0.5 million tonnes per year compared to what has been stated previously.

#### *1.5.3 The flexible mechanisms of the Kyoto Protocol*

The flexible mechanisms of the Kyoto Protocol are important instruments for counteracting climate change by international collaboration. Sweden's contributions aim at developing mechanisms to credible and effective strategic elements to be consistent with the commitments entailed by the Kyoto Protocol. Since 1993, Sweden has

been carrying out pilot activity to develop the project-based mechanisms.

In 2003, the Government made the assessment that work on developing the flexible mechanisms of the Kyoto Protocol should be reinforced. Proposed agreements for accreditation of emissions reductions have been negotiated with Estonia, Lithuania and Russia. An agreement was concluded with Romania in spring 2003. Negotiations are in process to carry out projects in important developing countries. Sweden is also participating with a share equivalent to ten million US dollars in the World Bank's Prototype Carbon Fund (PCF), which has contributed through exemplary contributions to the development of projects within the framework of the Kyoto Protocol's mechanisms and the rules for these. The aim of the Fund is to contribute to investments of various kinds in climate projects in countries with transitional economies and in developing countries. Around fifty projects have been contracted to date.

#### *Baltic Sea Collaboration in the area of climate*

Within the framework of the Baltic Sea Region Energy Co-operation (BASREC) and the Nordic co-operation under the Nordic Council of Ministers, the Baltic Sea region is being developed into a testing ground for the flexible mechanisms. At the end of 2003, an investment facility has been established with a view to financing climate projects in the Baltic Sea region. The Swedish contribution will be almost SEK 40 million.

The Swedish Energy Agency makes the assessment that the contributions and programmes described above taken together will entail reductions of 1 million tonnes of carbon dioxide per year on average during the first commitment period of the Kyoto Protocol and a considerable reduction in emission even before the beginning of the period.

#### *1.5.4 Summary of effects on emissions not taken into account in the projection on which allocation is based (excluding project mechanisms)*

**Table 2:** *Estimated effects of certain policy instruments/measures which have not been taken into consideration in the projection on which allocation is based*

Measure/Instrument	Potential effect, Mtonne CO <sub>2</sub> /year	Sector concerned
Sulphur content in fuel	- 0.26	Non-trading
Bio Fuel Directive	- 0.6	Non-trading
KLIMP	- 0.1	Trading and non-trading
Eco-driving	- 0.1	Non-trading
Prohibition on landfilling	- 0.5	Non-trading

Regulation on f-gases	-0.3	Non-trading
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## 1.6 Energy policy considerations

### *1.6.1 Sweden's energy policy*

The guidelines in the energy policy programme from 2002 (Government Bill 2001/02:143) state that the objective of Swedish energy policy is to secure access to electricity and other energy in the short and long-term on conditions that are competitive with the surrounding world. Energy policy is to create the conditions for efficient and sustainable use of energy and a cost-effective Swedish energy supply with low negative effect on health, environment and climate and facilitate the transformation to an ecologically sustainable society.

Energy policy is furthermore to contribute to creating stable conditions for a competitive business sector and to renewal and development of Swedish industry. Energy policy is also to contribute to a broader energy, environment and climate co-operation in the Baltic Sea region. Energy policy is to be designed taking into account the Swedish environment and climate objectives. Nuclear power is to be replaced by a more efficient use of electricity, conversion to renewable kinds of energy and environmentally acceptable electricity production technology.

A climate strategy for the energy policy area is presented in Government Bill (2001/02:143). According to this strategy, emissions of carbon dioxide in the field of energy are to be limited as far as possible taking into consideration competitiveness, employment and welfare.

### *1.6.2 Phasing out nuclear power*

Swedish power production is typified by low specific emissions of carbon dioxide since it is almost exclusively based on hydroelectric and nuclear power. According to the energy policy guidelines, both nuclear power reactors at Barsebäck are to be closed. The first reactor was closed in 1999. The Riksdag has made closure of the second reactor conditional on it being possible to replace the loss of electricity production by supply of new production of electricity and reduced use of electricity. The most important criteria for it being possible to say that the condition is met is that the loss of power can be compensated for so that the closure does not lead to marked negative effects on the price of electricity, availability of electricity for industry, the power balance, or for the environment and climate. In the most recent review in 2003, the Government found that the conditions for closure before the end of 2003 were not fully met as regards the power balance and the effect on the environment and the climate. The Government intends to endeavour to reach an agreement with industry on a long-term sustainable policy for the continued phasing-out of nuclear power and adaptation of the energy system. A negotiator has been appointed to prepare this

agreement. In March 2003, the Government gave supplementary instructions to the negotiator in addition to the previous remit to make a special examination of the feasibility of a fast closure of the second reactor in Barsebäck within the framework of a negotiated agreement. A report on Barsebäck 2 is to be submitted by 30 April 2004.

The Riksdag announced in a decision on 11 June 2003 that the Government should decide, on the basis of a possible agreement being reached in negotiations with the power industry or otherwise in accordance with the Phasing-out of Nuclear Power Act, when it is possible to shut down Barsebäck 2. However, the Riksdag underlined that the conditions set by the Riksdag for closure still apply.

### *1.6.3 Energy policy and the allocation of allowances*

The introduction of the trading scheme is expected to lead to higher electricity prices in the EU, since fossil-based electricity production is covered by the Emissions Trading Directive. Non-fossil based energy sources will become more competitive. The fossil component in the Swedish electricity production is small and the competitiveness of Swedish electricity producers in the European market will thus be strengthened. The district-heating sector, which is also covered by the trading scheme, is only exposed to competition from other forms of heating in Sweden.

The effects are opposite for the industrial sectors that are included in the trading scheme. The requirement for possession of allowances entails an additional overhead expense and a competitive disadvantage compared to companies not subject to such restrictions. The companies and industries covered by the trading scheme operate in an international market, where there is often tough competition, in many cases from companies outside the EU. Their competitive situation is also affected by higher electricity prices. These circumstances and the Government's climate policy strategy and the guidelines adopted by the Riksdag for energy policy argue in favour of adopting a more restrictive approach for allocation in the energy sector. The industry exposed to competition should on the other hand be treated relatively favourably to take into account their competition situation and the fact that process-related emissions cannot easily be reduced in the short-term. The use of fossil fuels should be kept at a low level. The proposed allocation of allowances between energy sectors and other trading sectors reflects this objective.

### *1.6.4 Sweden's climate strategy*

According to the Riksdag's decision in 2002, Swedish emissions of greenhouse gases for the period 2008-2012 are to be at least four per cent lower than emissions in 1990. According to the national target, emissions during this period shall at most correspond to 96 per cent of emissions in 1990 without compensation for absorption in carbon sinks or by flexible

mechanisms. If the emission trend proves to be less favourable than anticipated or the measures undertaken do not have the expected effect, the Government can propose additional measures and/or a reconsideration of the target. In this connection, the consequences for Swedish industry and its competitiveness shall be taken into account. Checkpoints will be set in 2004 and 2008. At the checkpoint in 2004, the Government intends as a complement, to consider a target that includes the flexible mechanisms.

