Sweden

Contents

Figures and tables

1. SUMMARY

The latest projections from Sweden's 2007 Monitoring Mechanism submission, adjusted in accordance with the latest inventory[1], reports projected total emissions of around 2.7% below the base year. This is slightly lower than reported in 2006 and again means that Sweden should overachieve its Kyoto target of 75 Mt CO_2–eq. (4% increase from the base year). Sweden does not provide a "With Additional Measures" projection as no further climate policies and measures are deemed necessary to meet the target.

Over the period 1990 – 2010, substantial reductions are projected to occur in emissions from the Solvents, Energy Consumption (in the commercial, residential and agriculture sectors), waste and agriculture. However, emissions from these sectors are expected to account for only 20% of total emissions in 2010. Over the same period, increases are expected from Energy Supply and Consumption (by industry and construction), industrial processes and transport, in particular. The most significant policy induced emission reductions (10 Mt CO2-eq.) are projected to result from a package of policies tackling emissions in the energy supply sector including and electricity certificate system, renewables, EU ETS, energy and carbon taxes. A number of measures are also implemented to address transport emissions including fuel taxes and measures to encourage uptake of green vehicles.

Sweden expects to meet its Kyoto target with domestic actions only, though preparation is underway to make use of Flexible Mechanisms. Reductions of 6.5 Mt CO2-eq. are projected for the 2008-2012 period through CDM and JI projects but no decision has been taken on the final contribution Kyoto mechanisms will make to achieving the first commitment period target.

Sweden expects GHG emissions to be reduced by a further 2.1 Mt CO2-eq. in 2010 through enhanced carbon sinks. Taking into account the effect of domestic policies and carbon sinks, emissions are projected to be 5.7 % below the BY, meaning that Sweden would overachieve its Kyoto target by 10 percentage points.

[1] Projections adjusted in accordance with Sweden's 2008 inventory submission. For further details, see Section 4 Metadata.

2. GHG PROJECTIONS AND PROGRESS TO KYOTO TARGETS

Table 1 shows, for all gases and main sectors:

- GHG emission projections for the "with existing measures" (WEM) scenario. A "with additional measures" (WAM), is not reported by Sweden
- Historic emissions (in the "reference year") as reported together with projections.

For Sweden, the reference year is the Kyoto base-year: 1990 for CO_2, CH_4 and N_2O, and 1995 for fluorinated gases (F-gases).

Table 1. Summary of reported projections by sector and by gas in 2010 (Mt CO_2–eq.)

	Carbon dioxide			Methane			Nitrous oxide			F-gases			Total		
	Reference year	2010 WEM	2010 WAM	Reference year	2010 WEM	2010 WAM	Reference year	2010 WEM	2010 WAM	Reference year	2010 WEM	2010 WAM	Reference year	2010 WEM	2010 WAM
Energy (excl. transport)	33.6	31.3	NE	0.3	0.3	NE	1.2	1.4	NE	NO	NO	NE	35.1	33.0	NE
Energy supply	10.9	14.9	NE	0.03	0.1	NE	0.3	0.5	NE	NO	NO	NE	11.3	15.4	NE
Energy – industry, construction	11.1	12.0	NE	0.0	0.0	NE	0.5	0.6	NE	NO	NO	NE	11.6	12.7	NE
Energy – other (commercial, residential, agriculture)	11.6	4.4	NE	0.2	0.2	NE	0.3	0.3	NE	NO	NO	NE	12.2	5.0	NE
Transport (energy)	18.2	21.0	NE	0.1	0.0	NE	0.2	0.2	NE	NO	NO	NE	18.4	21.2	NE
Industrial processes	4.6	4.9	NE	0.0	0.0	NE	1.0	0.6	NE	0.6	0.9	NE	6.3	6.5	NE
Waste	0.0	0.1	NE	2.9	1.2	NE	0.2	0.1	NE	NO	NO	NE	3.1	1.5	NE
Agriculture	NO	NO	NE	3.4	3.0	NE	6.0	5.1	NE	NO	NO	NE	9.4	8.1	NE
Other	0.0002	0.0001	NE	NE	NE	NE	0.0001	0.0002	NE	NE	NE	NE	0.0003	0.0003	NE
Total (excl. LULUCF)	56.4	57.4	NE	6.7	4.6	NE	8.5	7.4	NE	0.6	0.9	NE	72.3	70.3	NE

Key:
Reference year: base-year under the Kyoto Protocol (1990 for carbon dioxide, methane and nitrous oxide, and 1995 for F-gases).
WEM: 'with existing measures' projection
WAM: 'with additional measures' projection

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Source: Sweden's national report submitted to the European Commission under Article 3(2) of the Monitoring Mechanism, Decision 280/2004/EC. Report dated March 2007.

Table 2 shows, for all gases and main sectors:

- 1990 GHG emissions as reported in the latest (2008) GHG emissions inventory (1990-2006);
- Adjusted GHG emission projections for the WEM scenario. This adjustment of the projections reported in Table 1 is carried out to allow consistency and comparability between projections and the latest (2008) GHG inventory data[2].

Table 2. Summary of projections by sector and by gas in 2010 compared to 1990 emissions ($MtCO_2$-eq.)

