

# Finland

## Sources of information

- Reporting of implemented policies and measures by Finland under the Monitoring Mechanism of Community CO<sub>2</sub> and other greenhouse gas emissions (Council Decision 1999/296/EC) — year 2001, December 2001.
- Finland's Third National Communication under the United Nations Framework Convention on Climate Change, 2001.
- Information provided in a questionnaire as part of the Monitoring Mechanism, 2001.

## Quality and transparency of reporting

Finland's Third National Communication provides reasonably comprehensive information about both existing and planned policies and measures and the information is summarised in tabular form. The main area where information is lacking is in the quantitative assessment of policies and measures. There is some quantitative assessment of the combined effect of policies and measures in the 'additional measures' scenario, but not of individual measures. There is no quantification of policies and measures in the 'with measures' scenario. Policies and measures no longer in place are noted.

Individual policies and measures are not costed, however there is a discussion of government expenditure on the energy economy, under a number of broad headings including research and development, promotion of energy conservation and investment aid for renewables.

The latest report under the Monitoring Mechanism, largely takes selected information from the 3NC. The scoring in the tables below relates to the information in the 3NC.

**Table 1: Information provided on policies and measures**

Information provided	Level provided	Comments
Policy names	+++	
Objectives of policies	++	
Which GHGs?	All	
Status of implementation	+++	Clear distinction between existing and planned policies and measures
Implementation body specified	+++	
Quantitative assessment of implementation	+	Information only given on the combined effects of policies and measures in the with 'additional measures scenario'
Interaction with other P&Ms discussed	++	Some discussion on other policies & measures that affect GHG.

+, ++, +++ level of information available increases as the number of + signs increases

Information on projections is presented for a base scenario (taken from Finland's first National Communication), a 'with measures' scenario and a 'with additional measures' scenario. The policies and measures in the 'with measures' and 'with additional measures' scenarios are clearly identified.

The projections are disaggregated by gas (carbon dioxide, methane, nitrous oxide and fluorinated gases) and by sector are presented in both graphical and detailed tabular form. The sectoral disaggregation does not conform to the UNFCCC CRF as all energy-related emissions, with the exception of transport, are reported together. No breakdown for energy supply, domestic, industry, services etc is available.

**Table 2: Information provided on projections**

Category of information	Level of information provided	Comments
Scenarios considered	Base, with measures, with additional measures	
Expressed relative to inventory for previous years	Yes	
Starting year	2000	
Split of projections	++	No sectoral breakdown for energy-related emissions.
Presentation of results	+++	Detailed tables provided by sector
<b>Description of model (level of detail, approach and assumptions)</b>	++	Good description of various modelling approaches
Discussion of uncertainty	++	There is a qualitative discussion of the sensitivity of the results to input assumptions.
<b>Details of parameters and assumptions</b>	+	Most parameters are described only qualitatively

+, ++, +++ level of information available increases as the number of + signs increases

## Assessment of policies and measures

Information on policies and measures is clearly presented. Quantification of the effect of policies and measures is only given for the planned measures that are contained in the 'with additional measures' projection. Table 3 shows the effect of these measures.

**Table 3: Summary of the effect of policies and measures included in the projections (MtCO<sub>2</sub>)**

	With measures	With additional measures
<b>Energy</b>		
<i>Energy conservation</i>		3–4
<i>Promotion of renewable sources of energy</i>		4–5
<i>Action concerning electricity production</i>		6–0
<b>Other sectors</b>		
<i>Measures concerning other greenhouse gases</i>		>1
Total		14

Table 4 provides a detailed breakdown of both implemented and planned policies and measures.

Table 4: Detailed information on policies and measures

Sector	Name	Objective	GHG affected	Type of instrument	Status	Implementing entity	Estimate of savings (MtCO <sub>2</sub> )		CCPM
							2010	2020	
<b>Policies and measure in the with measures projection</b>									
Energy	Electricity Market Act	Increase competition	CO <sub>2</sub>	Regulatory	Implemented 1995 & modified in 1997	Ministry of Trade & Industry			y
Energy	Energy Taxation	Reduce energy consumption & to improve competitiveness of renewables	CO <sub>2</sub>	Fiscal	Implemented — latest change in 1998	Ministry of Finance			n
Energy	Energy Conservation Programme	To reduce energy consumption	CO <sub>2</sub>	Technical, regulatory, economic, information, education	Implemented 1995	Ministry of Trade & Industry, Motiva Oy			n
Energy	Voluntary agreement on energy conservation & energy auditing	Agreements on monitoring, conservation plans, energy audits, energy investment, new technology	CO <sub>2</sub>	Voluntary agreement	Implemented 1997	Ministry of Trade & Industry, Motiva Oy, industry, municipalities			n
Energy	Action plan for renewable energy	Reduce CO <sub>2</sub> & non GHG emissions	CO <sub>2</sub>	Fiscal, technical, information, education, economic	Implemented	Ministry of Trade & Industry			y