The allocation is in appropriate parts in agreement with the national climate strategy. The Government intends to make an overall analysis and co-ordination of various policy instruments within the scope of the work of the checkpoint in 2004. The intention is to achieve an efficient environmental steering in the climate change policy area that is consistent with Sweden's climate objectives. This review is part of the reform of the Swedish energy tax system. An important component in the further work is a co-ordination of the regulatory framework of the Environmental Code, energy taxation and alternative instruments such as trading with electricity certificates and allowances and long-term agreements. Together, these instruments should contribute to an environmental steering that is compatible with Swedish climate objectives and other societal objectives. Particular attention should be given to the competitiveness of the biofuels. The international competitiveness of industry should be taken into account by the overall effects of emissions trading, energy taxes and other instruments being kept at an acceptable level.

## **2 Allocation at activity and installation level**

### **2.1 Method for calculating the allocated quantity**

The general allocation method described below has been used for the existing installations covered by the trading scheme taken into use before 2002 and the installations which are considered to have unavoidable increases in emissions due to EU legislation. The method refers to the allocated number of allowances per year during the period 2005-2007. The same quantity is allocated each year. The allocation method for new entrants is described in section 4.2.

Emissions of carbon dioxide from installations in Sweden are divided into two categories (see also section 2.2):

- **Raw-material related emissions (process emissions)** refer to emissions of carbon dioxide created in a process from carbon which is bound in the raw material that is to be refined or in a

process where carbon is added to remove an undesired component from the raw material and where the intention of the process is not to produce power, heating, or transport energy and where at the same time the raw material is not substitutable at a reasonable cost in the short term.

- **Fuel-related emissions** refer to carbon dioxide emissions from combustion of fossil fuels with the primary intention of producing power, heating or transport energy.

$$\text{Allocation} = k (E_{98-01} \times K_{ex}) + ER_{05-07}$$

$k$	$k = 0.8$ for combustion installations in the energy sector <sup>10</sup> . $k = 1$ for other installations.
$E_{98-01}$	The average of historic raw material- and fuel-related emissions 1998-2001
$K_{ex}$	Correction factor larger than 1 if exceptional events took place during the years 1998 to 2001
$ER_{05-07}$	Supplement based on the installation's projection of raw-material related emissions for 2005-2007

The selected method is considered to be consistent with the criteria in Annex 3 of the Directive. This allocation method is moreover considered to be simple, transparent, non-bureaucratic and predictable. This is further developed in Chapter 6 on the national criteria.

### *2.1.1 Allocation in relation to historic emissions*

A starting point for allocation of allowances to existing installations is the respective installations historic emissions. This applies to both raw-material related and fuel-related emissions. The allocation is based on the average emissions of carbon dioxide per year from the respective installation between 1998 and 2001. The following circumstances have been taken into consideration in selection of the historic time period. A

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<sup>10</sup> By the energy sector is meant the installations whose main activity consists of the production of electricity and/or district heating. Combustion installations located adjacent to industry are not included in this definition of the energy sector.



base-year period that is close to the present takes into account economic growth in recent years. Many of the industries covered by the scheme underwent a recession in the first part and an upturn in the latter part of the 1990s. The adoption of later years is also considered to provide a better quality of emission data, since there is, inter alia, a greater probability that the present operator has their own data that can serve as the basis for the emission calculations for the time period selected.

In the cases when the installation was commissioned during the period 1998 to 2001, average emissions are calculated for a smaller number of years, although at least two, in accordance with the table below. For installations commissioned in 2002 to 2004, allowances are allocated on the basis of benchmarks or best available technology, as described in the section on new participants (see section 4.2). Benchmarks for electricity and heat production will be used for combustion installations. For other installations, best available technology will serve as the allocation method.

**Table 3:** Year on which allocation is based for installations commissioned between 1998 and 2004

Year installation commissioned	Emissions on which allocation is based
1998	Total emissions 1999 to 2001/3
1999	Total emissions 2000 to 2001/2
2000	Total emissions 2001 to 2002/2
2001	Total emissions 2002 to 2003/2

A scale factor ( $k$ ) of 0.8 is applied for combustion installations in the energy sector<sup>11</sup>. The reason for the scaling down of the allocation for these installations in particular is that the potential to reduce emissions is higher for fuel-based than for raw-material related emissions and that the energy sector in contrast to the industrial sectors has not been exposed to competition from outside the EU. See also in section 2.4 and section 3.1.

A correction factor ( $K_{ex}$ ), which is greater than 1 is applied if exceptional events occurred for an installation during the selected time period. The category exceptional event includes interruptions to operations due to breakdowns or very extensive refurbishment or another occurrence of a serious nature. For an occurrence to be classified as exceptional, the reduced emissions due to the occurrence should account for at least 10 per cent of the average emissions in other years. The allocation is then based instead on emissions during a smaller number of years, although at

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<sup>11</sup> By the energy sector is meant installations whose main activity consists of production of electricity and/or district heating. Combustion installations located adjacent to industry are not included in this definition of the energy sector.

least two. The correction factor is obtained by dividing the average emissions for the remaining years used with the average emissions for the whole period between 1998 and 2001.

### *2.1.2 Additional allocation for installations with raw-material related emissions*

The emissions defined in this allocation plan as raw-material related emissions cannot be reduced in the short-term without a reduction in output at the installation in question. To take this circumstance into account, if the installation emits raw-material related emissions of carbon dioxide, a supplement is made to the allocation based on historic emissions. The supplement corresponds to the projected increase in raw-material related emissions for the installation during the period 2005-2007. If the projection for raw-material related emissions is lower than the average of historic emissions, the installation will receive an allocation corresponding to the average of historic emissions between 1998 and 2001. The reasons for this allocation method being applied are described in more detail in section 2.4 on competition from outside the EU and in section 3.1 on the potential for reducing emissions.

The fact that allocation is wholly or partly based on the companies' own production and emissions projections could mean that an installation would receive too many allowances in relation to its requirements. A review of the companies' own projections will therefore be made by the competent authority (Swedish Environmental Protection Agency), which is to decide on allocation of allowances by 30 September 2004. The review will be based on micro- and macroeconomic analyses. This plan is based on an initial preliminary inspection of companies' projections. This inspection has not led to any reductions in the planned allocation for projected increases of raw-material related emissions since the preliminary inspection does not indicate overestimates in the companies' forecasts. The assessment is based on the National Institute of Economic Research's short-term forecast to 2005/2006, the Swedish Energy Administration's long-term forecast to 2010 and discussions with the companies concerned.