	Carbon dioxide			Methane			Nitrous oxide			F-gases			Total		
	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM
Energy (excl. transport)	33.4	31.3	NE	0.3	0.3	NE	1.2	1.4	NE	NO	NO	NE	35.0	33.0	NE
Energy supply	10.9	14.8	NE	0.03	0.1	NE	0.3	0.5	NE	NO	NO	NE	11.3	15.4	NE
Energy – industry, construction	10.9	12.0	NE	0.05	0.0	NE	0.5	0.6	NE	NO	NO	NE	11.5	12.6	NE
Energy – other (commercial, residential, agriculture)	11.6	4.4	NE	0.2	0.2	NE	0.3	0.3	NE	NO	NO	NE	12.2	5.0	NE
Transport (energy)	18.2	21.0	NE	0.1	0.03	NE	0.2	0.2	NE	NO	NO	NE	18.4	21.2	NE
Industrial processes	4.4	4.9	NE	0.01	0.01	NE	0.9	0.6	NE	0.5	0.9	NE	5.8	6.4	NE
Waste	0.04	0.1	NE	2.9	1.2	NE	0.2	0.1	NE	NO	NO	NE	3.1	1.5	NE
Agriculture	NO	NO	NE	3.4	3.0	NE	6.0	5.1	NE	NO	NO	NE	9.4	8.1	NE
Other	0.2	0.0001	NE	NE	NE	NE	0.1	0.0002	NE	NO	NO	NE	0.3	0.0003	NE
Total (excl. LULUCF)	56.3	57.3	NE	6.7	4.6	NE	8.5	7.3	NE	0.5	0.9	NE	72.0	70.2	NE

Key:
WEM: 'with existing measures' projection
WAM: 'with additional measures' projection

Source: Sweden's national report submitted to the European Commission under Article 3(2) of the Monitoring Mechanism, Decision 280/2004/EC. Report dated March 2007.

[2] The adjustment consists in applying an adjustment factor to projections from Table 1. This factor is the ratio between total emissions in the reference year as reported in the 2008 GHG inventory report (or, if the reference year is the base-year under the Kyoto Protocol, in the report of the review of the initial report under the Kyoto Protocol) and total emissions in the reference year as reported by the country with projections (Table 1).

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Annual greenhouse gas inventory 1990 - 2006 and inventory report, 14 April 2008.

Table 3. Summary of projections by sector and by gas in 2010 compared to 1990 emissions (index 100 = 1990)

	Carbon dioxide			Methane			Nitrous oxide			F-gases			Total		
	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM	1990	2010 WEM	2010 WAM
Energy (excl. transport)	100	93.5	NE	100	102.3	NE	100	114.5	NE	NO	NO	NE	100	94.3	NE
Energy supply	100	135.7	NE	100	240.3	NE	100	142.6	NE	NO	NO	NE	100	136.2	NE
Energy – industry, construction	100	109.9	NE	100	89.0	NE	100	110.8	NE	NO	NO	NE	100	109.8	NE
Energy – other (commercial, residential, agriculture)	100	38.2	NE	100	89.8	NE	100	91.7	NE	NO	NO	NE	100	40.8	NE
Transport (energy)	100	115.4	NE	100	27.6	NE	100	109.2	NE	NO	NO	NE	100	114.9	NE
Industrial processes	100	112.0	NE	100	133.1	NE	100	63.2	NE	100	192.3	NE	100	111.3	NE
Waste	100	226.9	NE	100	43.1	NE	100	71.7	NE	NO	NO	NE	100	47.5	NE
Agriculture	100	NO	NE	100	87.8	NE	100	84.9	NE	NO	NO	NE	100	86.0	NE
Other	100	0.05	NE	NE	NE	NE	100	0.2	NE	NO	NO	NE	100	0.1	NE
Total (excl. LULUCF)	100	101.8	NE	100	68.4	NE	100	86.1	NE	100	192.3	NE	100	97.4	NE

Key:
WEM: 'with existing measures' projection
WAM: 'with additional measures' projection

Source: Sweden's national report submitted to the European Commission under Article 3(2) of the Monitoring Mechanism, Decision 280/2004/EC. Report dated March 2007.
Annual greenhouse gas inventory 1990 - 2006 and inventory report, 14 April 2008.

Table 4. Summary of projections in 2010 compared to base year emissions under the Kyoto Protocol

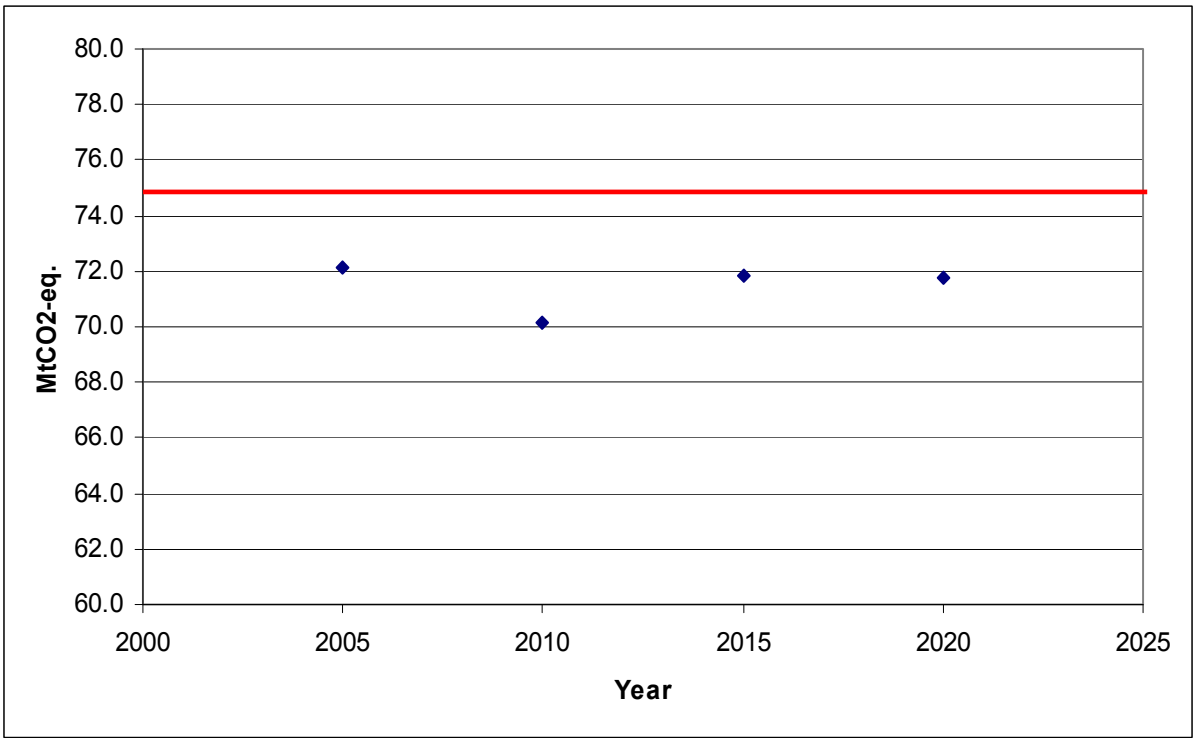
	Unit	Base-year emissions under the Kyoto Protocol	2010 projections 'with existing measures'	2010 projections 'with additional measures'
Total GHG emissions (excluding LULUCF)	Mt CO_2-eq.	72.2	70.2	NE
	Index (base-year emissions = 100)	100	97.2	NE

