

Greece

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1. SOURCES OF INFORMATION

Greece's 4th National Communication to the United Nations Framework Convention on Climate Change, March 2006.

Greece's National Allocation Plan for 2008-2012

The European Community's initial report under the Kyoto Protocol - Report to facilitate the calculation of the assigned amount of the European Community pursuant to Article 3, paragraphs 7 and 8 of the Kyoto Protocol (Submission to the UNFCCC Secretariat), EEA Technical report No 10/2006.

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

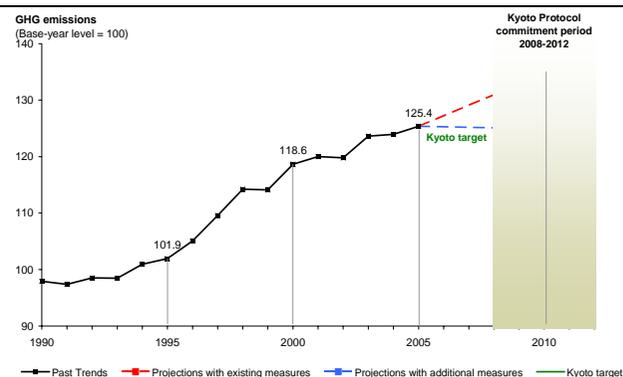
Base-year emissions

Base-year emissions of greenhouse gases are calculated using 1990 emissions for carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O) and 1995 emissions for fluorinated gases (SF₆, HFCs and PFCs).

Base-year data is as reported by Member States in the sources noted above. Base year data is not consistent with data reported in *The European Community's initial report under the Kyoto Protocol - Report to facilitate the calculation of the assigned amount of the European Community pursuant to Article 3, paragraphs 7 and 8 of the Kyoto Protocol (Submission to the UNFCCC Secretariat)*, EEA Technical report No 10/2006. This data is currently undergoing a review procedure by UNFCCC and is therefore subject to change.

