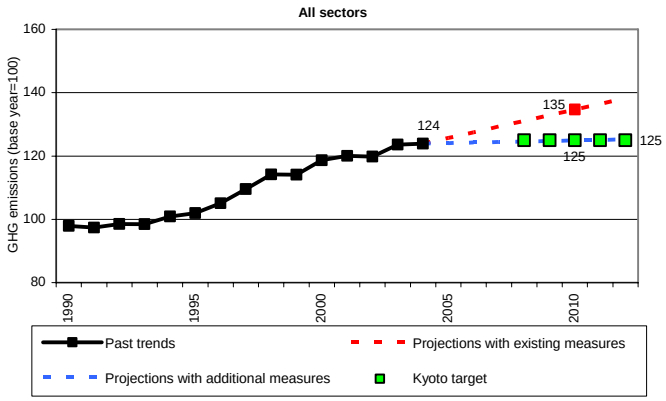
GREECE

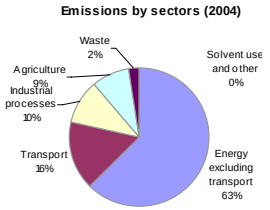
GREECE

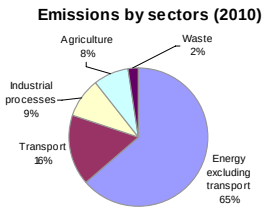
Share in total EU-15 GHG emissions 2004	3 %
Emissions base year (latest inventory)	111.1 Mt
Emissions 2004	137.6 Mt
Emissions base year (for projections)	111.7 Mt
Projections 2010 with existing measures	150.4 Mt
Projections 2010 with additional measures	139.5 Mt
Kyoto target (absolute, based on latest inventory)	138.8 Mt
Kyoto target (% from base year)	+ 25.0 %
Change base year to 2004	+ 23.9 %
Change 2003–04	+ 0.3 %
Change base year to 2010 with existing measures	+ 34.7 %
Change base year to 2010 with additional measures	+ 24.9 %
Distance to linear target path 2004	+ 6.4 percentage points
Use of Kyoto mechanisms	n.a.
Sinks (Articles 3.3. and 3.4)	n.a.
Emissions in 1990 (Article 3.7)	n.a.

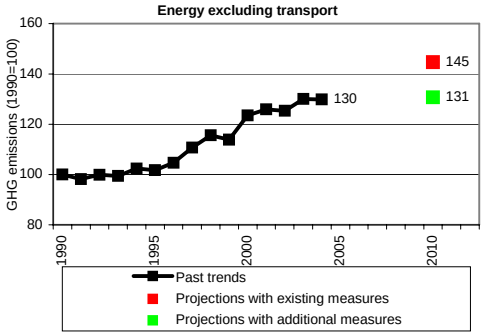


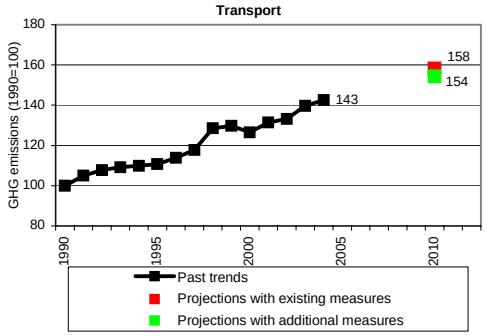
Past emissions: Greek GHG emissions were 0.3 % above those of 2003 and 23.9 % above base-year levels in 2004. The main factor for increasing emissions with regard to 2003 was increasing fossil fuel combustion in public electricity and heat production. From 1990 to 2004, electricity and heat production was by far the largest contributor to emission increases, mainly due to a strong increase in lignite-fired power production. Other sectors contributing to the emission increases were road transport and households.