### *2.1.3 Taking into account unavoidable emission increases due to other Community legislation*

Under the Emissions Trading Directive, consideration may be taken on allocation if there has been an unavoidable increase in emissions due to other Community legislation. Section 4.3 specified the Community legislation which is considered to give rise to unavoidable increases in emissions. A supplement is made for these emissions to that part of allocation based on historic emissions, in the corresponding way as for raw-material related emissions. This supplement is obtained by subtracting the average emissions for 1998-2001 from the forecast

emissions from the installation in question during the period 2005-2007. Section 4.3 list the Community legislation which is considered to give rise to unavoidable increases in emissions.

## 2.2 Taking the potential to reduce emissions into account

See section 3.1.

## 2.3 Taking EU legislation into account

See section 4.3.

## 2.4 Taking competition from outside the EU into account

Under Annex 3 of the Emissions Trading Directive, Member States may take into account competition from outside the EU when allocating allowances. According to the European Commission guidance, the criteria should only be used at activity level and in the cases when installations, as a result of climate policy and the implementation of the Emissions Trading Directive, are anticipated to be less competitive in relation to installations outside the EU.

The Swedish installations exposed to competition from outside the EU are mostly in the pulp and paper industry, iron and steel industry, mining industry (roasting and sintering) and cement industry. The installations in the primary industries concerned compete to a great extent in a global market, where many of the competitors are not subject to equivalent carbon dioxide restrictions, at least in the period 2005 to 2007. These installations have poorer or no possibilities to pass on increased costs for production to their customers, compared to installations that compete in a domestic or European market. The increase in costs imposed on participants in the trading scheme that have to purchase allowances can entail a competitive disadvantage for the companies concerned. This circumstance and its effect on growth and employment have been taken into account when determining the allocated quantity of allowances.

This consideration entails that special account is taken of the potential of reducing emissions of carbon dioxide in the case of raw-material related emissions. The allocation to the installations for this type of emissions is also based on projected emissions during the period 2005 to 2007. See also section 3.1.2 on consideration of the potential for reducing emissions of carbon dioxide and section 2.1 on the method for calculation of the allocated quantity.

A brief overview is presented below on the competitive position of the industries concerned.

#### *2.4.1 The competitive situation of Swedish primary industry<sup>12</sup>*

Swedish primary industry, dvs. the pulp and paper industry, energy-intensive chemical industry, mining and mineral industry and steel and metal manufacturing, account for approximately 15 per cent of value added by Swedish manufacturing industry. Primary industry is export-focused and accounts for approximately 20 per cent of the total value of exported Swedish industrial products.

##### *2.4.1.1 Paper and pulp industry*

Sweden accounts for 3 per cent of the manufacture of paper in the world and 9 per cent of world export. In 2001, Sweden was the seventh largest producer of board and paper in the world.

Measured as specialisation ratio, the pulp and paper industry in 1996 showed the strongest international competitiveness in Swedish industry.<sup>13</sup> Swedish international competitiveness is still based to a great extent on an abundant access to forest and good access to energy. If the companies in the industry need to purchase allowances at a price of 10 euro per tonne of carbon dioxide, their production costs may increase by 4-8 per cent depending on the product concerned. By way of comparison, the share of wage costs of production costs, including social security contributions is 14 per cent.

##### *Competitor countries*

The Swedish paper and pulp industry is highly export-oriented. Approximately 85 per cent of the production of paper and pulp is exported, the major part to western Europe. The competitors of the Swedish suppliers of paper outside the EU are mainly USA and Canada. Canada is an important competitor for newspaper paper. USA is an important competitor for kraftliner and Brazil and Indonesia are important competitors for fine paper. Pulp manufacturers in Sweden also compete with USA, Canada and Brazil as well as other European countries.

##### *2.4.2.2 Roasting and sintering*

Sweden is the leading ore producer in the EU. Approximately 95 per cent of iron ore production in the EU takes place in Sweden. World iron ore output totalled approximately 440 million tonnes in 1999. Output at LKAB, which is the only Swedish iron ore producer, amounted the same year to over 18 million tonnes. LKAB is responsible for approximately 4 per cent of the world iron ore trade. The export of ores totalled SEK 6.2

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<sup>12</sup> The section is based on Ds 2001:63 Svensk basindustri [Swedish primary industry] and Byman m.fl., Den handlande sektorns konkurrenssituation, 2003, [The competitive situation of the trading sector] unless another source is cited.

<sup>13</sup> Annex 5 of LU 99, Sweden's international competitiveness

billion in 1998. Net export accounted for approximately 2 per cent of the total net export of industrial products. In Sweden, it is only LKAB that has installations for sintering of metalliferous ore. LKAB's activities include mining and refining of iron ore into highly-refined iron ore products. In all, there are five pelletizing plants in Sweden, two in Malmberget, two in Kiruna and one in Svappavaara. All of them are thus located in the northernmost parts of Sweden. The blast furnace pellets are supplied primarily to Swedish and other European steel works, with Germany and Finland as the largest individual recipient countries. SSAB is the biggest customer for blast furnace pellets. Direct reduction pellets are primarily sent to the Middle East and North Africa where LKAB has a strong market position. If a company in the industry needs to purchase allowances at a price of 10 euro per tonne carbon dioxide, their production costs for pellets may increase by around 4 per cent. The production cost for pellets, excluding the ore raw material, may increase by 13 per cent. By way of comparison, wage costs, including social security contributions, are approximately 30 per cent of the production cost.

#### *Competitor countries*

Important competitor countries are Brazil, Australia and Canada. The price of iron ore pellets is set on the world market and LKAB has no influence over the price of iron ore pellets.

#### *2.4.2.3 Cement industry*

The Swedish cement industry consists, in principle, of one company, Cementa, which is part of the German group Heidelberg Cement. Cementa now has almost 90 per cent of the Swedish market. Almost half of the total output in Sweden is used in the domestic market. Approximately 50 per cent of the cement is exported to countries outside the EU, primarily to USA and a smaller part to Africa. The company's output of cement was over 2 million tonnes in 2000. This can be compared with 175 million tonnes in the EU in 1995. If a company in the industry needs to purchase allowances at a price of 10 euro per tonne carbon dioxide, their production costs may increase by approximately 10 per cent, which can have a considerable effect on their competitiveness. By way of comparison, the proportion of production costs accounted for by wages including social security contributions is 12 per cent.

#### *Competitor countries*

The competitor countries outside the EU are primarily local producers in the export markets, i.e. USA and certain African states.