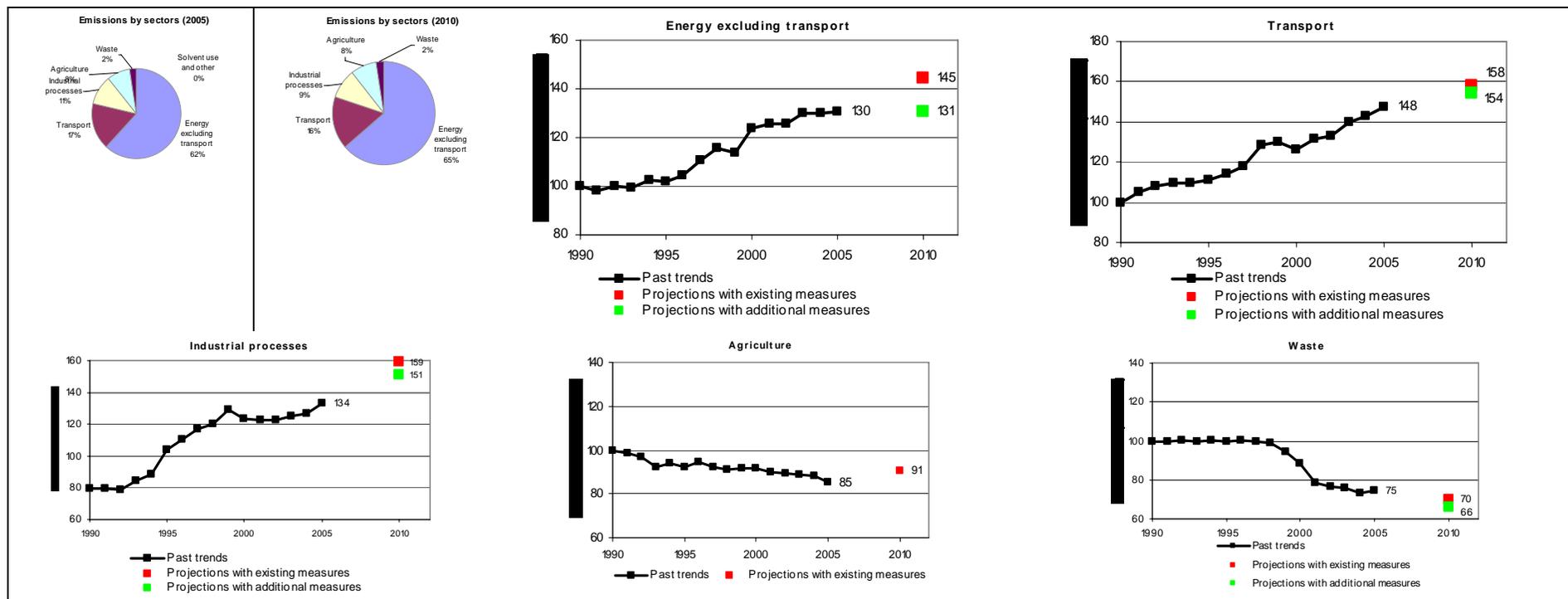
2. SUMMARY

GREECE	
Share in total EU-15 GHG emissions 2005	3.3 %
Emissions base year (initial report)	111.1 Mt
Emissions 2005	139.2 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 2005	+ 25.4 %
Change 2004-05	+ 1.2 %
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 2005	+ 6.6 index points
Use of Kyoto mechanisms	n.a.
Sinks (Articles 3.3. and 3.4)	n.a.
Emissions in 1990 (Article 3.7)	n.a.