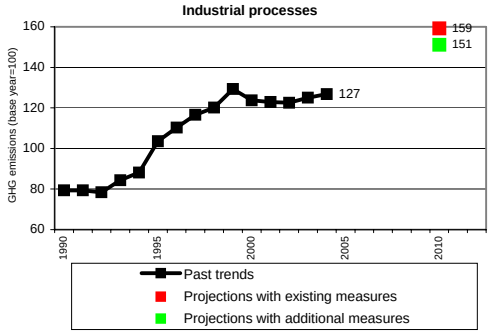
Emission projections: Emissions in 2004 were eleven percentage points below the level projected with existing measures for 2010. 'With measures' projections reported in 2004 were 55 percentage points higher than the ones reported in 2003. Greece exceeds the target of a 25 % increase on base-year emissions with existing domestic measures, but will meet its Kyoto target with additional domestic measures. No information on the potential use of the Kyoto mechanism and sinks according to Articles 3.3 and 3.4 has been provided so far.

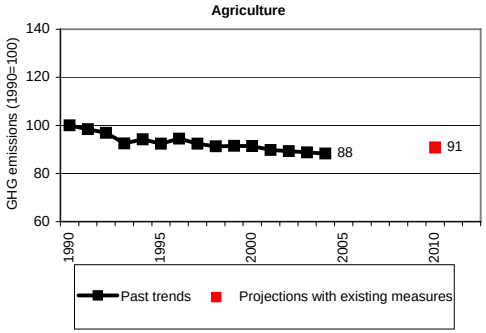


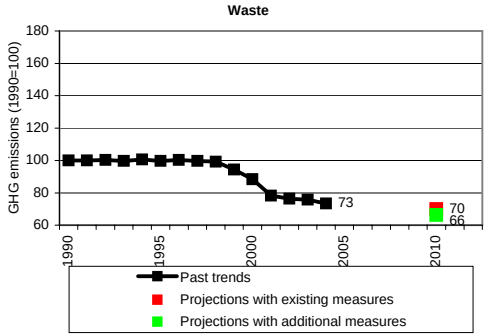












Greece

Please note that the projections relating to the NAP II are excluded from the EU Country Profiles as they were not available in time to be assessed for the 2006 Country Profiles.

Sources of Information

Greece 4th National Communication to the United Nations Framework Convention on Climate Change

Overview of CCPM implementation in MS

Source: Ms Responses to the CCPMS Questionnaire in 2005

CCPM	Greece
Taxation of energy products 2003/96/EC	
Emissions trading 2003/87/EC	N
Promotion of electricity from RE sources 2001/77/EC	R
Promotion of cogeneration 2004/8/EC	R
Directives on energy labelling of appliances	N
Motor challenge, voluntary EC programme	
Energy performance of buildings 2002/91/EC	R
Eco-management & audit scheme (EMAS) EC 761/2001	R
Efficiency of hot water boilers 92/42/EEC	B
Transport modal shift to rail 2001/12/EC etc.	
Promotion of biofuels for transport 2003/30/EC	N
Consumer information on cars 1999/94/EC	
Agreement with car manufacturers ACEA etc.	R
Support under CAP (1782/2003)	
Support under CAP - ammendment (1783/2003)	
Landfill directive 1999/31/EC	R

CODE

New *National PAM implemented after CCPM was adopted*	***N***

*Existing National PAM **re-enforced** by CCPM*	***R***
*National PAM already in force **before** CCPM was adopted*	***B***
Not reported	

Quality and Transparency of Reporting

The 4th NC provides information on policies and measures in the different sectors and gives quantified effects to 2015. Both with measures and with additional measures projections are provided disaggregated by sector, only the with measures projection is given by gas. The policies in the two scenarios are specified.

Table 1: Information Provided on Policies and Measures

Information provided	Level provided	Comments
Policy names	++	
Objectives of policies	++	Good description of policy objectives
Which greenhouse gases?	All	
Status of Implementation	+++	
Implementation body specified	+++	
Quantitative assessment of implementation	++	
Interaction with other P&Ms discussed	++	