Source: Sweden's national report submitted to the European Commission under Article 3(2) of the Monitoring Mechanism, Decision 280/2004/EC. Report dated March 2007. Annual greenhouse gas inventory 1990 - 2006 and inventory report, 14 April 2008.

In Figure 1, the same correction factor used in Table 2 has been applied to the projections for 2010, 2015 and 2020. Figure 1 presents the "With Existing Measures" scenario.

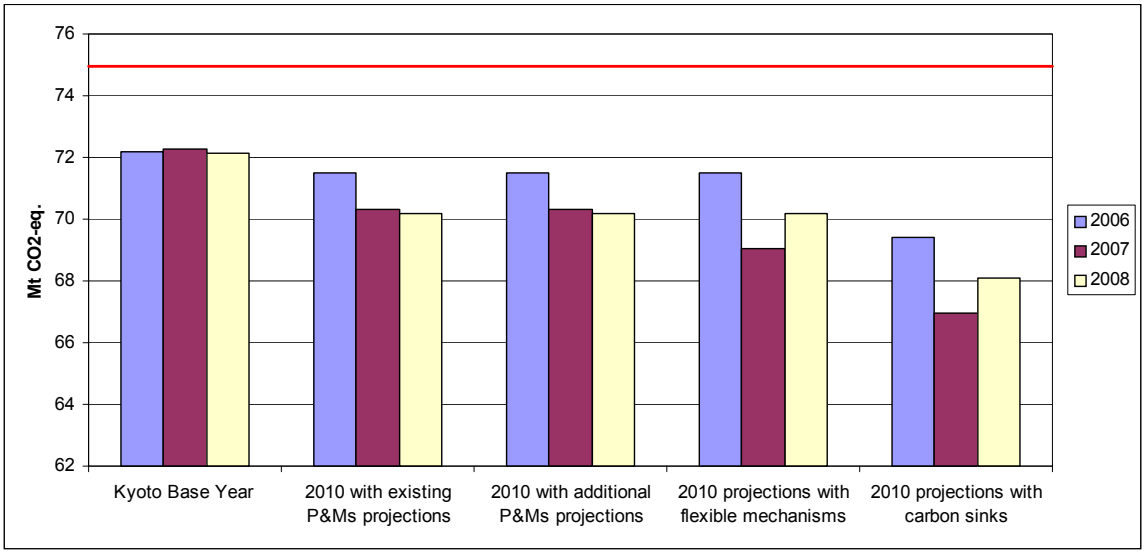
The red lines in Figure 1 and 2 indicate the Kyoto target of 75 Mt CO_2-eq., based on the revised Kyoto base year, 2008.

Figure 1. Greenhouse gas projections in 2010, 2015 and 2020 (Mt CO2–eq.)



Source: Sweden's national report submitted to the European Commission under Article 3(2) of the Monitoring Mechanism, Decision 280/2004/EC. Report dated March 2007.
Annual greenhouse gas inventory 1990 - 2006 and inventory report, 14 April 2008.

Figure 2. Comparison of 2010 projections reported in 2006, 2007 and 2008



Source: Sweden's national report submitted to the European Commission under Article 3(2) of the Monitoring Mechanism, Decision 280/2004/EC. Report dated March 2007. Annual greenhouse gas inventory 1990 - 2006 and inventory report, 14 April 2008. Source for 2006 data is 4th National Communication.

3. CLIMATE CHANGE MITIGATION POLICIES AND MEASURES

A top down calculation of existing measures was not possible as a 'without measures' projection was not provided.

Table 5. Summary of the effect of policies and measures included in the 2010 projections (Mt CO2–eq.)

	Top down calculation		Bottom Up calculation	
	Existing Measures	Planned Measures	Existing Measures	Planned Measures
Energy (total, excluding transport)	NE	NE	10.0	NE
Energy supply	NE	NE	NE	NE
Energy – industry, construction	NE	NE	NE	NE
Energy – other (commercial, residential, agriculture)	NE	NE	NE	NE
Transport (energy)	NE	NE	3.3	NE
Industrial processes	NE	NE	0.4	NE
Waste	NE	NE	1.4	NE
Agriculture	NE	NE	0.0	NE
Cross-sectoral	NE	NE	2.0	NE
Total (excluding LULUCF)	NE	NE	17.1	NE

Note: The effects of measures detailed above are calculated firstly by determining the difference between total projections in each scenario ('top down calculation') and secondly by summing the reported effect of individual measures ('bottom up calculation').

Source: Sweden's national report submitted to the European Commission under the Monitoring Mechanism, Decision 280/2004/EC. Report dated March 2007.