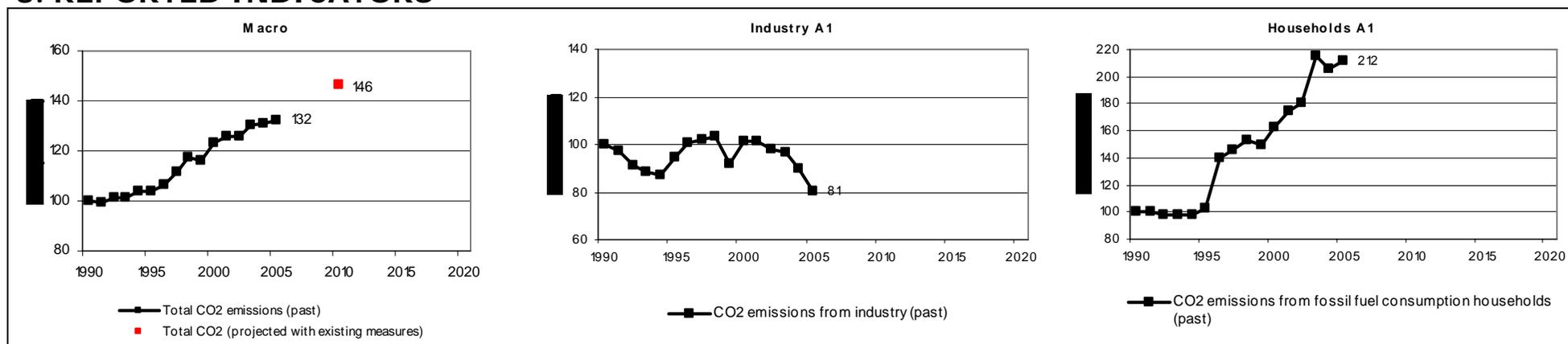


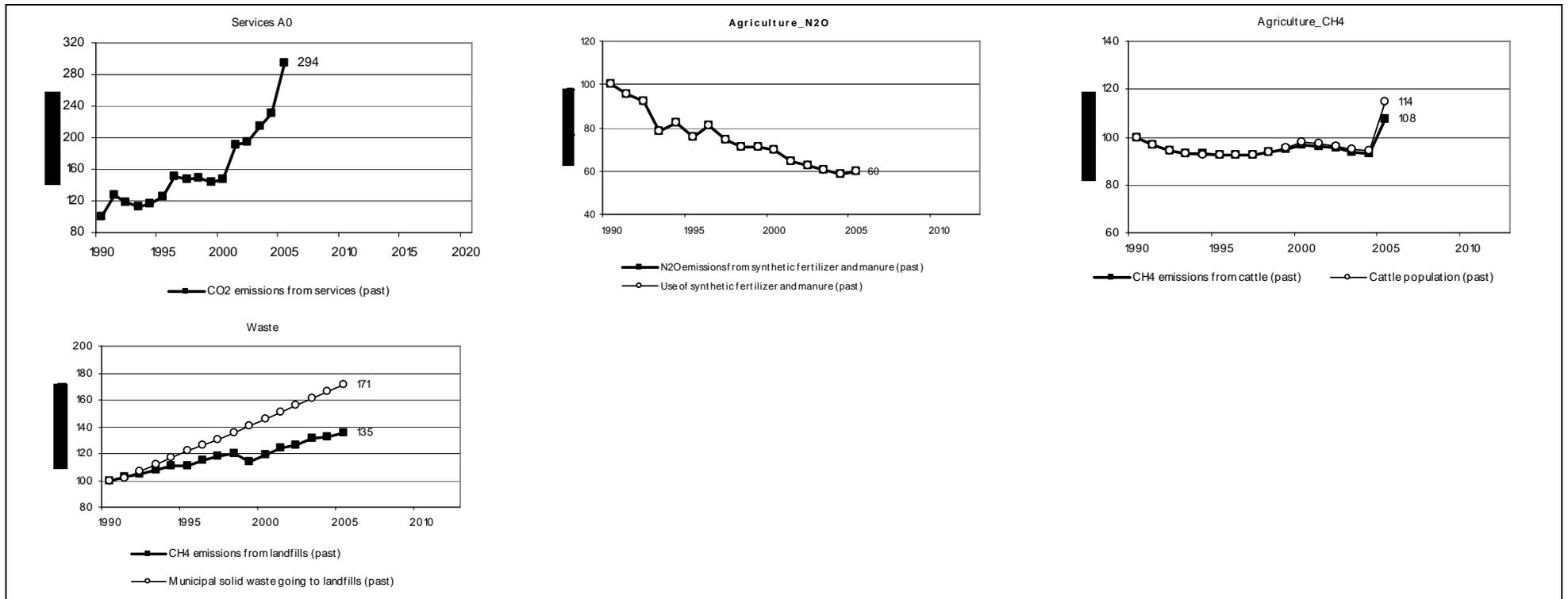
Past emissions: Greek GHG emissions were 1.2 % above those of 2004 and 25.4 % above base-year levels in 2005. The main factor for increasing emissions with regard to 2004 was increasing fossil fuel combustion in road transport and public electricity and heat production. From 1990 to 2005, electricity 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 2005 were nine percentage points below the level projected with existing measures for 2010. Greece exceeds the target of a 25 % increase on base-year emissions with existing domestic measures, but projects to 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.