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

Table 2: Information provided on Projections

Category of Information	Level of Information Provided	Comments
Scenarios considered	+++	
Expressed relative to base year	+++	
Starting year	2005	Not clear
Split of projections	++	By gas and by sector but base year emissions by sector not given (1990 and 1995 given separately).
Presentation of results	+++	Both tables and figures given
Description of model (level of detail, approach and	+++	Main assumptions and parameters given

assumptions)		
Sensitivity analysis (key inputs to model / high, central and low projections scenarios / robustness of model)	++	Three scenarios of energy-related emissions given
Discussion of uncertainty	++	
Details of parameters and assumptions	+++	Good level of detail

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

Assessment of Policies and Measures

Table 3: Summary of the Effect of Policies and Measures Included in the Projections ($MtCO_2$)

	With measures	With additional measures
Energy (total, excluding transport)		9.2
Energy supply		5.3
Energy – industry, construction		0.9
Energy – other (commercial, residential, agriculture)		3.0
Transport (energy)		0.6
Industrial processes		0.7
Waste		0.2
Agriculture		0.1
Total (excluding sinks)	0.0	10.9

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
							2010	2015	
Policies and measures in the "with measures" projection									
Energy Supply	Natural gas in electricity generation	To increase the use of natural gas, through fiscal incentives and investment in infrastructure	CO2	Economic	Implemented	PPC/Private	4.855	4.935	N
Energy Supply	Natural gas in electricity generation	To increase the use of natural gas, through fiscal incentives and investment in infrastructure	CO2	Economic	Adopted	PPC/Private	8.67	10.815	N
Energy Supply	Natural gas in electricity generation from autoproducers	To increase the use of natural gas, through fiscal incentives and investment in infrastructure	CO2	Economic	Adopted	MD	2.105	4.186	N
Energy Supply	Cogeneration	To increase the use of natural gas, through fiscal incentives and investment in infrastructure	CO2	Economic	Implemented	MD	0.165	0.151	**N**

Sector	Name	Objective	GHG affected	Type of instrument	Status	Implementing entity	Estimate of savings ($MtCO_2$)		CCPM
							2010	2015	
Energy Supply	Cogeneration	To increase the use of natural gas, through fiscal incentives and investment in infrastructure	CO2	Economic	Adopted	MD	0.674	1.215	**N**
Energy Supply	Promotion of wind energy	Investment grants	CO2	Economic/Regulatory	Implemented	RAE/MD/Private	0.947	0.88	**?**
Energy Supply	Promotion of wind energy	Investment grants	CO2	Economic/Regulatory	Adopted	RAE/MD/Private	2.043	2.823	**?**
Energy Supply	Small hydroelectric units	Investment grants	CO2	Economic/Regulatory	Implemented	RAE/MD/Private	0.081	0.075	**?**
Energy Supply	Small hydroelectric units	Investment grants	CO2	Economic/Regulatory	Adopted	RAE/MD/Private	0.343	0.319	?
Energy Supply	Large hydroelectric units		CO2	Economic (PPC investments)	Implemented	RAE/MD/Private	0.369	0.528	?
Energy Supply	Photovoltaic units	Investment grants	CO2	Economic	Implemented	RAE/MD/Private	0.002	0.002	?
Energy Supply	Biomass	Investment grants	CO2	Economic/Regulatory	Implemented	RAE/MD/Private	0.266	0.256	?
Energy Supply	Solar energy in residential sector	Investment grants	CO2	Economic	Implemented	MEPWPP	1.167	1.199	?
Energy Supply	Solar energy in the tertiary sector and in industry	Investment grants	CO2	Economic	Implemented	MEPWPP	0.004	0.004	?

Sector	Name	Objective	GHG affected	Type of instrument	Status	Implementing entity	Estimate of savings ($MtCO_2$)		CCPM
							2010	2015	
Industry	Natural gas in industry	To increase the use of natural gas, through fiscal incentives and investment in infrastructure	CO2	Economic	Implemented	MD	0.904	1.102	N
Residential/Tertiary	Natural gas in tertiary and residential	To increase the use of natural gas, through fiscal incentives and investment in infrastructure	CO2	Economic	Implemented	MEPWPP	1.215	1.581	N
Transport	CNG buses	To increase the use of natural gas, through fiscal incentives and investment in infrastructure	CO2	Economic (public investments)	Implemented	MT	0.007	0.012	N
Transport	Biofuels	Fiscal incentives	CO2	Economic/Regulatory	Adopted	MT	1.194	1.375	?
Transport	ACEA agreement		CO2	Regulatory	Adopted	MT	0.446	1.053	Y
Waste	EU landfill directive		CH4	Regulatory	Adopted	MEPWPP	2.888	5.13	Y