#### *2.4.2.4 The iron and steel industry*

The value added for the steel and metal industry in Sweden in 1998 totalled SEK 26 billion, i.e. 5 per cent of the total value added of the

manufacturing industry. The industry accounted for 44 per cent of the total net export of the manufacturing industry and 4 per cent of the total number of employees in the manufacturing industry. The total steel production fluctuated between 4 and 5 million tonnes per year during the years 1970 to 1999. A shift has taken place over time from merchant iron to special steel. The world output of furnace steel totalled 788 million tonnes in 1999. Sweden's share of this output is 0.5 per cent. The total output of iron powder in the world in 2001 was around 1 million tonnes, Höganäs being the leading manufacturer. In Europe, Höganäs accounts for the whole output in principle. Iron powder is refined into pressing, welding and cutting powder. If a company in the industry needs to purchase allowances at a price of 10 euro per tonne carbon dioxide, their production costs for ore-based steel production may increase by approximately 10 per cent and can accordingly to a considerable extent affect the competitive position vis à vis producers outside the EU. By way of comparison, wage costs, including social security contributions, account for approximately 20 per cent of the production costs.

#### *Competitor countries*

Although the Swedish steel output is small in an international perspective, the Swedish steel works are largest or among the largest in the world for their niche products. The most important competitor countries outside the EU of the Swedish steel and metal industry are USA, Japan and South Korea. The largest market for Höganäs iron powder is Europe and Asia. The export share of Swedish steel output is 80 per cent. Of the total world output of steel, 41 per cent is produced in countries that do not have quantitative commitments under the Kyoto Protocol or which have declared that they do not intend to ratify it. The Swedish ore-based steel industry encounters considerable competition from producers in those countries in the European market.

#### *2.4.2.5 The climate policy of the most important competitor countries<sup>14</sup>*

Canada has ratified the Kyoto protocol. Canada's climate policy is primarily focused on increased awareness among the population of the climate problem, development of new technology, that the state is to set a good example and investments in creating knowledge and measures for increased collaboration between different sectors of business. Canada is also planning to introduce agreements with industry (major sources of emissions) on reduction of carbon dioxide emissions. If a company enters into an agreement with the state, the company will be exempted from a planned carbon dioxide fee. Reductions of emissions are to be made possible with the aid of trading with allowances. Discussions with industry are in process on a scheme of this kind.

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<sup>14</sup> The Swedish Energy Agency, *Klimatstrategier i ett urval av Annex 1-länder* [Climate strategies in a selection of Annex 1 countries, in Swedish]

USA's commitment under the Kyoto Protocol is to reduce emissions by 7 per cent by 2008 to 2012. However, USA has declared that it does not intend to ratify the protocol. Climate policy is at present focused on long-term technological development and improved knowledge about the climate problem, while binding measures aiming at emission reductions are wholly absent at the federal level. The north-eastern states of the USA are planning a cap-and-trade scheme for carbon dioxide. However, this will only apply to the power sector.

Australia has a commitment in the Kyoto Protocol, although it has declared that it does not intend to ratify the protocol. However, it intends to achieve their commitment to limit emissions to at most 108 per cent of emissions in 1990. Australia's climate policy is focused on investment programmes, voluntary undertakings, certification and marking, conservation and increase of carbon sinks etc.<sup>15</sup>

Japan has ratified the Kyoto protocol. The measures undertaken by Japan up to and including 2001 are primarily focused on improving energy efficiency with the aid of technological improvements and information campaigns. Grants are given, inter alia, for energy monitoring systems in housing. Japan is also working to replace parts of the vehicle fleet with environmental vehicles. The Government is working to speed up the rate of introduction of hybrid vehicles and natural gas powered buses/coaches and trucks. Japan is intending to use the flexible mechanisms to comply with its commitment.

Other competitor countries, such as South Korea, Brazil, Indonesia, the African states, etc. do not have quantitative commitments in the Kyoto Protocol.

## 2.5 Consistency with the Commission's monitoring and reporting guidelines

When collecting data for the national allocation plan, the aim has been to achieve the maximum possible consistency with the guidelines for monitoring and reporting. (KOM(2004)130 final).

Installation-specific emission factors and thermal values have been used for the majority of the installations. The default emission factors and default thermal values used for Sweden's national reporting to the UN Climate Convention have been used for installations where these emission factors have not been available.

The Government makes the assessment that good consistency with the guidelines has been achieved. The installations included in the scheme

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<sup>15</sup> Australia's third national report to the UN Climate Convention

also include those with emissions that were not previously reported in the international climate reporting to the UN Climate Convention. Among these can be noted use of sodium carbonate and carboniferous additives in glass manufacture, clay and carboniferous additives in manufacturing ceramic products, coal/oil for carbon injection and carbon electrodes and other carboniferous raw materials in steel manufacturing, burnt coke for regeneration of catalysers at cracker installations, limestone in iron production; recirculated process material in manufacturing of cement and limestone and dolomite for sulphur cleaning of flue gases. Altogether, these emissions total approximately 0.4 million tonnes carbon dioxide per year.

## 2.6 Taking early action and clean technology into account

See sections 3.2 and 3.3.

## 2.7 Unilateral introduction of additional installations in the trading sector

Pursuant to Article 24 of the EU Emissions Trading Directive (2003/87/EC), Member States may as from 2005 include installations carrying out activities covered by the Emissions Trading Directive below the capacity limits referred to in Annex 1 of the Directive. The Government states in the Bill *Guidance for the Implementation of the EU Directive establishing a scheme for trading with allowance for greenhouse gas emissions* (Government Bill 2003/04:31, in Swedish) that Sweden should keep open the possibility of including installations below the capacity limits specified in the Directive. The Government considers that combustion installations with a capacity below 20 MW which are a part of a district heating system, where the total installed capacity in the scheme amounts to at least 20 MW, should be included in the trading scheme. Since heat is sold on local markets, the Government makes the assessment that a unilateral inclusion of these installations would not have any impact on the internal market. This unilateral addition of installations means that approximately an additional 60 installations in Sweden will be covered by the trading scheme compared to if the 20 MW-limit had been applied strictly in accordance with the Directive and the Commission's guidance. The installations in question are listed in the Annex.

## 2.8 Opt-out

Pursuant to Article 27 of the Emissions Trading Directive, the Member States can apply to the Commission for a temporary exclusion of certain installations from the trading scheme. The Swedish government does not exclude that an application of this kind may be made to the Commission, although, at the time of submission of this plan, no need for such exclusions have been identified. If this possibility is made use of,



environmental steering consistent with the intentions of the Directive shall be ensured.

### 3 Technical aspects

#### 3.1 Taking the potential to reduce emissions into account

Pursuant to Annex 3 of the Emissions Trading Directive, consideration shall be given to the potential, including the technological potential, for reducing emissions.

In a comparison of the potential for reducing emissions in the installations covered by the emissions trading scheme, certain installations have been identified where the potential for reducing emissions without reducing output is considered to be very small in the period 2005 to 2007. This concerns in particular raw-material related emissions. This refers to emissions of carbon dioxide created in a process from carbon which is bound in the raw material that is to be refined or in a process where carbon is added to remove an undesirable component from the raw material and where the purpose of the process is not to produce power, heating or transport energy and where at the same time manufacturing or production is not substitutable at reasonable cost in the short term.