Sector	Name	Objective	GHG affected	Type of instrument	Status	Implementing entity	Estimate of savings (MtCO <sub>2</sub> )		CCPM
							2010	2020	
Energy	R&D	Reduce CO <sub>2</sub> & non GHG emissions	CO <sub>2</sub>	Technical, information, education, Voluntary agreement	Implemented	Ministry of Trade & Industry			y
Transport	Voluntary agreement with European, Japanese & Korean car industries	Reduction of CO <sub>2</sub> emissions from passenger cars	CO <sub>2</sub>	Voluntary agreement	Implemented	EU with car industry			y
Transport	Differentiation of vehicle taxation	Promoting purchase & use of energy-efficient vehicles	CO <sub>2</sub>	Fiscal	Planned	National government			n
Transport	Promotion of public & non-motorised transport	Increasing share of public & non-motorised transport	CO <sub>2</sub>	CO <sub>2</sub> , N <sub>2</sub> O	Implemented, new measures planned	National government in co-operation with local authorities			n
Transport	Eco-driving	Adoption of eco-efficient driving skills & habits	CO <sub>2</sub>	Information, education, economic	Implemented	National government in co-operation with local driving schools			n
Transport	Energy saving	Adoption of energy saving agreements between administration & transport operators	CO <sub>2</sub>	Voluntary agreement	Implemented, new arrangements in preparation	National government in co-operation with transport operators			n

Sector	Name	Objective	GHG affected	Type of instrument	Status	Implementing entity	Estimate of savings (MtCO <sub>2</sub> )		CCPM
							2010	2020	
Waste Management	Government decisions on landfills	Reduce CH <sub>4</sub> emissions	CH <sub>4</sub>	Regulatory	Implemented	Ministry of the Environment			y
Waste Management	Waste minimisation, collection & recovery of waste paper & other waste fractions	Reduce CH <sub>4</sub> emissions	CH <sub>4</sub>	Regulatory	Implemented	Ministry of the Environment			n
Waste Management	Waste tax	Reduce CH <sub>4</sub> emissions	CH <sub>4</sub>	Fiscal	Implemented	Ministry of Finance			n
Agriculture	Agenda 2000, including agri-environmental measures	Reduce GHG emissions	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	Economic	Implemented	Ministry of Agriculture & Forestry			n
<b>Policies and measures in the with additional measures projection</b>									
Energy	Revised energy conservation programme	Reduce energy consumption	CO <sub>2</sub>	Technical, information, education, fiscal	Planned	Ministry of Trade & Industry, Motiva Oy, Ministry of Finance, Ministry of the Environment			n
Energy	New action plan for renewable energy	Reduce CO <sub>2</sub> & non-GHG emissions	CO <sub>2</sub>	Fiscal, technical, information, education, economic	Adopted	Ministry of Trade & Industry			y
Energy	Supply of electricity	Reduce CO <sub>2</sub> emissions	CO <sub>2</sub>	Regulatory, economic	Planned	Ministry of Trade & Industry			y

Sector	Name	Objective	GHG affected	Type of instrument	Status	Implementing entity	Estimate of savings (MtCO <sub>2</sub> )		CCPM
							2010	2020	
Transport	Increase of fuel taxation	Reduce traffic volume & GHG emissions	CO <sub>2</sub>	Fiscal	Planned	Ministry of Finance			n
Transport	Additional promotion of public transport	Promote public transport	CO <sub>2</sub>	Information, education, economic	Planned	Government in co-operation with local authorities			n
Transport	Broader energy savings agreements	Broaden the scope & effectiveness of energy saving agreements	CO <sub>2</sub>	Voluntary agreement	Planned	Ministry of Transport & Communications			n
Transport	Additional measures to maintain urban infrastructure	Concentration of urban infrastructure	CO <sub>2</sub>	Information, education, economic	Planned	Government in co-operation with regional & local authorities			n
Waste Management	Landfill gas recovery	Reduce CH <sub>4</sub> emissions	CH <sub>4</sub>	Regulatory, Fiscal	Planned	Ministry of the Environment, Ministry of Finance			n
Waste Management	Waste minimisation & the utilisation of source-separated waste fractions as material & energy	Reduce CH <sub>4</sub> emissions	CH <sub>4</sub>	Regulatory, fiscal	Planned	Ministry of the Environment, Ministry of Finance			n

Sector	Name	Objective	GHG affected	Type of instrument	Status	Implementing entity	Estimate of savings (MtCO <sub>2</sub> )		CCPM
							2010	2020	
Waste Management	Development of waste taxation	Reduce CH <sub>4</sub> emissions	CH <sub>4</sub>	Regulatory, Fiscal	Planned	Ministry of Finance			n

## Evaluation of projections

Tables 5 to 7 summarise the latest emissions projections and compare them with Finland's target under the EU burden sharing agreement. The 'with measures' projection shows that without additional policies and measures, Finland's emissions will increase by 16.6 % in 2010 compared with 1990 levels. However, if the effect of the planned measures are taken into account, then the 'with additional measures' projection shows that Finland is expected to meet its target.