Sector	Name	Objective	GHG affected	Type of instrument	Status	Implementing entity	Estimate of savings ($MtCO_2$)		CCPM
							2010	2015	
MEPPPW	Ministry for the Environment, Physical Planning and Public Works	MD	Ministry for Development	MT	Ministry for Transport	PPC	Public power company		

Policies and measures in the "with additional measures" projection

Sector	Name	Objective	GHG affected	Type of instrument	Status	Implementing entity	Estimate of savings (MtCO2)		CCPM
							2010	2015	
Policies and measures in the "with additional measures" projection									
Energy supply	Extended use of natural gas in electricity generation		CO2	Regulatory	Planned	MD/RAE/PPC	2.833	3.902	N
Energy supply	Cogeneration		CO2	Economic	Planned	MD	0.257	0.257	N
Energy supply	Wind energy		CO2	Economic	Planned	MD/RAE/Private	1.535	1.783	?
Energy supply	Small hydroelectric units		CO2	Economic	Planned	MD/RAE/Private	0.581	1.261	?
Energy supply	Photovoltaic units		CO2	Economic	Planned	MD/RAE/Private	0.027	0.05	?

Sector	Name	Objective	GHG affected	Type of instrument	Status	Implementing entity	Estimate of savings (MtCO2)		CCPM
							2010	2015	
Energy supply	Geothermal units		CO2	Economic	Planned	MD/RAE/Private	0	0.052	?
Energy supply	Biomass		CO2	Economic	Planned	MD/RAE/Private	0.394	0.562	?
Energy supply	Solar energy in the residential sector		CO2	Economic	Planned	MEPWPP	1.001	1.712	?
Energy supply	Solar energy in the tertiary sector and in industry		CO2	Economic	Planned	MEPWPP	0.208	0.206	?
Industry	Energy conservation interventions		CO2	Economic	Planned	MD	0.282	0.296	N
Industry	Natural gas in industry		CO2	Economic	Planned	MD/RAE/PPC	0.202	0.239	N
Transport	Improvements in road signally		CO2	Economic (public investments)	Planned	MT	0.067	0.148	N
Transport	Promotion of public means of transport		CO2	Economic (public investments)	Planned	MT	0.542	0.921	N
Buildings	Improvement of the thermal building of existing buildings		CO2	Economic/Regulatory	Planned	MEPWPP	0.103	0.14	Y
Buildings	Systematic maintenance of central heating boilers		CO2	Economic/Regulatory	Planned	MEPWPP	0.181	0.191	Y
Buildings	Replacement of central heating boilers		CO2	Economic/Regulatory	Planned	MEPWPP	0.063	0.104	Y
Buildings	External shading of buildings, night		CO2	Economic/Regulatory	Planned	MEPWPP	0.053	0.079	Y

Sector	Name	Objective	GHG affected	Type of instrument	Status	Implementing entity	Estimate of savings (MtCO2)		CCPM
							2010	2015	
	ventilation								
Buildings	Energy efficient air conditioning units		CO2	Regulatory	Planned	MD	0.227	0.377	?
Buildings	Energy efficient electric appliances		CO2	Regulatory	Planned	MD	0.26	0.357	?
Buildings	Replacement of incandescent bulbs by high efficient ones		CO2	Information	Planned	MD	1.085	1.601	?
Buildings	Advanced lighting control systems		CO2	Economic/Regulatory	Planned	MEPWPP	0.023	0.049	?
Waste	Combustion of biogas		CH4	Regulatory	Planned	MEPWPP	0.201	0.149	
Industrial process	Recovery of F gas from final disposal of appliances		HFC	Regulatory	Planned	MD	0.718	1.536	Y
Agriculture	Manure management systems		CH4	Economic	Planned	MRDF	0.067	0.064	
Agriculture	Organic farming		N2O	Economic	Planned	MRDF	0.067	0.088	