3. REPORTED INDICATORS





GREECE

Priority Indicators		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Macro	Total CO ₂ emissions, kt	84,314	83,867	85,243	85,409	87,307	87,426	89,623	94,361	98,966	98,141	103,963	106,210	105,905	109,914	110,280	111,668
	GDP, Bio Euro (EC95)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	117
Macro B0	CO ₂ emissions from energy consumption, kt	77,137	76,726	78,048	78,128	80,082	79,756	81,958	86,432	91,194	90,300	95,847	97,949	97,793	101,727	102,000	103,117
	GDP, Bio Euro (EC95)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	117
Transport C0	CO ₂ emissions from passenger cars, kt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Number of kilometres by passenger cars, Mkm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industry A1	CO ₂ emissions from industry, kt	10,457	10,161	9,525	9,276	9,096	9,856	10,547	10,650	10,834	9,640	10,614	10,633	10,253	10,103	9,406	8,430
	Gross value-added total industry, Bio Euro (EC95)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23
Households A1	CO ₂ emissions from fossil fuel consumption households, kt	4,671	4,681	4,586	4,553	4,581	4,803	6,512	6,813	7,145	6,989	7,576	8,154	8,446	10,036	9,602	9,882
	Stock of permanently occupied dwellings, 1000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,660
Services A0	CO ₂ emissions from fossil fuel consumption in commercial and institutional sector, kt	527	671	626	596	614	659	799	773	788	761	777	1,011	1,030	1,131	1,221	1,549
	Gross value-added services, Bio Euro (EC95)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	75
Transformation B0	CO ₂ emissions from public and autoproducer thermal power stations, kt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	All products - output and autoproducer thermal power stations, PJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Additional Priority Indicators		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Transport D0	CO ₂ emissions from freight transport on road, kt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Freight transport on road, Mtkm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industry A1.1	Total CO ₂ emissions from iron and steel, kt	725	679	665	622	603	618	489	558	572	583	601	701	840	777	780	791
	Gross value-added - iron and steel industry, Bio Euro (EC95)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Industry A1.2	Energy related CO ₂ emissions chemical industries, kt	1,391	926	563	529	442	457	686	803	1,129	740	825	724	765	970	1,083	1,155
	Gross value-added - chemical industry, Bio Euro (EC95)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Industry A1.3	Energy related CO ₂ emissions - glass pottery and building materials industry, kt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Gross value added - glass pottery and building materials industry, Bio Euro (EC95)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industry C0.1	Total CO ₂ emissions from iron and steel, kt	725	679	665	622	603	618	489	558	572	583	601	701	840	777	780	791
	Production of oxygen steel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,115
Industry C0.2	Energy related CO ₂ emissions from glass, pottery and building materials, kt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Cement production, kt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Supplementary Indicators		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Transport B0 (diesel)	CO ₂ emissions of diesel-driven cars, kt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Number of km, of diesel-driven passenger cars, Mio km	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transport (B0) (petrol)	CO ₂ emissions of petrol-driven cars, kt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Number of km, of petrol-driven passenger cars, Mio km	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transport C0	CO ₂ emissions from passenger cars, kt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Passenger transport by cars, Mpkm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transport E1	CO ₂ emissions from domestic air transport, kt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Domestic air passenger, Mio	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industry A1.4	Energy related CO ₂ emissions food industry, kt	902	925	940	960	920	936	1,006	975	1,062	966	1,090	995	1,040	1,093	878	801
	Gross Value Added food, drink and tobacco industry, Mio EUR (EC95)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industry A1.5	Energy related CO ₂ emissions - paper and printing industry, kt	301	289	281	266	251	211	289	340	306	315	374	345	355	365	253	238
	Gross value added paper and printing industry, Mio EUR (EC95)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Households A0	Surface area of permanently occupied dwellings, Mio m ²	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Specific CO ₂ emissions of households for space heating, t/m ²	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Services B0	CO ₂ emissions from space heating in commercial and institutional, kt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Surface area of services buildings, Mio m ²	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transformation D0	CO ₂ emissions from public thermal power stations, kt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	All products output by public thermal power stations, PJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transformation E0	CO ₂ emissions from autoproducer, kt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	All products output by autoproducer thermal power stations, PJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transformation	CO ₂ emissions from classical power production, kt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	All products output by public and autoproducer power stations, PJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transport	CO ₂ emissions from transport, kt	15,355	16,128	16,550	16,769	16,858	16,966	17,422	18,022	19,649	19,823	19,303	20,014	20,268	21,234	21,646	22,347
	Total final energy consumption from transport, PJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industry	Energy related CO ₂ emissions paper and printing industries, kt	301	289	281	266	251	211	289	340	306	315	374	345	355	365	253	238
	Physical output of paper, kt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industry	CO ₂ emissions from the industry sector	10,457	10,161	9,525	9,276	9,096	9,856	10,547	10,650	10,834	9,640	10,614	10,633	10,253	10,103	9,406	8,430
	Total final energy consumption from industry, PJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Households	CO ₂ emissions from households, kt	4,671	4,671	4,681	4,586	4,553	4,581	4,803	6,512	6,813	7,145	6,989	7,576	8,154	8,446	10,036	9,602
	Total final energy consumption from households, PJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

