Sweden

Sources of information

- Report to the Monitoring Mechanism December 2001
- Sweden's Third National Communication to the UNFCCC, 2001

Quality and transparency of reporting

The information on policies and measures is taken from the monitoring paper and the third national communication. A clear discussion is presented of the aims of the various policies and measures and the policies and measures are summarised in a Table. Good details are provided of the costs and implementation of the policies. For a few measures, quantification of their effect is given but only until 2005.

Table 1: Information provided on policies and measures

Information provided	Level provided	Comments
Policy names	+++	
Objectives of policies	+++	
Which GHGs?	CO_2, CH_4 and halogenated gases	
Status of implementation	+++	
Implementation body specified	+++	
Quantitative assessment of implementation	+	Provided for some but not all measures and only up to 2005
Interaction with other P&Ms discussed	+	Discussed for some measures

The latest projections contain a *with measures* scenario covering all six greenhouse gases with a base year of 1990 for carbon dioxide, methane and nitrous oxide and 1995 for hydrofluorocarbons, perfluorocarbons and sulphur hexafloride. It is not clear which of the individual policies and measures is included in the projections. The totals are disaggregated by gas and by sector (energy, transport, process, agriculture and waste), and individual gases are disaggregated further. For 2010, one projection is provided but for 2020 there are 2 scenarios dependent on assumptions made about the nuclear power plants. The modelling and parameter assumptions made are described with a good level of detail.

Table 2: Information provided on projections

Category of information	Level of information provided	Comments
Scenarios considered	With measures	
Expressed relative to inventory for previous years	Yes 1990–1999 all gases	
Starting year	1990, 1995 for halogenated gases	
Split of projections	++	Projections split by gas and sector but base year emissions not given for all splits
Presentation of results	++	Results presented in both tabular and graphical form. Base year emissions difficult to
Description of model (level of detail, approach and assumptions)	+++	Details of the models and parameter assumptions good
Discussion of uncertainty	+	Some discussion of uncertainty
Details of parameters and assumptions	+++	Good level of detail on energy use in different sectors and on underlying assumptions

Assessment of policies and measures

Table 3 shows an overview of the areas in which policies and measures are defined. Many of the policies are not quantified. Table 4 gives more details of the measures.

Table 3: Overview of national policies and measures ($MtCO_2$)

	With measures[a]	With additional measures
Energy supply	1.5[b]	
Business	Nq	
Industrial processes	Nq	
Transport	0.1	
Residential	Nq	Nq
Public	Nq	
Agriculture	Nq	
Land use change	Nq	
Waste management	0.7	
International	0.2	
Total	Nq	

[a] It is not clear whether the policies are included in the *with measures* scenario, these figures represent all implemented policies. Not all measures are quantified.
[b] This figure is for policies in the energy field and will include energy savings in other sectors
Nq not quantified but policies in that area

Table 4: Detailed information on polices and measures

Sector	Name	Objective	GHG affected	Type of instrument	Status	Implementing entity	Estimate of savings ($MtCO_2$)	CCPM
							2005	
Energy	Energy Tax	Reduce energy use in all sectors	CO_2	Fiscal	Implemented	National tax board	8	n
Energy	Taxes on electricity production	Encourage production of electricity from certain fuels	CO_2	Fiscal	Implemented			
Energy	Reform of electricity market	Liberalises the electricity market	CO_2	Fiscal	Implemented	STEM	–	n
Energy	Special pilot project for biomass fuels	Makes biomass fuel more competitive	CO_2	Fiscal	Implemented	STEM	–	n
Energy	Investment grants for biomass fuelled CHP	Increase renewable electricity generation	CO_2	Fiscal	Implemented	STEM	655	n
Energy	Investment grants and subsidies for renewable power	Increase renewable electricity generation	CO_2	Economic	Implemented	STEM	292	n
Energy	Conversion from electric to district heating	Reduce electricity consumption	CO_2	Economic	Implemented	STEM	162	n
Energy	Conversion from electric to other individual heating	Reduce electricity consumption	CO_2	Economic	Implemented	Local Government	57.5	n
Energy	Information, procurement and labelling of new energy technologies	Reduce energy consumption	CO_2	Economic/information	Implemented	STEM	300	n