Evaluation of Projections

Table 5: Summary of projections by gas in 2010 (MtCO2)

	Base year	with measures	with additional measures
Carbon dioxide (excl. sinks)	84.0	122.9	
Methane	10.0	9.0	
Nitrous oxide	14.2	14.0	
HFCs*	3.4	4.4	
PFCs	0.1	0.1	
SF_6			
Total (excl. sinks)	111.7	150.4	139.5
% change relative to base year (excl. sinks)		34.7%	24.9%

*base year for F-gases is 1995

Table 6: Summary of projections (6 gas basket) by sector in 2010 ($MtCO_2eq$)

	1990*	with measures	% change relative to 1990	with additional measures	% change relative to 1990
Energy (total, excluding transport)	66.1	95.6	45%	86.4	31%
Transport (energy)	15.6	24.8	58%	24.1	54%
Industrial processes	8.8	14.1	59%	13.4	51%
Waste	5.4	3.8	-30%	3.5	-34%
Agriculture	13.5	12.3	-9%	12.3	-9%
Total (excl. sinks)	109.4	150.4	37%	139.7	28%

*Note Base year emissions not available in this split. These are 1990 emissions.

Table 6 Expanded: Summary of projections by sector and by gas in 2010 (MtCO2eq)

	Carbon Dioxide			Methane			Nitrous Oxide			F-gases		
	Base year	With measures	With additional measures	Base year	With measures	With additional measures	Base year	With measures	With additional measures	Base year	With measures	With additional measures
Energy (exc transport)	61.71	89.71		1.43	2.11		2.92	3.75				
Transport (energy)	15.35	23.86		0.11	0.17		0.18	0.72				
Industrial processes	6.76	9.03					0.71	0.44		1.19	4.44	
Waste	0.02	0.14		5.01	3.22		0.33	0.39				
Agriculture				3.45	3.52		10.06	8.75				
Total (excl. sinks)	83.85	122.75	0	10.01	9.02	0	14.19	14.04	0	1.19	4.44	0