Table 6. Detailed information on Existing Policies and measures

Sector	Projection Scenario	Name	Type	GHG	Status	Absolute Reduction [kt CO2 eq. p.a.] 2005	2010	2020	Costs [EUR/t]
Agriculture	WM	Programme of measures to reduce losses of crop nutrients	Economic Education	CH_4 N_2O	implemented	details			
Agriculture	WM	Targeted environmental payments in the environment and rural development programme	Economic	CH_4 N_2O	implemented	details			
Cross-cutting Energy supply	WM	Energy tax	Fiscal	CO_2	implemented	Cluster value	Cluster value	Cluster value	
Cross-cutting Energy supply	WM	Carbon dioxide tax	Fiscal	CO_2	implemented	Cluster value	Cluster value	Cluster value	
Cross-cutting	WM	The Environ mental Code	Regulatory	CH_4 CO_2 HFC N_2O PFC SF_6	implemented	details			
Cross-cutting	WM	Local Investment Programme (LIP)	Economic	CH_4 CO_2 HFC N_2O PFC	expired	1,500	1,500	1,500	

				SF_6				
Cross-cutting	WM	Climate Investment Programme (KLIMP)	Economic	CH_4 CO_2 HFC N_2O PFC SF_6	implemented	500	500	500
Cross-cutting	WM	Climate Information Campaign	Education	CH_4 CO_2 HFC N_2O PFC SF_6	expired	details		
Cross-cutting	WM	EU Emissions trading scheme	Economic	CO_2	implemented	Cluster value	Cluster value	Cluster value
Energy consumption	WM	Subsidies for energy advisory services	Education	CO_2	implemented	details		
Energy consumption	WM	Subsidies for technology procurement	Economic	CO_2	implemented	details		
Energy consumption	WM	Energy labelling	Education	CO_2	implemented	details		
Energy consumption	WM	Law on energy declaration for buildings	Regulatory	CO_2	implemented	details		
Energy consumption	WM	Energy efficiency campaign	Information	CO_2	implemented	details		

Energy consumption	WM	Implementation of the Energy Performance of Building Directive	Information	CO_2	adopted	details		
Energy consumption	WM	Programme for Energy efficiency improvement	Voluntary/ negotiated agreement	CO_2	implemented	details		
Energy consumption	WM	Programme for reduced electricity use 1990-2002	Economic	CO_2	expired			800
Energy consumption	WM	Building regulations standards for energy effficiency	Regulatory	CO_2	implemented	details		
Energy supply	WM	Investment support for conversion from oil	Economic	CO_2	implemented	details		
Energy supply	WM	Investment support for conversion from direct-acting electric heating	Economic	CO_2	implemented	details		
Energy supply	WM	Reduced tax for wind power	Fiscal	CO_2	implemented	details		
Energy supply	WM	Law on guarantees of origin	Regulatory	CO_2	implemented	details		
Energy supply	WM	Programme for increased supply of electricity from renewables, 1990-2002	Economic	CO_2	expired	Cluster value	Cluster value	Cluster value
Energy supply	WM	Electricity certificate system	Economic	CO_2	implemented	Cluster value	Cluster value	Cluster value
Industrial Processes	WM	F-gas regulation including mobile air condistironers directive	Regulatory	HFC PFC SF_6	implemented		150	400
Industrial Processes	WM	Application of the Environmental Code	Regulatory	HFC PFC	implemented		200	200

				SF_6				
Forestry	WM	Provisions on drainage i the Environmental code	Regulatory	CH_4 CO_2	implemented	details		
Forestry	WM	provisions on nature reserves and habitat protection	Regulatory	CO_2	implemented	details		
Forestry	WM	Provisions on forest stewardship	Regulatory	CO_2	implemented	details		
Forestry	WM	Voluntary set-asides	Voluntary/ negotiated agreement	CO_2	implemented	details		
Transport	WM	Tax relief on biomass fuels	Fiscal	CO_2	implemented	300	400	400
Transport	WM	Motor fuel taxes	Fiscal	CO_2	implemented	2,350 more	2,500 more	2,800 more
Transport	WM	Implementation of the automotive industry's commitment on lower carbon dioxide emissions from new cars	Voluntary/ negotiated agreement	CO_2	implemented	details		
Transport	WM	Taxation of cars received as benefit	Fiscal	CO_2	implemented	200	200	200
Transport	WM	Law on supply of renewable fuels	Regulatory	CO_2	implemented	details		
Transport	WM	Support for renewable fuels	Economic	CO_2	implemented	details		
Transport	WM	Instruments for increased introduction of greeen cars	Regulatory	CO_2	implemented	100	200	200

Transport	WM	Vehicle tax	Fiscal	CO_2	implemented	details		
Waste	WM	Rules on municipal waste planning, rules on producer responsibility for certain goods, tax on landfilling of waste, prohibition of landfilling	Fiscal Regulatory	CH_4	implemented	800	1,400	1,900
Cross-cutting		Combined emission reduction of	Economic		expired			
Energy supply		SE-CRS-300 SE-CRS-301 SE-CRS-308 SE-ENS-190 SE-ENS-191	Fiscal	CO_2	implemented Other	700	10000	38000

Source: Öko Institut, (accessed 7th July 2008), ECCP Policies and Measures database, http://www.oeko.de/service/pam/index.php

Table 7. Status of national policies and measures (PAM) in relation to European common and coordinated policies and measures (CCPM)