4. OVERVIEW OF CCPM IMPLEMENTATION IN GREECE

Table 1. Information provided on the implementation of policies and measures

Sector	CCPM	Status
Cross-cutting	Kyoto Protocol project mechanisms 2004/101/EC	
Cross-cutting	Emissions trading 2003/87/EC	N
Cross-cutting	Integrated pollution prevention and control 96/61/EC	
Energy supply	Promotion of cogeneration 2004/8/EC	R
Energy supply	Taxation of energy products 2003/96/EC	
Energy supply	Internal electricity market 2003/54/EC	
Energy supply	Promotion of electricity from RE sources 2001/77/EC	R
Energy supply	Internal market in natural gas 98/30/EC	
Energy supply	Emissions from large combustion plants 88/609/EEC	
Energy consumption	Directives on energy labelling of appliances	N
Energy consumption	End-use efficiency and energy services 2006/32/EC	
Energy consumption	Ecodesign requirements for energy-using products 2005/32/EC	
Energy consumption	Energy performance of buildings 2002/91/EC	R
Energy consumption	Eco-management & audit scheme (EMAS) EC 761/2001	R
Energy consumption	Energy-efficiency labelling for office equipment Regulation No. 2422/2001	
Energy consumption	Efficiency fluorescent lighting 2000/55/EC	
Energy consumption	Efficiency of hot water boilers 92/42/EEC	B
Transport	Environmental performance freight transport (Marco Polo Programme)	
Transport	Motor challenge, voluntary EC programme	
Transport	Promotion of biofuels for transport 2003/30/EC	N
Transport	Integrated European railway area (2nd + 3rd Railway package) (COM(2002)18 final)	
Transport	Transport modal shift to rail 2001/12/EC etc.	
Transport	Consumer information on cars 1999/94/EC	
Transport	Agreement with car manufacturers ACEA etc.	R
Industrial Process	F-gas regulation (Regulation No 842/2006)	
Industrial Process	Industrial Process: HFC emissions from air conditioning in motor vehicles 2006/40/EC	
Agriculture	Support under CAP (1782/2003)	
Agriculture	Support under CAP - amendment (1783/2003)	
Agriculture	Nitrates 91/676/EEC	
Agriculture	Transition to rural development support No 2603/1999	
Agriculture	Agricultural production methods compatible with environment Regulation (EEC) No 2078/92	
Agriculture	Aid scheme for forestry measures in agriculture (Regulation (EEC) No 2080/92)	
Agriculture	Emission by engines to power agricultural or forestry 2000/25/EC	

Agriculture	Pre-accession measures for agriculture and rural development Regulation (EC) No 1268/1999	
Waste	Directive on waste 2006/12/EC	
Waste	Landfill directive 1999/31/EC	R
Waste	Packaging and packaging waste (Directive 94/62/EC, 2004/12/EC, 2005/20/EC)	

Legend

New national PAM implemented after CCPM was adopted

Existing national PAM **re-enforced** by CCPM

National PAM already in force **before** CCPM was adopted

Not reported

N
R
B

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

5. COMPLETENESS 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. However, only the “with measures” projection is given by gas. The policies in the two scenarios are specified.

Table 2. Information provided on policies and measures

Information provided	Level of information provided	Comments
Policy names	+++	Clear names provided
Objectives of policies	++	Most objectives provided
Which greenhouse gases?	All	
Status of Implementation	+++	
Implementation body specified	+++	
Quantitative assessment of implementation	++	
Interaction with other policies and measures discussed	++	

Table 3. Information provided on projections

Category of Information	Level of information provided	Comments
Scenarios considered		“With measures” and “with additional measures” scenarios.
Expressed relative to base year	+++	
Starting year	2005	Not clear
Split of projections	++	Base year emissions by sector not given (1990 and 1995 given separately). “With measures” split by gas and sector but no gas split for “with additional measures”.
Presentation of results	+++	Both tables and figures given
Description of model (level of detail, approach and assumptions)	+++	Main assumptions and parameters given
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	0	Not discussed
Details of parameters and assumptions	++	Most indicators and parameters provided, with discussion of assumptions.

6. ASSESSMENT OF POLICIES AND MEASURES

Table 4. Summary of the effect of policies and measures included in the 2010 projections (Mt CO₂-eq.)