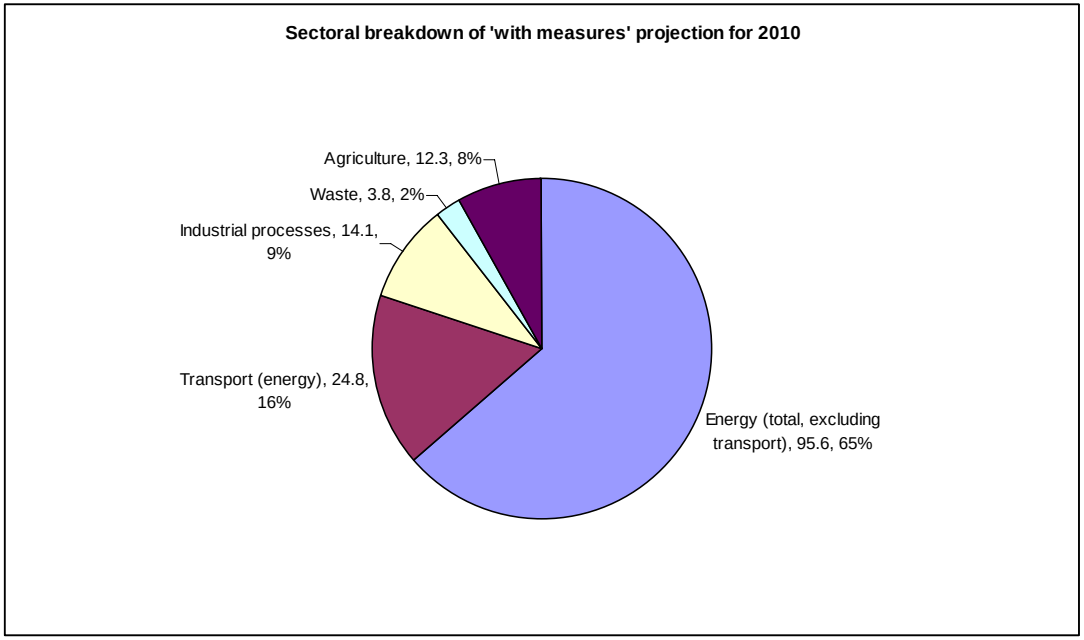

Sectoral breakdown of 'with measures' projection for 2010
Agriculture, 12.3, 8%
Waste, 3.8, 2%
Industrial processes, 14.1, 9%
Transport (energy), 24.8, 16%
Energy (total, excluding transport), 95.6, 65%

Table 7: Assessment of the Target

	Excl. sinks	
	$MtCO_2$ equiv.	**% of base year level (six gas basket)**
Base year emissions (from projections)	111.7	100%
Kyoto Commitment/burden sharing	139.6	25.0%
With existing P&Ms projections	150.4	134.7%
Gap (-ve means no gap)	10.8	9.7%
With additional P&Ms projections	139.5	124.9%
Remaining gap	-0.1	-0.1%
Effect of flexible mechanisms		0.0%
Remaining gap (if target includes flex mechs)	-0.1	-0.1%

Table above does not include LUCF. Please refer to the LUCF section in the main report for further information.

Description of Modelling Approach

Overview of modelling approach

For scenario development and projections, two main model types have been used:

Economic-technical model (ENPEP) for the energy sector

Spreadsheet models for the non-energy sectors, in which future changes in activity data are derived mainly from statistical analysis, while emissions factors are derived from expert assessments based on the IPCC/CORINAIR metholodology.

Sensitivity analysis

Three additional scenarios have been analysed for the energy sector. The quantification uses the ENPEP model, but uses different assumptions. The three sensitivity scenarios are:

The reference scenario, which is similar to the with measures scenario but does not take into consideration some of the already adopted policies and measures and uses lower international energy prices and lower economic growth rates.

Carbon tax scenario (CTS) – imposition of an environmental tax.

Weak growth rate – lower rates of development for the Greek economy.

With the exception of the carbon tax scenario, the other scenarios lead to similar emissions in 2010, with slight differences in 2020. The CTS is lower in all time period

Details of the uncertainty assessment

Uncertainty was not considered separately

Projection indicator reporting

A comprehensive time series of indicators was provided and is summarised in Table 8. In future years, Greece should aim to also submit the numerator in addition to the indicator.

Reporting of parameters on projections

Data are provided for most of the parameters for the projection.

Table 8) Indicators for projections to monitor and evaluate progress with policies and measures (2005/166/EC) Annex III

No	Eurostat Sectors	Indicator	2005	2010	2015	2020
1	Macro	CO_2 intensity of GDP, t/Euro million	769	686	612	563
2	Transport C0	CO_2 emissions from passenger cars, kt				
		Number of kilometres by passenger cars, Mkm				
3	Transport D0	CO_2 emissions from freight transport (all modes), kt				
		Freight transport (all modes), Mtkm				
4	Industry A1	Energy	532	496	460	429

		related CO_2 intensity of industry, t/Euro million				
5	Households A1	Specific CO_2 emissions of households, t/dwelling	2.4	2.6	2.7	2.8
6	Services A0	CO_2 intensity of the services sector, t/Euro million	13	14	14	13
7	Transformation B0	Specific CO_2 emissions of public and autoproducer power plants, t/TJ	304	274	260	248
8	Agriculture	Specific N_2O emissions of fertilizer and manure use, kg/kg	0	0	0	0
9	Agriculture	Specific CH_4 emissions of cattle production, kg/head	80	80	80	79
10	Waste	Specific CH_4 emissions from landfills, kt/kt	0	0	0	0

Table 9) List of Parameters on Projections (Annex IV Implementing Provisions)