Status	CCPM	Sector
National policies and measures already in force **before** CCPM was adopted	Promotion of cogeneration 2004/8/EC	Energy supply
	Promotion of electricity from RE sources 2001/77/EC	Energy supply
	Eco-management & audit scheme (EMAS) EC 761/2001	Energy consumption
	Support for rural development from EAGGF (1257/1999)	Agriculture
	Nitrates directive 91/676/EEC	Agriculture
	Landfill directive 1999/31/EC	Waste
Existing national policies and measures **reinforced** by CCPM	Integrated pollution prevention and control 96/61/EC	Cross-cutting
	Taxation of energy products 2003/96/EC	Energy supply
	Internal electricity market 2003/54/EC	Energy supply
	Internal market in natural gas 98/30/EC	Energy supply
	Promotion of biofuels for transport 2003/30/EC	Transport
	Transport modal shift to rail 2001/12/EC etc.	Transport
New national policies and measures implemented after CCPM was adopted	Kyoto Protocol project mechanisms 2004/101/EC	Cross-cutting
	Emissions trading 2003/87/EC	Cross-cutting
	Directives on energy labelling of appliances	Energy consumption
	Energy performance of buildings 2002/91/EC	Energy consumption
	Energy labelling for office equipment 2422/2001	Energy consumption
	Efficiency fluorescent lighting 2000/55/EC	Energy consumption
	Efficiency of hot water boilers 92/42/EEC	Energy consumption
	Motor challenge, voluntary EC programme	Energy consumption
	Consumer information on cars 1999/94/EC	Transport
	Agreement with car manufacturers ACEA etc.	Transport
	HFCs in mobile air conditioning 2006/40/EC	Transport
	F-gas regulation (842/2006)	Industrial Process
	Support under CAP (1782/2003)	Agriculture
	Support under CAP - amendment (1783/2003)	Agriculture
Status of national policy or measure **not reported**	Ecodesign requirements for energy-using products 2005/32/EC	Energy consumption
	End-use efficiency and energy services 2006/32/EC	Energy consumption
	Integrated European railway area (COM(2002)18 final)	Transport
	Marco Polo programme on freight transport	Transport
	Rural development support and CAP(2603/1999, 1698/2005 and 1290/2005)	Agriculture
	Support scheme for energy crops under CAP (795/2004)	Agriculture
	Pre-accession measures for agriculture and rural development (1268/1999)	Agriculture

Packaging and packaging waste (94/62/EC, 2004/12/EC, 2005/20/EC)	Waste
Directive on waste 2006/12/EC	Waste

Source: MS responses to the CCPMs questionnaire, 2005. Personal communications.

4. METADATA

Sources of information

Sweden's national report submitted to the European Commission under the Monitoring Mechanism, Decision 280/2004/EC. Report dated March 2007.

Sweden's 4th National Communication submitted to the UNFCCC, dated 30 December 05.

Sweden's 2008 GHG inventory submission, CRF tables submitted 14 April 2008, as accessed through the EEA GHG data viewer,
http://dataservice.eea.europa.eu/PivotApp/pivot.aspx?pivotid=455.

Base-year emissions from the UNFCCC website,
http://unfccc.int/ghg_data/kp_data_unfccc/base_year_data/items/4354.php

European Climate Change Programme (ECCP), Database on Policies and Measures in Europe http://www.oeko.de/service/pam/index.php

Kyoto base-year emissions

Kyoto base-year emissions are presented throughout, except Table 1 which presents projections reference year emissions (see below). Kyoto base year emissions of greenhouse gases were calculated using 1990 emissions for carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) and 1995 emissions for fluorinated gases (SF_6, HFCs and PFCs).
These base-year emissions include emissions from LULUCF under Art. 3.7 of the Kyoto Protocol.

Kyoto base-year emissions have now been reviewed and set for all EEA countries.

Projections reference year emissions

Projections reference year emissions are presented in Table 1.

Projections reference year emissions are defined as projections-consistent emissions data for a given historic year, as chosen by the Member State. Inventory recalculations from year to year may mean that latest inventory data cannot be compared with projections based on older inventory data. Where such an inconsistency has arisen, MS projections have been corrected by applying the following formula, in Table 2:

Corrected projection = reported projections * latest inventory total GHG emissions / Table 1 reported total GHG emissions for the same reference year

Quality of Reporting

Member State reporting in the sources detailed above was assessed semi-qualitatively. Scoring was attributed according to the level of detail and clarity: from o (representing not reported) to +++ (representing very detailed and/or clear reporting). Guidance used for this assessment included the reporting requirements laid down in:

- EU legislation: Monitoring Mechanism (280/2004/EC) and Implementing Provisions (2005/166/EC)
- UNFCCC reporting guidelines for national communications available in English, French, Spanish ("Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications - FCCC/CP/1999/7")

The following tables detail reporting considered to be best practice for the purposes of this assessment.

Information provided	**Example of good practice**
Policy names	Clear names and description provided with unique identifier.
Objectives of policies	Good description of objectives
Types of policies	Type of policy instrument specified e.g. regulatory, fiscal
Which greenhouse gases?	Specifies which gases each PAM affects
Status of Implementation	Clear for each PAM: planned, adopted, implemented, expired
Implementation body	Clear which authorities are responsible for implementation
Quantitative assessment of emission reduction effect and cost of policies	Almost all PAMs are actually quantified. Total effect of all PAMs specified. WOM projection provided.
Interaction with other national and EU level policies	Detailed discussion and analysis of policy interactions.
Measures implementing community legislation	Report details which national policies are implementing individual pieces of EU legislation.
Arrangements for flexible mechanisms	Details arrangements for use of flexible mechanisms.
Balance between domestic action and flexible mechanisms	Regarding reductions required to meet Kyoto target, details proportion to result from domestic action and flexible mechanisms.

Category of Information	**Example of good practice**
Projection scenarios	"With Existing Measures" and "With Additional Measures" projections required, "without measures projection" optional.
Policies included in each projection	Clear presentation of the policies included in each projections scenario.
Expressed relative to historic reference year data	Projections are presented alongside consistent historic emissions.
Starting year	Starting year and emissions used as basis for projections is detailed.
Split of projections	Projection split by all 6 gases (or F-gases together), all sectors and years
Presentation of results	Clear, both tables and graphs provided and/or used excel reporting template.
Description of methodologies	Description of approach, model and assumptions

Sensitivity analysis	Was an analysis carried out to determine the sensitivity of projections to variance in the input parameters? Are high medium and low scenarios presented?
Discussion of uncertainty	Is an uncertainty range for the projections provided?
Details of parameters and assumptions	Are parameters as required under Monitoring Mechanism 280/2004/EC reported?
Indicators for projections	Are indicators for projections as required under Monitoring Mechanism 280/2004/EC reported?