Sector	Name	Objective	GHG affected	Type of instrument	Status	Implementing entity	Estimate of savings ($MtCO_2$)	CCPM
							2005	
Energy	Measures to develop electric heating supply in Southern Sweden	Need to compensate for closure of Barseback	CO_2	Economic	Implemented	STEM	70	n
Energy	Municpal energy planning	Reduce energy consumption	CO_2	Regulatory	Implemented	STEM	–	n
Energy	Planning, building and housing act	Reduce energy consumption	CO_2	Regulatory	Implemented	National board of housing	–	n
Energy	Environmental code for infrastructure products	Assess impact of projects on climate	CO_2	Regulatory	Implemented	Swedish Environmental Protection Agency	–	n
Energy	Standards for energy use in residential and commercial properties	Reduced energy consumption	CO_2	Regulatory	Implemented	National board of housing	–	n
Energy	Comprehensive municipal planning	Reduce energy consumption	CO_2	Regulatory	Implemented	National board of housing	–	n
Energy	Measures for R&D	R&D to develop new fuels and technologies	CO_2	R&D	Implemented	STEM	–	n
Energy	Local investment programmes for ecological adjustment	Municipal adjustment to achieve ecological sustainability	CO_2	Economic	Implemented	Local Government	–	n
Energy	General environmental factors to be considered under the	Establish certain fundamental principles	CO_2	Regulatory	Implemented	Swedish Environmental Protection Agency	–	n

Sector	Name	Objective	GHG affected	Type of instrument	Status	Implementing entity	Estimate of savings ($MtCO_2$)	CCPM
							2005	
	Environmental Code							
Energy	Investment programmes for ecological buildings	Reduce energy consumption	CO_2	Economic	Implemented	National board of housing	–	n
Waste	Collect landfill gas	Reduce methane emissions	CH_4	Regulatory	Implemented	Swedish Environmental Protection Agency	–	n
Waste	Ban of landfilling of organic waste	More stable landfills and use of waste as a resource	CH_4	Regulatory	Implemented	Municipalities	–	n
Waste	Ban on landfilling of sorted burnable waste	Improvement in disposal of all burnable waste	CH_4/CO_2	Regulatory	Implemented	Swedish Environmental Protection Agency	781	n
Waste	Waste tax	Reduce the quantity of landfilled waste	CH_4	Fiscal	Implemented	Swedish Environmental Protection Agency	–	n
Waste	Landfill directive	Improve waste management	CH_4	Regulatory	Implemented	Swedish Environmental Protection Agency	–	y
Waste	Environmental code requirements for municipal waste management	More efficient waste management	CH_4	Regulatory	Implemented	Swedish Environmental Protection Agency		
Residential	Grants for home solar heating systems	Increase the use of solar energy	CO_2	Regulatory	Implemented	Local Government	4	n

Sector	Name	Objective	GHG affected	Type of instrument	Status	Implementing entity	Estimate of savings ($MtCO_2$)	CCPM
							2005	
Residential	Heat insulation for buildings	Tougher requirements for thermal bridges	CO_2	Regulatory	Implemented	National board of housing	–	n
Residential	Swan criteria for oil burners	Nordic eco-labelling has produced criteria for oil burners with an output up to 120kW	CO_2	Regulatory	Implemented	–	–	n
Residential	Investment grants for ecological building	Reduce energy consumption	CO_2	Economic	Implemented	Ministry of Finance/Board of housing	–	n
Residential	Energy declarations for apartment buildings	Better overview of the energy status of Swedish buildings	CO_2	Regulatory	Proposed	National board of housing	–	n
Residential	Individual metering of heating and hot water	Increasing awareness of energy use	CO_2	Voluntary	Proposed	National board of housing	–	n
Forestry	Start-up grants for energy forests	Cultivation of energy forest	CO_2	Economic	Implemented	National Board of agriculture	–	n
Forestry	Environmental factors to be considered under the Silviculture Act	Sustainable forestry	CO_2	Regulatory	Implemented	National board of forestry	–	n
Forestry	National Board of Forestry recommendatio	Optimise biomass fuel abstraction	CO_2	Regulatory	Implemented	National board of forestry	–	n