	With measures	With additional measures
Energy (total, excluding transport)	NE	9.2
Energy supply	NE	5.3
Energy – industry, construction	NE	0.9
Energy – other (commercial, residential, agriculture)	NE	3.0
Transport (energy)	NE	0.6
Industrial processes	NE	0.7
Waste	NE	0.2
Agriculture	NE	0.1
Cross-sectoral	NE	0
Total (excluding LULUCF)	NE	10.9

Table 5. Detailed information on policies and measures

(Where no projection scenario information was reported for a policy or measure, the status field was used to decide which projection scenario it should be included in. A status of implemented, adopted, expired or a blank field was assumed to belong to the “with measures” projection. If the status is reported as planned the policy or measure is included in the “with additional measures” projection scenario)

Policies and measures in the “with measures” projection

Sector	Projection Scenario	Name	Type	GHG	Status	Absolute Reduction			Costs
						[kt CO ₂ eq. p.a.]			[EUR/t]
						2005	2010	2020	
Cross-cutting		EU Emission trading	Economic	CO ₂	implemented				
Cross-cutting		Operational Programme Competitiveness (OPC)	Economic	CH ₄ CO ₂ HFC N ₂ O PFC SF ₆	implemented				
Cross-cutting		Operational Programme Environment	Economic	CH ₄ CO ₂ HFC N ₂ O PFC SF ₆	implemented				
Energy supply	WM	Natural gas in electricity generation	Economic	CO ₂	implemented	5,964	4,855		
Energy supply	WM	Natural gas in electricity generation from auto-producers	Economic	CO ₂			2,105		
Energy supply	WM	Cogeneration	Economic	CO ₂	implemented	192	165		
Energy supply	WM	Improvements in conventional power generation system	Economic	CO ₂	implemented				

<u>Sector</u>	Projection Scenario	Name	Type	GHG	Status	Absolute Reduction [kt CO ₂ eq. p.a.]			<u>Costs</u>
						2005	<u>2010</u>	2020	<u>[EUR/t]</u>
Energy supply	WM	Wind energy	Economic Regulatory	CO ₂	implemented	1,083	947		
Energy supply	WM	Small hydroelectric units	Economic Regulatory	CO ₂	implemented	93	81		
Energy supply	WM	Large hydroelectric units	Economic	CO ₂	implemented		369		
Energy supply	WM	Photovoltaic units	Economic	CO ₂	implemented	3	2		
Energy supply	WM	Solar energy in the residential sector	Economic	CO ₂	implemented	1,227	1,167		
Energy supply	WM	Solar energy in the tertiary sector and in industry	Economic	CO ₂	implemented	4	4		
Energy supply		Value added tax	Fiscal	CO ₂	implemented				
Energy supply	WM	Natural gas in residential/tertiary sector	Economic	CO ₂	implemented	483	1,215		
Energy supply	WM	Natural gas in electricity generation	Economic	CO ₂		2,043	8,670		
Energy supply	WM	Cogeneration	Economic	CO ₂			674		
Energy supply	WM	Wind energy	Economic	CO ₂		765	2,043		
Energy supply	WM	Small hydroelectric units	Economic Regulatory	CO ₂		93	343		
Energy supply	WM	Natural gas in industry	Economic Fiscal	CO ₂	implemented	592	904		
Energy consumption	WM	Biomass	Economic Regulatory	CO ₂	implemented	288	266		
Transport	WM	ACEA Agreement	Voluntary/ negotiated agreement	CO ₂			446		
Transport	WM	Promotion of the use of biofuels	Regulatory	CO ₂		372	1,194		
Transport		Technical checks of vehicles	Regulatory	CH ₄					

Sector	Projection Scenario	Name	Type	GHG	Status	Absolute Reduction [kt CO ₂ eq. p.a.]			Costs
						2005	2010	2020	[EUR/t]
				CO ₂					
				N ₂ O					
Transport		Exhaust control card	Regulatory	CH ₄					
				CO ₂					
				N ₂ O					
Transport		Renewal programme for the fleet of motorcycles	Regulatory	CO ₂					
Transport		Age limits for the withdraw of public use cars (taxi)	Regulatory	CO ₂					
Transport	WM	CNG Buses	Economic	CO ₂	implemented	7	7		
Waste	WM	EU Landfill Directive	Regulatory	CH ₄			2,888		
Waste		Solid waste disposal on land, Decision 50910/2727	Regulatory	CH ₄	implemented				
Waste		Wastewater	Regulatory	CH ₄	implemented				