The Monitoring Mechanism report and accompanying Excel template provided good descriptions of policies and measures (PAMs). Most PAMs were quantified either individually or as a group per sector. However there was no quantification of PAMs reported for the first time in the 2007 Monitoring Mechanism report, ie those that were introduced since Sweden's submission of its 4th National Communication.

The projections were clearly and comprehensively reported, with a split of projections by greenhouse gases and by sectors according to the Common Reporting Format (CRF).

Nearly all projection indicators and some parameters were provided. Limited information was provided about model sensitivity and uncertainty.

Table 8. Information provided on policies and Kyoto flexible mechanisms

Information provided	Level of information provided	Comments
Policy names	+++	Clear description
Objectives of policies	+++	Good description of objectives
Types of policies	+++	
Which greenhouse gases?	+++	Specifies which gases each PAM deals with; all gases covered.
Status of Implementation	+++	Clear for each PAM, either implemented or expired.
Implementation body	+++	Specified for each PAM
Quantitative assessment of emission reduction effect and cost of policies	++	Most PAMs quantified, either individually or as a group per sector.
Interaction with other national and EU level policies	+++	Reported in 4th NC.
Measures implementing community legislation	+++	Reported in 4th NC.
Arrangements for flexible mechanisms	+++	
Balance between domestic action and flexible mechanisms	+++	Clear.

Table 9. Information provided on projections

Category of Information	Level of information provided	Comments
Projection scenarios	+++	With Existing Measures (WM) scenario. WAM not considered as target will be reached WM.
Policies included in each projection	+++	Clear all measures fall under the WM scenario as no WAM projection.
Expressed relative to base year	+++	Projections presented relative to 1995 for F-gases and 1990 for other gases.
Starting year	+++	The starting year is 2004 for all sectors, except Agriculture which used 2000.
Split of projections	+++	Split by all gases (F-gases together) and sectors.
Presentation of results	+++	Clearly presented in MM report and accompanying Excel template. Report has tables as well as graphs.
Description of methodologies (approach, model and assumptions)	++	Good description of models, some discussion of assumptions.
Sensitivity analysis	+	One sensitivity alternative, only for energy sector (higher GDP alternative).
Discussion of uncertainty	0	
Details of parameters and assumptions	++	Most mandatory parameters reported
Indicators for projections	+++	Full set of indicators reported.

Parameters for projections are presented in Table 10. MS. Parameters used for the projections are presented. Parameters not included were not used in the projections. Note that figures for 2010 and 2020 in the energy sector are interpolations of 2015 and 2025.

Table 10. Parameters for Projections

			Central Economic Scenario						High Economic Scenario				
1. Mandatory parameters on projections	**units**	**Base Year**	**2004**	**2005**	**2010**	**2015**	**2020**	**2025**	**2005**	**2010**	**2015**	**2020**	**2025**
Assumptions for general economic parameters													
GDP (value at given years)	Value (Euro 2000 basis)	213331.40	282007.20	290194.49	324380.62	364516.47	403950.45	447650.46	290194.49	329054.63	374203.50	419111.46	469408.79
GDP growth rate	Annual growth rate			2.90	2.36	2.36	2.08	2.08	2.90	2.60	2.60	2.29	2.29
Population (value at given years)	Thousand People	8.59	9.01	9.05		9.5		9.9	9.05		9.5		9.9
Population growth rate	% of 2005 value												
International coal prices	USD/tonne		55	54	49	50.5	50	50.5	54	49	50.5	50	50.5
International oil prices	USD/Barrel		36	35.83	35.00	38	37	38	35.83	35	38	37	38
International gas prices	USD/Mbtu		4.2	4.33	5.00	5.3	5.2	5.4	4.33	5	5.3	5.2	5.4
Assumptions for the energy sector													
Total gross inland consumption	Petajoule (PJ)	1058.67	1289.41	1316.11	1449.62	1583.14	1663.99	1744.84	1319.73	1452.63	1623.00	1724.67	1826.34
Oil (fossil)	Petajoule (PJ)	683.39	732.24	740.18	779.89	819.59	871.55	923.51	742.32	799.39	843.14	911.32	979.50
Gas (fossil)	Petajoule (PJ)	23.52	36.90	40.58	59.00	77.42	82.45	87.47	40.64	54.75	78.10	84.52	90.94
coal	Petajoule (PJ)	111.43	109.89	111.35	118.64	125.92	122.58	119.24	111.70	116.31	129.78	127.00	124.22
Solid bio-fuels	Petajoule (PJ)	240.32	401.01	411.57	464.41	517.24	541.30	565.36	412.49	458.32	527.31	553.84	580.37
Liquid bio-fuels	Petajoule (PJ)	0.00	6.31	7.38	12.75	18.11	21.19	24.28	7.43	12.20	18.64	22.01	25.37
solar	Petajoule (PJ)												
wind	Petajoule (PJ)	0.00	3.06	5.04	14.95	24.85	24.91	24.97	5.15	11.66	26.04	25.99	25.94
geothermal	Petajoule (PJ)												
Hydro	Petajoule (PJ)	261.03	218.25	220.85	233.85	246.85	246.85	246.85	220.85	228.97	246.85	246.85	246.85
Nuclear (IEA	Petajoule (PJ)	728.63	817.4	814.86	802.03	789.20	789.20	789.20	814.86	806.85	789.20	789.20	789.20