Emissions related to non-substitutable raw materials consist of the following categories:

Cement and lime: Carbon dioxide released in connection with combustion of limestone or dolomite.

Glass manufacturing and manufacturing of ceramic products: Emissions related to use of limestone, soda, dolomite and carboniferous additives in glass manufacture and manufacturing of ceramic products.

Glass wool manufacturing: Emissions related to use of limestone and dolomite.

Blast furnace, iron and steel production, coking plant: Emissions from use of blast furnace and LD-gas in blast furnaces, steel works and coking plants. Emissions from carbon electrodes and various “fuels” for carbon injection in iron and steel manufacturing are regarded as emissions related to non-substitutable raw materials.

Emissions that arise when coke and anthracite are used in the reduction of ore to metallic iron. Emissions related to electro steel works' consumption of anthracite and coke.

*Roasting/Sintering.* Carbon dioxide emissions in pellets manufacturing from use of dolomite and limestone.

*The energy sector.* Emissions from combustion of blast furnace and LD-gas in combustion installations adjoining steel production installations. There is no alternative market for blast furnace gas since it is low in energy and therefore gives very high carbon dioxide emissions per unit of energy, approximately 3 times higher than coal. . The same applies to LD-gas although it is somewhat more energy-rich than blast furnace gas. Coking oven gas generated in steel production is, however, a very energy-rich gas with lower emissions per unit of energy than, for instance, oil, LPG and natural gas. Although coking oven gas is created as an unavoidable bi-product of the coking process, it is not difficult to find a use for and is not to be regarded as a raw-material related emission. Furthermore, carbon dioxide emissions from use of limestone and dolomite for sulphur cleaning or acid reduction in flue gases and from combustion of coke in regeneration of catalytic crackers are regarded as emissions related to non-substitutable raw materials.

*Mineral oil refineries.* Carbon dioxide emissions from combustion of coke in regeneration of catalytic crackers.

The emissions related to non-substitutable raw materials corresponded to about 35 per cent of the total emissions in the trading sector during the period 1998-2001. The predominant part of emissions of the iron and steel industry are emissions related to non-substitutable raw materials. Mineral oil refineries have predominantly fuel-based emissions. The pulp and paper industry only has fuel-related emissions. In the mineral industry, the fuel-related emissions account for approximately as large a part of the total emission as the emissions related to non-substitutable raw materials. One and the same installation can naturally generate both fuel and raw-material related emissions.

When allocating allowances for emissions related to non-substitutable raw materials, special consideration is to be given to the low or non-existent potential for reducing emissions of carbon dioxide. The justification for this special treatment is particularly strong for the installations that generate raw-material related emissions and which are also exposed to competition from outside Europe such as the iron and steel industry and cement manufacturing. See section 2.4 for a more detailed description of consideration to competition from outside Europe.

### *3.1.1 Method to determine potential for reducing emissions*

The method for determining potential for reducing emissions based on:

- a) macroeconomic model calculations with a general equilibrium model
- b) analysis of emissions from activities over time and the emissions of activities in comparisons with emissions by other countries

c) technical factors.

### *3.1.1.1 Macroeconomic assessments*

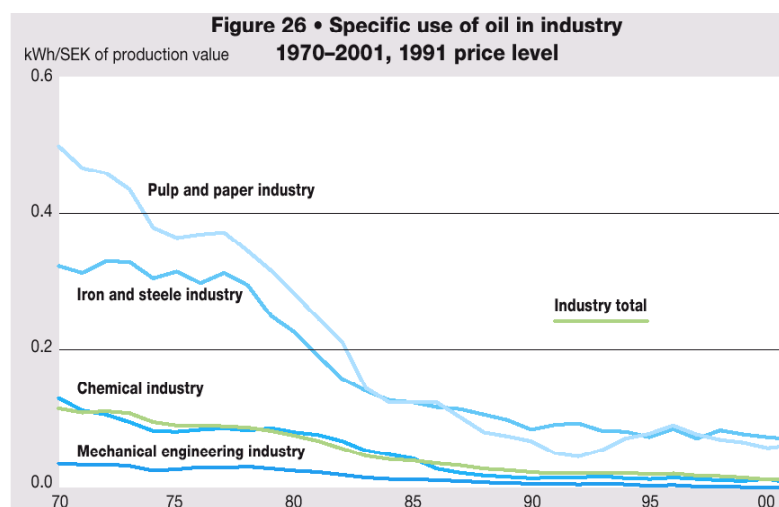
The most recent macroeconomic assessment of the effects that introduction of different carbon dioxide restrictions would have on the Swedish economy and on carbon dioxide emissions was made by the parliamentary climate commission (*Förslag till Swedish climate strategy*, SOU 2000:23 [Proposal for a Swedish Climate Strategy, in Swedish]). These calculations show that the greatest potential emission reductions are to be found in the housing and properties sector, and also in the public sector, trade and other services and in households. The potential for reducing emissions in industry is considerably less. In industry, there is potential mainly in the pulp and paper industry and engineering industry. The lowest potential is in the iron and steel industry, chemical industry and petroleum refineries.

### *3.1.1.2 Analysis of emissions from different activities<sup>16</sup>*

The low potential for reducing carbon dioxide emissions in the primary industry depends to a great extent on the far-reaching emission reductions and efficiency improvements already made and the fact that many Swedish installations in an international comparison have among the lowest emissions of carbon dioxide per unit of output. Extensive improvement of efficiency and transfer to electricity from oil in the primary industry has meant a very great reduction in the use of oil and thereby fuel-related specific emissions in the industries concerned. Great increases in output in the primary industry have therefore only led to limited increases in emissions and thereby reduced emissions per krona of output value.

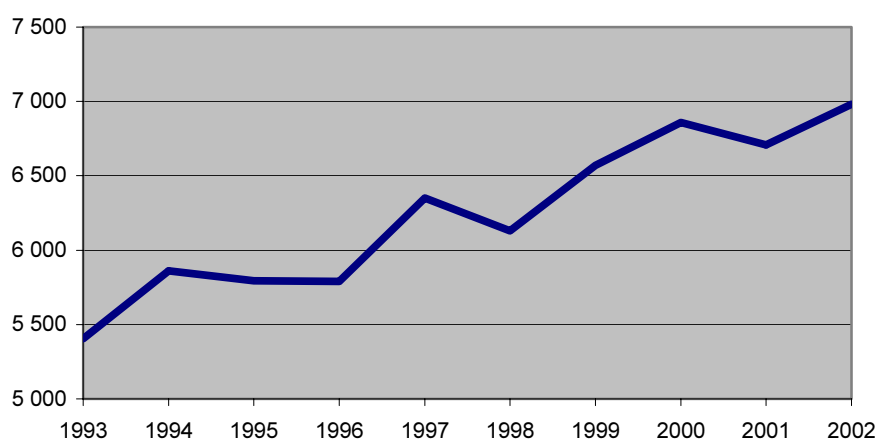
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<sup>16</sup> This section is based on Ds 2001:63 Svensk basindustry and Byman et al., Den handlande sektorns konkurrenssituation, 2003, where no other source is cited



**Figure 1:** The specific use of oil by industry 1970–2001, 1991 prices  
Source: STEM, Energy in Sweden 2002

Swedish primary industry has expanded substantially in particular in the late 1990s. Despite reduced specific emissions, the increased output has led to increased emissions of carbon dioxide, since the increase in output has exceeded the increase in efficiency and emissions are to a large extent tied to output. However, emissions are low in an international comparison. If these installations are out competed by installations with higher specific emissions, global carbon dioxide emissions will increase. The development of output in base industry in recent years is shown in the figure below.