Policies and measures in the “with additional measures” projection

Sector	Projection Scenario	Name	Type	GHG	Status	Absolute Reduction [kt CO ₂ eq. p.a.]			Costs
						2005	2010	2020	[EUR/t]
Energy supply	WAM	Geothermal energy units	Economic	CO ₂	planned				
Energy supply	WAM	Biomass	Economic	CO ₂	planned		394		
Energy supply	WAM	Natural gas in residential/tertiary sector (space heating and cooling)	Economic	CO ₂	planned		168		

<u>Sector</u>	Projection Scenario	Name	Type	GHG	Status	Absolute Reduction [kt CO ₂ eq. p.a.]			<u>Costs</u>
						2005	2010	2020	[EUR/t]
Energy supply	WAM	Cogeneration	Economic	CO ₂	planned		257		
Energy supply	WAM	Wind energy	Economic	CO ₂	planned		1,535		
Energy supply	WAM	Small hydroelectric units	Economic	CO ₂	planned		581		
Energy supply	WAM	Photovoltaic units	Economic	CO ₂	planned		27		
Energy supply	WAM	Solar energy in the residential sector	Economic	CO ₂	planned		1,001		
Energy supply	WAM	Solar energy in the tertiary sector and in industry	Economic	CO ₂	planned		208		
Energy supply	WAM	Natural gas in industry	Economic	CO ₂			202		
Energy consumption	WAM	Improvement of the thermal behaviour of existing buildings	Economic	CO ₂	planned		103		
Energy consumption	WAM	Systematic maintenance of central heating boilers	Economic	CO ₂	planned		181		
Energy consumption	WAM	Replacement of central heating boilers	Economic Regulatory	CO ₂	planned		63		
Energy consumption	WAM	External shading of buildings, night ventilation and use of roof fans	Economic Regulatory	CO ₂	planned		53		
Energy consumption	WAM	Energy efficient air conditioning units	Regulatory	CO ₂	planned		227		

<u>Sector</u>	Projection Scenario	Name	Type	GHG	Status	Absolute Reduction [kt CO ₂ eq. p.a.]			<u>Costs</u>
						2005	<u>2010</u>	2020	<u>[EUR/t]</u>
Energy consumption	WAM	Energy efficient electric appliances	Regulatory	CO ₂	planned		260		
Energy consumption	WAM	Replacement of incandescent bulbs by high efficiency ones	Information	CO ₂	planned		1,085		
Energy consumption	WAM	Advanced lighting control systems	Economic Regulatory	CO ₂	planned		23		
Energy consumption	WAM	Energy conservation interventions	Economic	CO ₂	planned		282		
Transport	WAM	Improvements in road signalling	Economic	CO ₂	planned		67		
Transport	WAM	Promotion of public means of transport	Economic	CO ₂	planned		542		
Industrial Processes	WAM	Recovery of F-gases from discarded equipment	Economic	HFC	planned		718		
Agriculture	WAM	Improved manure management systems	Economic	CH ₄	planned		67		
Agriculture	WAM	Organic farming	Economic	N ₂ O	planned		67		
Waste	WAM	Combustion of Biogas	Regulatory	CH ₄	planned		201		

Source: Öko Institut, (accessed 14th June 2007), ECCP Policies and Measures database, <http://www.oeko.de/service/pam/index.php>

7. EVALUATION OF PROJECTIONS

Table 6. Summary of projections by gas in 2010 (Mt CO₂-eq.)

	Base-year	With measures	With additional measures
Carbon dioxide (excl. LULUCF)	84.0	122.9	NE
Methane	10.0	9.0	NE
Nitrous oxide	14.2	14.0	NE
HFCs	3.4	4.4	NE
PFCs	0.1	0.1	NE
SF ₆	0	0	NE
Total (excl. LULUCF)	111.7	150.4	139.5
% change relative to base year (excl. LULUCF)		34.7%	24.9%

Table 7. Summary of projections (6 gas basket) by sector in 2010 (Mt CO₂-eq.)