1. Mandatory Parameters on Projections	2005	2010	2015	2020	2005-2010	2010-2015	2015-2020
Assumptions for general economic parameters							
— GDP (value at given years or annual growth rate and base year)	149.6	179.2	212.4	243.9	3.67%	3.46%	2.81%
— Population (value at given years or annual growth rate and base year)	11082	11261	11366	11377	0.32%	0.19%	0.02%
— International coal prices at given years in $2000 per tonne	39.5	37.2	36.5	37.4	-1.20%	0.30%	0.50%
— International oil prices at given years in $2000 per barrel	29.2	23.5	25.2	26.8	-6%	1.40%	1.30%
— International gas prices at given years in $2000 per toe	170.9	125.7	134.5	143.3	-6%	1.40%	1.30%
Assumptions for the energy sector							
— Total gross inland consumption (ktoe) (split by oil,gas,coal,renewables,nuclear,other)	32291	35304	38303	41210			
— Total electricity production by fuel type (ktoe) (oil, gas, coal, renewables, nuclear, other)	4824	5751	6377	7096			
— Energy demand by sector split by fuel (delivered)							
agriculture	1300	1400	1509	1624			
industry	7077	7625	8140	8621			

1. Mandatory Parameters on Projections	2005	2010	2015	2020	2005-2010	2010-2015	2015-2020
residential	5257	5906	6360	6800			
tertiary	1840	2272	2678	3085			
transport	7556	8554	9518	10239			
— Assumptions on weather parameters, especially heating or cooling degree days							
Assumptions for the industry sector							
For Member States using macroeconomic models:							
— The share of the industrial sector in GVA and growth rate	22%	21%	20%	20%	2,84%	2.68%	2.17%
For Member States using other models:							
— The production index for industrial sector							
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 (bil. P - km)	160	193	225	250	3.82%	3.12%	2.13%
— The growth of freight tonne kilometres	32	38	44	49	3.50%	2.98%	2.18%

1. Mandatory Parameters on Projections	2005	2010	2015	2020	2005-2010	2010-2015	2015-2020
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							
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 thousand							
Dairy cattle	213	202	193	183			
Non dairy cattle	376	375	375	375			
Sheep	9150	9320	9493	9669			
Goats	5810	5977	6150	6327			

1. Mandatory Parameters on Projections	2005	2010	2015	2020	2005-2010	2010-2015	2015-2020
Poultry	32376	34002	35740	37593			
— The area of crops by crop type (1000 ha)							
Trees and Vines	1149	1152	1161	1669			
Arable	1864	1869	1883	1896			
Rice	26	28	31	33			
Market gardening	118	118	119	120			
Fodder plants	320	321	323	325			
Fallow land	455	457	460	463			
— Emissions factors by type of livestock for enteric fermentn and manure management (t)							
Assumptions in the waste sector							
— Waste generation per head of population or tonnes of municipal solid waste (kg/cap/day)					1.41	1.57	1.73
— The organic fractions of municipal solid waste							
— Municipal solid waste disposed to landfills, incinerated or composted (in tonnes or %)							
Assumptions in the forestry sector							
— Forest definitions							
Areas of:							

1. Mandatory Parameters on Projections	**2005**	**2010**	**2015**	**2020**	**2005-2010**	**2010-2015**	**2015-2020**
— managed forests							
— unmanaged forests							

Country Conclusions

Greenhouse gas projections for Greece are presented in the 4th National Communication. Greek emissions of the basket of six greenhouse gases are projected to be 35% above the base year levels in 2010 for the “with measures” scenario. For the “with additional measures” scenario, emissions are 25% above the base year, which means Greece will meet its Kyoto Target of a 25% increase, with additional measures.

There is a good level of detail on both the projections and the policies and measures. Projections were presented clearly and broken down further by sub-sector Summaries of the data were good, but report did lack a “with additional measures” summary by gas and a breakdown of the base year (rather than 1990) by sector . The reporting of the effect of policies and measures detailed savings to 2015 would have given a more comprehensive quantitative assessment. Presentation of the effect of policies and measures was clear and detailed, providing useful information for analysis.

GREECE - **Priority indicators (see Chapters A5.2 and A5.4 for more information on indicators)**