**Table 5: Summary of projections by gas in 2010 (MtCO<sub>2</sub>)**

	Base year	With measures	With additional measures*
CO <sub>2</sub>	62.5	76.4	64.7
CH <sub>4</sub>	6.1	3.5	2.8
N <sub>2</sub> O	8.4	8.3	7.4
HFCs & PFCs	0.0	1.7	0.9
SF <sub>6</sub>	0.1		
<b>Total</b>	<b>77.1</b>	<b>89.9</b>	<b>75.8</b>
% change rel 1990		16.6 %	-1.6 %

\*The base year (1990) figures have recently been revised. Therefore the target figure for 2010 (75.8MtCO<sub>2</sub>) differs from the revised 1990 emissions (77.1 MtCO<sub>2</sub>).

**Table 6: Summary of projections by sector in 2010 (MtCO<sub>2</sub>)**

	Base year	With measures	% change relative to 1990	With additional measures*	% change relative 1990 (additional measures)
Energy	46.4	62.3	34.3	51.3	10.6
Transport	13.2	13.9	5.8	13.7	3.7
Industrial processes	2.9	4.5	54.6	2.6	-10.7
Solvents	0.1	0.1	0.0	0.1	0.0
Agriculture	10.1	6.8	-32.7	6.7	-33.7
Waste management	3.8	1.6	-57.9	0.8	-78.9
Other	0.6	0.7	16.7	0.7	16.7
<b>Total</b>	<b>77.1</b>	<b>89.9</b>	<b>16.7 %</b>	<b>75.8</b>	<b>-1.7 %</b>

\*The base year (1990) figures have recently been revised. Therefore the target figure for 2010 (75.8Mt CO<sub>2</sub>) differs from the revised 1990 emissions (77.1 Mt CO<sub>2</sub>).

**Table 7: Assessment of the target**

	MtCO <sub>2</sub> equiv.	% of 1990 level (six gas basket)
Base year (from inventory)	77.1	100.0
Commitment	77.1	100.0
With existing P&Ms	89.9	116.6
Gap (-ve means no gap)	12.8	16.6
Effect of additional P&Ms	14.1	18.3

## Description of modelling approach

In order to study the effects of the climate strategy, two major research projects were launched as early as in the beginning of 1999. The Government Institute for Economic Research (VATT) studied the effects in collaboration with the Technical Research Centre of Finland (VTT), and in the other project, the Research Institute of the Finnish Economy (ETLA) and VTT produced joint estimates of the effects. ETLA



and VTT have developed a computable general equilibrium model that combines a top-down approach of economic behaviour with a bottom-up description on energy and paper industries. The model facilitates a simultaneous analysis of both economic and technological choices.

Economic top-down models do not usually define production processes in great detail, relying instead on production functions to catch the usage of inputs, including energy. The interdependencies of various sectors as well as economic choices are modelled much more meticulously. Engineering models, on the other hand, tend to take a partial equilibrium approach and contain detailed descriptions of production technologies and processes, but leave the economic environment exogenous. The model developed by ETLA and VTT combines these two approaches.

In the VATT/VTT project two large models were used in an iterative manner. The energy sector calculations are carried out by means of the EFOM model, managed by VTT Energy. The economic evaluation is largely based on calculations with KESSU, which is owned by the ministry of Finance but deployed in VATT. EFOM is an optimisation energy model. Its original design is rooted in an initiative of the European Commission to obtain a model standard for energy system modelling throughout Europe. The Finnish version has been extended and tuned to the Finnish circumstances, e.g. concerning the abundant use of district heat and the significance of the pulp and paper industry. Parameters used in the modelling are given below.

<b>Modelling parameters</b>			
Parameter	2000	2010	Units
Population	5.17	5.23	Millions
GDP	520	690	Billion FIM

Source: Questionnaire

## Country conclusions

Finland has provided up to date and detailed information about policies and measures to reduce greenhouse gas emissions and projections. Both the Third National Communication and the latest Monitoring report provide a good level of description of the policies and measures, although the quantification for individual policies and measures is mostly absent. The policies and measures included in both the ‘with measures’ and ‘with additional measures projections’ are clearly identified.

The projections are clearly presented in both graphical and tabular form and are disaggregated by individual greenhouse gas. The sectoral breakdown is less comprehensive with all energy-related emissions, except transport reported together.

With existing measures the projections show a 17 % gap to Finland’s burden sharing target. Additional policies and measures are identified which the projections indicate will fill this gap and enable Finland to meet its target through domestic measures alone.