Sector	Name	Objective	GHG affected	Type of instrument	Status	Implementing entity	Estimate of savings ($MtCO_2$)	CCPM
							2005	
	ns on forest fuel extraction							
Forestry	Protected areas	Protect certain forest ecosystems	CO_2	Regulatory	Implemented	National board of forestry	–	n
Forestry	Environmentally related forestry certification	Sustainable forestry	CO_2	Misc.	Implemented	National board of forestry	–	n
Forestry	Tighter restrictions on the use of nitrogen fertilisers on forest soils	Reduce N leaching from forest soils	N_2O	Regulatory	Implemented	National board of forestry	–	n
Transport	Procurement of ethanol/petrol hybrid cars	Increase the scope for use of biomass motor fuels	CO_2	Voluntary	Implemented	NUTEK	–	n
Transport	Promoting development and use of IT and traffic information methods	Reduce fuel consumption	CO_2	R&D	Implemented	VV	–	n
Transport	Green car	Reduce fuel consumption	CO_2	R&D	Implemented	Ministry of Industry and Trade	–	n
Transport	Transport quality assurance and Economical Driving transport projects	Reduce fuel consumption	CO_2	Misc.	Implemented	VV	100	n
Transport	Joint	Reduce fuel	CO_2	Misc.	Implemented	NUTEK	–	n

Sector	Name	Objective	GHG affected	Type of instrument	Status	Implementing entity	Estimate of savings ($MtCO_2$)	CCPM
							2005	
	programmes for development of more environmentally compatible vehicles	consumption						
Transport	Greater investment in tramway infrastructure	Make trams more competitive	CO_2	Misc.	Implemented	National rail administration	–	n
Transport	Use of renewable energy to run railways	Reduce impact of transport system on climate	CO_2	Misc.	not given			
Public	The Challenger Municipalities project	Begin phasing out use of fossil fuels inn five municipalities	CO_2	Misc.	Implemented	Municipalities	–	n
Public	Climate objectives set by municipalities	Reduce impact on climate	CO_2	Misc.	Implemented	Municipalities	–	n
Public	General environmental factors to be considered under the Environmental Code	Establish certain fundamental principles governing all activities	CO_2	Regulatory	Implemented	Swedish Environmental Protection Agency		
Industry	Encouraging the introduction of environmental management systems in	Reduce impact on climate	CO_2	Information	Implemented	NUTEK	–	n

Sector	Name	Objective	GHG affected	Type of instrument	Status	Implementing entity	Estimate of savings ($MtCO_2$)	CCPM
							2005	
	SMEs							
Halogenated gases	The Refrigerants Order	Governs the use of refrigerants including halocarbons	F-gases	Regulatory	Implemented	Swedish Environmental Protection Agency	–	n
International	Joint implementation	Improve efficiency of the Baltic energy systems	CO_2	Economic	Implemented	STEM	220	n
International	Participation in world bank Carbon Fund	Develop flexible mechanism	CO_2	Economic	Implemented	Ministry of Industry and Trade	–	n

Evaluation of projections

The projections presented here are those contained in the 3rd National Communication and on the 1990 inventory reported in that document. The breakdown by greenhouse gas is presented in Table 5. The with measures projections meets the Kyoto commitment so a with additional measures projection is not presented.

Table 5: Summary of projections by gas in 2010 ($MtCO_2$)

	Base year	With measures	With additional measures
CO_2	55.8	57.7	
CH_4	6.8	4.7	
N_2O	7.2	7.4	
F-gases	0.5	1.1	
Total	70.4	70.9	
% change rel 1990		+1 %	
CO_2 removals, land use and forestry	–20.3	–24.3	

Table 6 summarises the projections by sector. All sectors except transport and residential are projected to decrease in the with measures projections.