**Figure 2:** Development of output in Swedish primary industry in million Euros (fixed prices)  
Source: National Institute of Economic Research

*Cement and lime industry*

Around 60 per cent of carbon dioxide emissions in these industries are raw-material related emissions. During the period from 1998 to 2000, carbon dioxide emissions per tonne cement in Sweden were 0.80-0.82 tonnes. In 2002 emissions were 0.75 tonnes per tonne cement in Europe on average.<sup>17</sup> However, the figures are not wholly comparable since they refer to different time periods. An additional problem with comparability is that the Swedish cement products are intended for a different use under different climatological conditions than in other European countries. Accordingly, the types of cement produced in the EU vary between countries and the desired qualities of the cement affects the use of raw materials and the energy consumed in the process.

#### *Mineral oil refineries*

According to the Solomon index, an energy efficiency index that compares energy consumption in 300 refineries in the world, the average energy intensity value was 92 in 2000. Sweden's three fuel refineries (Scanraff, Preem and Shell) are among the best of the total of 85 participating refineries as regards energy efficiency. In 2000, the Swedish refineries were at second, third and seventh place respectively.

#### *Sintring and roasting*

Carbon dioxide emissions per tonne of output of magnetite pellets total approximately 35 kg. This is over the half of the emissions per produced tonne of hematite pellets, since magnetite produces energy during the process and accordingly less fuel needs to be used. Magnetite pellets are manufactured by LKAB in Sweden.

#### *Iron and steel production including continuous casting*

The ore-based steel production is carried out in Sweden by SSAB. According to a study made by IISI<sup>18</sup> and which is supplemented by the Swedish steel producers' association, emissions from the European ore-based steel producers amount to 2.0 tonnes of carbon dioxide per tonne of steel while SSAB's corresponding emissions total 1.7 per tonne steel. In another comparison<sup>19</sup> between SSAB's emissions and 35 installations internationally, emissions from SSAB are said to be 1.41 tonnes of carbon dioxide per tonne steel. This information also includes pellets production at LKAB. The corresponding average figure for 35 installations in the world is 1.90 tonnes of carbon dioxide per tonne of

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<sup>17</sup> Jaako Pöyry Consulting, Riktmärken för national fördelningsplan plan, 2004 [Benchmarks for the national allocation plan, in Swedish]

<sup>18</sup> International Iron and Steel Institute

<sup>19</sup> Sandberg et al., CO<sub>2</sub> emissions from Swedish Steel Industry, Scandinavian Journal of Metallurgy, 2001:30

steel. In the latter comparison, adjustments have been made for process variations and for the effect of the exceptionally high natural magnetite content of the Swedish iron ore on emissions.

### *3.1.1.3 Technical factors*

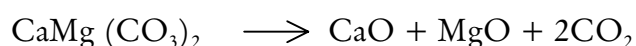
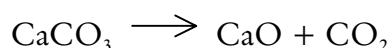
In the ore-based steel production in Sweden, the process mainly takes place in blast furnace where furnace steel is produced and refined into steel, which is cast into substances for further processing. A chemical change takes place in the process so that the iron atoms in the oxygen atoms are separated from the iron atoms in the ore and liquid raw iron is obtained.

The oxygen is released with the aid of carbon and carbon dioxide is produced as a result of this chemical process that is necessary to manufacture iron. The quantity of carbon dioxide released is thus directly related to the quantity of iron produced. The equivalent also applies for the electro steelworks that add anthracite and coke as reduction agent in their processes.

The blast furnace process is considered to be the realistic alternative in the short and medium-term to manufacture iron and steel from ore.

Theoretically there are alternative reduction agents for coal. Today, coke is used from coal to reduce iron ore, although other fuels have been used and can be used. Historically, charcoal has played an important part in most countries. Charcoal is, however, not considered to be financially viable in Swedish conditions. Another alternative, which is only relevant in the very long term is to use hydrogen as a reduction agent.

In lime production, carbon dioxide has to be separated from limestone or dolomite in accordance with the reactions



The carbon dioxide produced in these reactions is related to the raw material and is a part of the intention of the industrial process. It is thus not possible to reduce this raw-material related emission. This process-related emission is 44/40 kg carbon dioxide per kg calcium (Ca) in production based on limestone and 44/24 kg carbon dioxide per kg magnesium (Mg) which undergoes the process in production based on dolomite.

In ceramic products, limestone and dolomite are important raw materials which in accordance with the above description necessarily produce carbon dioxide emissions.

Soda, limestone and dolomite are used in glass manufacture and in glass fibre and give rise to carbon dioxide emissions. There are no realistic alternatives at present.

Catalytic crackers in the refinery sector become coated when coke is used. This coke must be burnt to keep the catalyser fresh. Carbon dioxide is created and heat emitted during combustion. The heat is used in the process and replaces other fuel.

Sulphur cleaning or acid reduction of flue gases in the energy sector entails additives of limestone and dolomite to bind the sulphur. This gives rise to unavoidable emissions of carbon dioxide.

### *3.1.2 Method to take into consideration the potential in allocation to sectors*

The low potential for reducing the raw-material related emissions is taken in to account, as stated in section 2.1, by a supplement to allocation corresponding to the forecast increase in such emissions to 2005 to 2007 compared to the level that corresponds to the average of historic emissions.

## 3.2 Taking early action into account

Sweden takes the view that early action has been taken at many of the installations covered by the system for trading with allowances to reduce emissions of carbon dioxide. For instance, energy efficiency measures and fuel switching in the energy sector have led to reductions in emissions. This development has been driven forward, inter alia, by financial instruments such as the carbon dioxide tax (introduced in 1991) and investment aid. Sweden has not used any special method to reward early action at installation level.