definition for energy calc.)			3										
Net Electricity import (-+)	Petajoule (PJ)	-6.36	-7.57	-13.84	-45.17	-76.50	-67.92	-59.34	-13.13	-26.05	-68.73	-56.85	-44.97
Other Please Specify													
Heat received from industry, dwellings, services etc.		27.77	40.28	38.84	31.66	24.48	24.76	25.04	38.94	34.79	25.49	25.64	25.79
Total electricity production	Gwhe	7051.43	16427.89	17462.36	22634.70	27807.04	27829.61	27852.19	17505.97	20930.98	28286.77	28436.14	28585.51
Oil (fossil)	Gwhe	1810.56	2416.39	2271.30	1545.88	820.45	722.37	624.29	2271.73	1782.01	825.14	724.71	624.29
Gas (fossil)	Gwhe	464.44	858.06	1336.44	3728.35	6120.27	5989.48	5858.69	1335.74	2848.44	6112.63	6165.74	6218.86
coal	Gwhe	2377.78	4129.72	4146.39	4229.76	4313.12	3682.10	3051.08	4175.29	4091.99	4630.99	4029.11	3427.22
Renewable	PJ	2398.65	9023.72	9708.22	13130.71	16553.20	17435.67	18318.14	9723.20	12208.54	16718.00	17516.57	18315.14
Nuclear (IEA definition for energy calc.)	GWh	728.63	817.43	814.86	802.03	789.20	789.20	789.20	814.86	806.85	789.20	789.20	789.20
Other Please Specify													
Energy demand by sector (delivered)		1590.12	1716.69	1735.37	1828.80	1922.23	1954.10	1985.96	1743.16	1838.76	2007.90	2054.94	2101.98
Energy Industries	Petajoule (PJ)	829.35	914.56	924.32	973.10	1021.89	1018.95	1016.01	929.75	972.92	1081.71	1082.91	1084.11
Oil (fossil)	Petajoule (PJ)	21.33	22.75	21.09	12.76	4.44	3.72	3.01	21.09	15.63	4.49	3.75	3.01
Gas (fossil)	Petajoule (PJ)	8.83	12.28	14.79	27.36	39.92	39.12	38.32	14.80	22.81	40.02	40.36	40.70
coal	PJ	38.17	27.71	27.92	28.99	30.05	23.15	16.25	28.10	26.78	32.00	25.23	18.45
Renewables	PJ	32.02	34.81	46.05	102.27	158.48	163.95	169.42	51.30	105.97	216.19	224.57	232.95
Nuclear (IEA definition for energy calc.)		729.00	817.00	814.45	801.73	789.00	789.00	789.00	814.45	801.73	789.00	789.00	789.00
Industry	Petajoule (PJ)	301.09	354.46	360.02	387.87	415.71	436.96	458.22	361.22	391.96	428.84	454.48	480.12
Oil (fossil)	Petajoule (PJ)	74.58	67.55	67.92	69.74	71.57	69.21	66.85	68.10	69.04	73.64	71.53	69.43
Gas (fossil)	Petajoule (PJ)	10.37	15.82	16.45	19.60	22.74	27.61	32.48	16.52	20.60	23.44	28.55	33.66
coal	PJ	62.11	64.90	65.95	71.20	76.44	79.43	82.42	66.12	71.23	78.33	81.77	85.20
Renewables	PJ	154.03	206.18	209.70	227.33	244.96	260.71	276.46	210.47	231.09	253.42	272.62	291.82
Commercial (Tertiary)	Petajoule (PJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Oil (fossil)	Petajoule (PJ)												
Gas (fossil)	Petajoule (PJ)												
coal													
Renewables													
Residential	Petajoule (PJ)	194.21	131.86	130.91	126.12	121.34	112.28	103.22	130.91	124.53	121.38	112.30	103.22
Oil (fossil)	Petajoule (PJ)	148.01	78.15	75.65	63.14	50.64	42.37	34.09	75.65	64.73	50.64	42.37	34.09
Gas (fossil)	Petajoule (PJ)	4.33	8.00	8.46	10.75	13.04	13.28	13.52	8.46	9.98	13.04	13.28	13.52
coal		1.71	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Renewables	PJ	40.15	45.71	46.79	52.22	57.65	56.63	55.60	46.80	49.81	57.69	56.65	55.60
Transport	Petajoule (PJ)	265.47	315.81	320.13	341.71	363.29	385.91	408.52	321.28	349.35	375.98	405.25	434.53
Oil (fossil)	Petajoule (PJ)	265.47	308.70	311.86	327.67	343.48	362.29	381.10	312.97	335.75	355.62	380.82	406.02
Gas (fossil)	Petajoule (PJ)	0.00	0.80	0.88	1.29	1.71	2.43	3.14	0.88	1.41	1.71	2.43	3.14
coal													
Renewables	PJ	0.00	6.31	7.38	12.75	18.11	21.19	24.28	7.43	12.20	18.64	22.01	25.37
Assumptions on weather parameters, especially heating or cooling degree days													
Heating Degree Days	Annual HDD	81.7	94.1	92.4	100	100	100	100	92.4	100	100	100	100
Cooling Degree Days	Annual CDD												
Assumptions for the industry sector													
Gross value-added total industry, Bio Euro (EC95) 2000	Value (Euro 2000 basis)		56.02	56.57	70.81	86.07	101.93	120.70	56.57	72.24	89.29	106.85	127.85
For Member States using macroeconomic models:													
The share of the industrial sector in GDP and growth rate													
For Member States using other models:													
The production index for industrial sector													
Energy Intensive	Index units (Base Year 100)	100.00	160.39			211.60		258.18			219.40		272.69

Non Energy Intensive	Index units (Base Year 100)	100.00	204.22			330.99		483.18			343.43		512.18
Assumptions for the transport sector													
For Member States using macroeconomic models:													
The growth of transport relative to GDP													
For Member States using other models:													
The growth of passenger person kilometres													
The growth of freight tonne kilometres													
Assumptions for buildings (in residential and commercial or tertiary sector)													
For Member States using macroeconomic models:													
The level of private consumption (excluding private transport)													
The share of the tertiary sector in GDP and the growth rate													
For Member States using other models:													
The rate of change of floor space for tertiary buildings and dwellings													
The number of dwellings and number of employees in the tertiary sector													
The number of dwellings	1000 dwellings			4316	4503	4690	4840						
The number of emplyees in the tertiary sector													