Table 6: Summary of projections by sector in 2010 ($MtCO_2$)

	Base year	**With measures**	**% change relative to 1990**	**With additional measures**	**% change relative 1990 (additional measures)**
Energy[a]	34.6	33.3	–4 %		
Transport	19.7	22.3	+13 %		
Industrial processes and F-gases	5.6	7	+25 %		
Agriculture	8	7.4	–8 %		
Waste management	2.5	1	–60 %		
Total	70.4	70.9			

[a] This is the total for all energy use except for transport

An assessment of the target is presented in Table 7. The commitment is for +4 % compared to 1990 and the with measures projection is +1 %.

Table 7: Assessment of target

	MtCO2 equiv.	% (six gas basket)
Base year from projection	70.4	
Commitment	73.2	+4 %
With existing P&Ms	70.9	1 %
Gap	–2.3	3 %
Additional P&Ms	–	–

Description of modelling approach

Three main model types have been used for projections and scenarios in the Third National Communication.

- Economic-technical models for energy use (National Energy Administration) and energy supply (MARKAL) combined with analytical models for future transport demand (SIKA's passenger and goods transport model).

- Spreadsheet models in which expert assessments are made of future changes in premises (activity data and emission factors). Emissions are quantified using IPCC/UNFCC methodology.
- Statistical analyses and supplementary expert assessments.

The scenarios for carbon dioxide emissions from the energy sector are based on calculations and assessments of developments in the energy system. The energy system comprises energy use as well as supply. Scenarios have been produced for various energy sub-sectors. These are then combined to form an 'energy balance'. Energy consumption is balanced by energy supply. In addition to end use in industry, housing and services, and transport, the user side also includes conversion and distribution losses, as well as international shipping. The supply side comprises total supply of fuel and hydropower generation, nuclear power generation, wind power and net import of electricity. The methods and analyses used are based on a socio-economic perspective.

Method for expert assessments and use of spreadsheet models
The basic approach is the methodology used to determine emissions of greenhouse gases developed by the IPCC and used in the common reporting format under the Climate Convention. In some cases, UN methodology has been supplemented with national emission factors or has been expanded to better describe national conditions. These calculations principally require input data in the form of activity data, emission factors, correction factors and their changes over time. Assessments have been made of the way this input data changes over time as a consequence of the objectives and measures decided up to 1999. This has been done in consultation with experts at various agencies and trade organisations. The advantage of these models is that the same type of input data is used for historical emissions and the time series is thus congruent. The drawback is that input data for the calculations must be determined independently — often in the form of output data from another model or with the help of experts.

Spreadsheet models of this kind are used for projections for halocarbons, methane and nitrous oxide from agriculture, forest sinks of carbon dioxide and methane from waste (landfill).

The drawback of the simple analysis is that the models do not specifically take into account any overlaps or synergies between sectors or policy areas. The estimates of future emissions must therefore be supplemented with expert assessments of the potential impact of current political objectives, measures and instruments on emissions.

Projection parameters for STEM Model

Parameter	1997	2010	Unit
Population		9039000	0.14 % growth per annum (1997–2010)
GDP		1.9	% change per annum (1997–2010)
Renewables Share	47 %	46 %	Includes large-scale hydro
Crude Oil (International price)	19.12	17	USD / barrel
Coal (International price)	44.1	42	USD / tonne
Natural Gas (International price)	2.3	2.6	USD / Mbtu
Transport Passenger growth	118	148	Passenger/km
Freight growth	82	103	Tonnes/km

Source: Questionnaire

Country conclusions

In the document provided under the EU Monitoring Mechanism, the description of the policies in terms of costs and implementation is good. However, the greenhouse gas savings

arising from the policies are stated only for 2005. No additional policies and measures are described as the with measures projection already meets the commitment under the burden sharing agreement.

Details of the methodology and parameters used are good.