## 3.3 Taking clean technology into account

An important criterion in the Emissions Trading Directive is that the allocation plan is to contain information on how consideration is to be taken to clean technology, including energy efficient technology. In the view of the Swedish government, combined heating and power production is an energy-efficient technology. Swedish combined power and heating plants comply well with the demands for highly-efficient combined heating and power that are defined in the EU Directive on efficiency requirements for new hot-water boilers fired with liquid or gaseous fuels

(92/42/EEC). In accordance with section 4.2, the allocation of allowances to new entrants is to be based on benchmarks for combustion installations that generate electricity, district heating or steam. When calculating the benchmark values to be used, special attention has been given to the greater efficiency of co-generation plants compared to other types of production. See also in section 4.2. Allocation of allowances to

new entrants in the energy sector will only take place to combined heating and power production.

#### **4 Pooling, new entrants and other EU legislation**

##### 4.1 Pooling

Pursuant to the Emissions Trading Directive, operators can, for installations where activities listed in Annex 1 of the Directive are carried out, form a pool of installations with the same activities, known as pooling. Member States wishing to allow pools to be formed should submit an application to the Commission for consideration.

Sweden does not intend to allow the forming of pools of this kind. The reason for this is that it is not considered that participation in a pool will reduce the administrative burden on the companies concerned.

##### 4.2 Treatment of new entrants

Allocation to new entrants is planned to total an average of 1.8 million tonnes per year during the period 2005 to 2007.

Pursuant to the Emissions Trading Directive, a new entrant is every installation that carried out one or more of the activities listed in Annex 1 of the Directive and which has been granted a permit or updated its permit to emit greenhouse gases due to a change of the type or functioning of the installation or due to an expansion, after the national allocation plan has been submitted to The European Commission. Since the national legislation on the trading scheme has not yet come into force, no permits to emit emissions of greenhouse gases have yet been granted. In Sweden, the issue of permits to emit greenhouse gases to new entrants will be made subject to the requisite permits having been obtained pursuant to the Environmental Code or earlier environmental legislation (see also section 6.3). All installations listed in this plan have environmental permits pursuant to the Environmental Code or the equivalent. As the installations have been granted environmental permits, the Government makes the assessment that it is probable that the installation will be taken into commission during the period 2005 to 2007. The issue of allowances will take place, when the respective installation has been commissioned.

The operators whose installations may be commissioned during the period 2005 to 2007, but who do not yet have an environmental permit, are to apply for an allocation from the reserve designated for this purpose. The reserve totals 0.8 million tonnes per year. The size of the



reserve has been estimated on the basis of knowledge of planned new installations that have not yet been granted an environmental permit. It is uncertain whether the size of the reserve is sufficient for all new entrants to be able to receive allowances free of charge. Allocation should be made on a first-come first-served basis. The operators who apply for allocation when the reserve of allowances has been exhausted will be referred to the market for allowances.

New entrants are considered to obtain allowances by application of the following method:

An installation is to be granted allowances on the basis of benchmarks to the extent that such are available. Where benchmarks are not available, best available technology (BAT) will serve as the basis for allocation of allowances. For installations with unavoidable increases in emissions due to other Community legislation, the allocation is to be based on the projected emissions from the installation during the period 2005 to 2007.

Benchmarks have been considered as possible to apply for combustion installations that produce electricity, district heating and/or steam. Best available technology is used for other installations.

The calculation of benchmarks for electricity and heat respectively is based on the following formula:

$$e_{group,baseyear} = \frac{E_{group,baseyear}}{P_{group,baseyear}} \quad [g CO_2/MJ \text{ or tonne } CO_2/GWh]$$

where E stands for carbon dioxide emissions for a group of installations and P output (of electricity or heating) from the same group of installations during the base year period, 1998 to 2001. The benchmarks are based on the performance of existing Swedish installations.

The benchmark for electricity is based on electricity from condensing power installations, combined heat and power plants and back-pressure installations in industry. The benchmark for heat is based on heating plants, heat from combined heat and power plants and industrial boilers. Electricity production from combined heat- and power installations included in the benchmarks are weighted with a factor of 2.5 and heat production in combined heat and power installations with a factor of 1.0. This means that if a combined heat and power installation produces the same quantity of electricity and heating, 5/7 of the emissions will be assigned to electricity and 2/7 to heating. In this way, combined heat and power is compensated for its high energy efficiency, arising from the combined operation. A reference to the factor 2.5 can be found in Annex 2 to *Proposal for a Directive of the European Parliament and of the Council on energy end-use efficiency and energy services*, KOM(2003)739.

All fuels except waste, blast furnace gas and LD-gas are included in the calculation of the benchmarks i.e. coal, coke, coking oven gas, peat, oil, diesel, LPG, natural gas and biofuels.

For allocation, the benchmark 265 tonnes CO<sub>2</sub>/GWh is used for electricity production and the benchmark 83 tonnes CO<sub>2</sub>/GWh for heat production.

The allocation to new entrants can be written as:

$$\text{Allocation}_{05-07} = k \times \text{Projected output}_{05-07} \times \text{BM/BAT}$$

<b><i>k</i></b>	<i>k</i> =0.8 for combustion installations in the energy sector <sup>20</sup> . <i>k</i> =1 for other installations.
<b>Projected output<sub>05-07</sub></b>	Emissions in accordance with projected produced quantity of the relevant product for the installation 2005 to 2007. Only production based on fossil fuels is meant for electricity and heat production.
<b>BM</b>	Benchmarks used for combustion installations in industry and the energy sector. For electricity: 265 tonne CO <sub>2</sub> /GWh. For heating: 83 tonne CO <sub>2</sub> / GWh.
<b>BAT</b>	Best Available Technology used for other installations. Corresponds to estimated specific emissions at the installation in question (tonne CO <sub>2</sub> / product).

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<sup>20</sup> The energy sector refers to installations whose main activity consists of electricity and/or district heating production. Combustion installations located adjacent to industry are not included in this definition of the energy sector

In the event of the new entrant being an existing installation that is expanding, allowances are allocated in accordance with this method only for the emissions that ensue from the increase in production.

A scale factor ( $k$ ) is applied for fuel-related emissions from combustion installations in the energy sector<sup>21</sup>, for consistency with the treatment of existing installations, see section 2.1. The factor is also used for new installations that apply for allowances from the reserve.

As regards fuel-related emissions from new installations, the Government stated in the Guideline Bill that a more restrictive approach should apply than to allocation to new installations with raw-material related emissions. In Annex 3 of the Emissions Trading Directive, it is stated that the allocation plan is to contain information on the manner in which clean technology, including energy efficient technology, is taken into account. The Government further stated in the Guideline Bill that it is considered that combined heat and power technology is an energy efficient technology of this kind. With a view to favouring new installations with energy-efficient technology, allowances are only allocated to combined heat and power installations in the energy sector.