Assumptions in the agriculture sector													
For Member States using macroeconomic models:													
The share of the agriculture sector in GDP and relative growth													
For Member States using other models:													
Livestock numbers by animal type													
Total Cattle	1000 heads	1718	0	1605	1460	1460	1460			0	0	0	
Dairy cattle	1000 heads	576		393	360	360	360						
Non-dairy cattle	1000 heads	1142		1212	1100	1100	1100						
sheep	1000 heads	406		471	500	500	500						
swine	1000 heads	2264		1811	2000	2000	2000						
poultry	1000 heads	15200		17154	17000	17000	17000						
Other, please specify	1000 heads												
Goats		4		5.5	5	5	5						
Horses		300		283	300	300	300						
Reindeer		271		251	220	220	220						
The area of crops by crop type													
Emissions factors by type of livestock for enteric fermentation and manure management													
Enteric fermentation Dairy cattle	Kg CH4 / animal and year are used	130	130	130	130	130	130						
Enteric fermentation Non-dairy cattle - suckler cows	Kg CH4 / animal and year are used	98	98	98	98	98	98						
Enteric fermentation Non dairy cattle - other cattle	Kg CH4 / animal and year are used	50	50	50	50	50	50						
Enteric fermentation sheep	Kg CH4 / animal and year are used	8	8	8	8	8	8						
manure	Kg CH4 / animal	18.14	18.14	18.14	18.14	18.14	18.14						

management Dairy cattle	and year are used												
manure management Non-dairy cattle	Kg CH4 / animal and year are used	4.89	4.89	4.89	4.89	4.89	4.89						
manure management sheep	Kg CH4 / animal and year are used	0.19	0.19	0.19	0.19	0.19	0.19						
manure management Swine	Kg CH4 / animal and year are used	2.49	2.49	2.49	2.49	2.49	2.49						
manure management Poultry	Kg CH4 / animal and year are used	0.078	0.087	0.078	0.078	0.078	0.078						
Fertilizer use & Crops													
Synthetic fertilizers	tonnes of nitrogen per year		179700	170000	170000	170000	170000						
Farmyard manure	tonnes of nitrogen per year		65296	65400	65400	65400	65400						
Pasture manure	tonnes of nitrogen per year		41180	42200	42200	42200	42200						
Assumptions in the waste sector													
Waste generation per head of population or tonnes of municipal solid waste													
The organic fractions of municipal solid waste													
Municipal solid waste disposed to landfills, incinerated or composted (in tonnes or %)	kt	0		422	82	91	100						
Assumptions in the forestry sector													
Forest definitions	Forest land is defined as land with a tree crown cover of more												

	than 10%, an area of more than 0.5 ha and trees that should be able to reach a minimum height of 5 m at maturity.												
Areas of:													
managed forests	Hectares	27966000		28939000	28939000	28939000	28939000						
unmanaged forests													

Total electricity production	Gwhe	7051.43	16427.89	17462.36	22634.70	27807.04	27829.61	27852.19	17505.97	20930.98	28286.77	28436.14	28585.51
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Nuclear (IEA definition for energy calc.)	GWh	728.63	817.43	814.86	802.03	789.20	789.20	789.20	814.86	806.85	789.20	789.20	789.20

2. Recommended parameters on projections	2005	2010	2015	2020	Units
Assumptions for general economic parameters					
GDP growth rates split by industrial sectors in relation to 2000					
Comparison projected data with official forecasts					
Assumptions for the energy sector					
National coal, oil and gas energy prices per sector (including taxes)					
National electricity prices per sector as above (may be model output)					
Total production of district heating by fuel type					
Assumptions for the industry sector					
Assumptions fluorinated gases:					
Aluminium production and emissions factors					
Magnesium production and emissions factors					
Foam production and emissions factors					
Stock of refrigerant and leakage rates					
For Member States using macroeconomic models:					
Share of GDP for different sectors and growth rates					
Rate of improvement of energy intensity (1990 = 100)					
For Member States using other models:					
Index of production for different sectors					
Rate of improvement or index of energy efficiency					
Assumptions for buildings (in residential and commercial / tertiary sector)					
For Member States using macroeconomic models:					
Share of tertiary and household sectors in GDP					
Rate of improvement of energy intensity					
For Member States using other models:					
Number of households					
Number of new buildings					
Rate of improvement of energy efficiency (1990 = 100)					
Assumptions for the transport sector					
For Member States using econometric models:					
Growth of transport relative to GDP split by passenger and freight					
Improvements in energy efficiency split by vehicle type					
Improvements in energy efficiency split by vehicle type, whole fleet/new cars					

Rate of change of modal split (passenger and freight)					
Growth of passenger road kilometres					
Growth of passenger rail kilometres					
Growth of passenger aviation kilometres					
Growth of freight tonne kilometres on road					
Growth of freight tonne kilometres by rail					
Growth of freight tonne kilometres by navigation					
Assumptions for the agriculture sector					
For Member States using econometric models:					
Agricultural trade (import/export)					
Domestic consumption (e.g. milk/beef consumption)					
For Member States using other models:					
Development of area of crops, grassland, arable, set-aside, conversion to forests etc					
Macroeconomic assumptions behind projections of agricultural activity					
Description of livestock (e.g. by nutrient balance, output/animal production, milk production)					
Development of farming types (e.g. intensive conventional, organic farming)					
Distribution of housing/grazing systems and housing/grazing period					
Parameters of fertiliser regime:					
Details of fertiliser use (type of fertiliser, timing of application, inorganic/organic ratio)					
Volatilisation rate of ammonia, following spreading of manure on the soil					
Efficiency of manure use					
Parameters of manure management system:					
Distribution of storage facilities (e.g. with or without cover):					
Nitrogen excretion rate of manures					
Methods of application of manure					
Extent of introduction of control measures (storage systems, manure application), use of best available techniques					
Parameters related to nitrous oxide emissions from agricultural soils					
Amount of manure treatment					