#### 4.3 Other legislation or policies

The following EU legislation is considered to lead to unavoidable increases in emissions in Sweden:

- a) Directive 2003/17/EG and the supplement in Directive 98/70/EG regarding the quality of petrol and diesel fuels

The implementation of this Directive will lead in Sweden to increased emissions of carbon dioxide in the trading sector. As a result of the directive, a completely new installation is planned consisting of a hydrocracker and a hydrogen plant. The emissions from the installation are expected to total 0.8 million tonnes per year in 2006 and 2007. Special consideration is taken to emissions from the installation by allowances being allocated corresponding to the installation's forecast production (See section 2.1 on the method of calculating the allocated quantity). This is justified since the increased carbon dioxide emissions in the installation will mean that emissions of carbon dioxide can be decreased in the transport sector, which is not covered by the trading scheme. Emissions will be reduced due to it being possible to improve the energy efficiency of new vehicle motors and reduce fuel use in new vehicles by 2 to 3 per cent. In the use of products from the new installation, it is

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<sup>21</sup> By the energy sector is meant installations whose main activity consists of the production of electricity and/or district heating. Combustion installations situated adjacent to industry are not included in this definition of the energy sector

calculated that carbon dioxide emissions will be reduced by a total of 1.03 million tonnes per year. 0.26 million tonnes per year of this reduction can be assigned to Sweden, while the remaining reductions in emissions are expected to take place in the rest of Europe.

The following EU legislation has been taken into account in projections of carbon dioxide emissions that serve as one of the bases for determination of the total allocated quantity of allowances in Sweden:

- b) Directive 2003/96/EC restructuring the Community framework for the taxation of energy products and electricity.

Sweden has taxed energy and carbon dioxide emissions for a long time. The Swedish tax rates are included in the prerequisites for the Swedish projections that have been made on emissions of greenhouse gases (see also section 1). The EU Directive on energy taxes will probably not significantly change the Swedish emissions, since the minimum fuel tax rates are substantially already complied with in Sweden.

- c) Directive 2001/77/EC on the promotion of electricity from renewable energy sources in the internal electricity market  
Part of Sweden's strategy to implement the directive consists of a certificate system for electricity production from renewable sources of energy. This scheme is one of the projection prerequisites in the Swedish projections of emissions of greenhouse gases (see section 1). The scheme as such will lead to reductions of emissions of carbon dioxide. A large part of these reductions are expected to take part in other countries in Sweden's vicinity, however, since the fossil component in the Swedish electricity production system is low.

## 5 Involvement of the public

A politically appointed commission<sup>22</sup> has been commissioned to draft proposals for a Swedish scheme and a regulatory framework for the flexible mechanisms of the Kyoto Protocol (Dir. 2001:56). At a meeting with the Commission on 20 February 2003, representatives of industry and the Swedish Society for Nature Conservation presented their views on the allocation principles. The Commission has, on this basis, inter

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<sup>22</sup> A commission of this kind is given its instructions and reports to the Government. The Commission also includes representatives of the relevant industry bodies and experts from the ministries.

alia, drafted proposals for principles for allocation and submitted its recommendations to the Government in May 2003 (SOU 2003:60).

The Commission's report has been circulated by the Government for comment to 150 stakeholders. In Sweden, the accepted referral procedure in drafting of proposals by the Government consists of the stakeholders, including authorities, representatives of industry, and interest organisations most closely affected by the proposals being actively given an opportunity to state their points of view. In addition to these stakeholders, individual persons, companies, organisations, etc. have the opportunity to submit comments on the referral. 170 statements were received. A summary of the referral comments is available at the Ministry of Industry, Employment and Communications (dnr 2003/4470/ESB).

On the basis of the Commissions's recommendations and the points of view of the referral organisations, the Government submitted a proposal for guidelines on the allocation to the Riksdag on 4 December (Government Bill. 2003/04:31). This Government Bill has been published on the Government's website ([www.regeringen.se](http://www.regeringen.se)). On 10 March, the Riksdag decided to authorise the Government to draft and submit to the European Commission a national plan for allocation of allowances based on the principles and considerations that the Government presented in its Bill and the criteria in Annex III of the Emissions Trading Directive (bet. 2004/04:MJU11, rskr. 2003/04:150).

Furthermore, the above-mentioned Commission has submitted a proposal for a law on permits and allocation of allowances to the Government on 5 December 2003 (SOU 2003:120). This report has also been circulated for referral. At an open hearing organised by the Ministry of Industry, Employment and Communications on 15 January 2004, a number of points of view were put forward on the Commission's proposals concerning allocation and permits. In addition, 89 written statements were submitted to the Government, which have been summarised in a referral summary (Dnr 2003/4470/ESB).

The plan which has now been submitted to the European Commission is being made available at the same time so that the public can put forward points of view through press releases and advertisements in Dagens Nyheter, Svenska Dagbladet, Aftonbladet and Expressen and on the Government's website ([www.regeringen.se](http://www.regeringen.se)) which can also be accessed through the emissions trading portal [www.utslappshandel.se](http://www.utslappshandel.se).

Points of view must be submitted by 18 May 2004 to be taken into account. Points of view are to be submitted in writing to the Registrar, Näringsdepartementet, 103 33 Stockholm or [registrator@industry.ministry.se](mailto:registrator@industry.ministry.se).

## 6 National criteria

A list is shown below of the criteria that Sweden has used in drawing up the allocation plan, in addition to the criteria listed in Annex 3 of the Emissions Trading Directive.

### 6.1 Simple, transparent, non-bureaucratic and predictable allocation method

In order for an allocation method to be acceptable, the participants in the trading scheme need the allocation method to be simple, transparent, non-bureaucratic and predictable. The allocation method that Sweden has chosen as the main method, i.e. allocation based on historic emissions, supplemented by certain possibility for additional allocation, has been assessed to be best to comply with these criteria in comparison with other types of allocation methods. Moreover, the method has been assessed as most realistic to apply from 2005 taking into consideration data availability.

### 6.2 Application for allocation

A condition for a Swedish installation obtaining allowances is that operator applies for allocation of allowances at the competent authority. The competent authority will make its decision on allocation of allowances on the basis of applications by 30 September 2004.

### 6.3 Conditional allocation

A condition that the participants in the scheme shall obtain their allowances issued in accordance with the decision as per 30 September 2004 is that participants receive or apply for a permit to emit greenhouse gas emissions by 31 December 2004.

An additional condition for new entrants to obtain allowances is that the installation receives requisite permits pursuant to the Environmental Code or earlier environmental legislation and that they hold a permit to emit greenhouse gas emissions. A condition for a permit to emit greenhouse gas emissions to be received is that a permit has been obtained pursuant to the Environmental Code or earlier environmental legislation.

### 6.4 Allocation of allowances when process gases are used by another operator than the operator generating them

Pursuant to paragraph 92 of the EU Commission guidance, it is stated in cases where gases are waste from a production process and used as fuel by another operator, that allocation of allowances between the two installations is to be determined by the Member States.

In Sweden this case arises in ore-based steel production where excess process activity gases are used to produce electricity and heating. The

allowances are to be granted to the operators for the facility that transfers the gas.