	Base-year *	with measures	% change relative to base-year	with additional measures	% change relative to base-year
Energy (total, excluding transport)	66.1	95.6	45%	86.4	31%
Energy supply	NE	NE	NE	NE	NE
Energy – industry, construction	NE	NE	NE	NE	NE
Energy – other (commercial, residential, agriculture)	NE	NE	NE	NE	NE
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. LULUCF)	109.4	150.4	37%	139.7	28%

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

Table 8. Summary of projections by sector and by gas in 2010 (Mt CO₂-eq.) compared to base-year emissions

	Carbon dioxide			Methane			Nitrous oxide			F-gases (SF ₆ , HFCs and PFCs)		
	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 (excl. transport)	61.71	89.71	NE	1.43	2.11	NE	2.92	3.75	NE	0	0	NE
Transport (energy)	15.35	23.86	NE	0.11	0.17	NE	0.18	0.72	NE	0	0	NE
Industrial processes	6.76	9.03	NE	0	0	NE	0.71	0.44	NE	1.19	4.44	NE
Waste	0.02	0.14	NE	5.01	3.22	NE	0.33	0.39	NE	0	0	NE
Agriculture	0	0	NE	3.45	3.52	NE	10.06	8.75	NE	0	0	NE
Total (excl. LULUCF)	83.85	122.75	NE	10.01	9.02	NE	14.19	14.04	NE	1.19	4.44	NE

Figure 1. Share by sector of 2010 greenhouse gas emissions according to the "With measures" projections

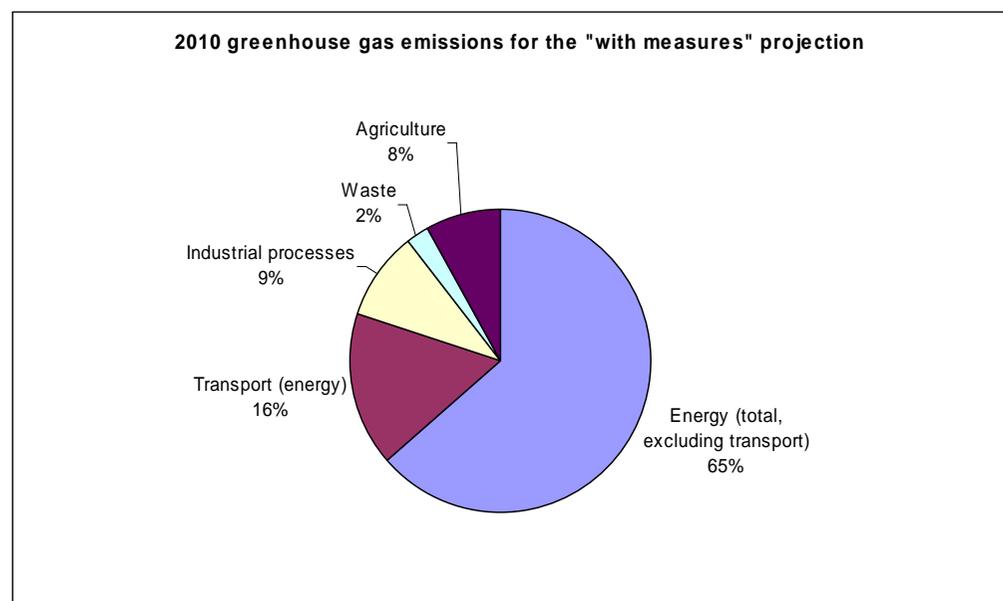


Table 9. Summary of projections (6 gas basket) in 2010, 2015 and 2020 (Mt CO₂-eq.)

	Base year*	2010	2010, % of base year level	2015	2015, % of base year level	2020	2020, % of base year level
Total (excluding LULUCF)	109.4	139.7	127.6%	142.3	130.0%	166.8	152.5%

* Base year is 1990 for all gases except 1995 for F-gases

Projections for 2010 and 2015 are “with additional measures”, 2020 is “with measures” (“with additional measures” not available).

Table 10. Assessment of the target (6 gas basket), with a comparison of 2010 projections in 2005, 2006 and 2007 national reports

	Emissions in MtCO ₂ -equiv., excluding LULUCF			
	2010 projections from 2005	2010 projections from 2006	2010 projections from 2007	2010 projections from 2007 % of base-year level
Base year emissions used for projections	111.7	111.67	111.67*	100%
Kyoto Commitment/burden sharing	139.6	139.59	139.59	25.0%
With existing P&Ms projections	150.4	150.41	150.41	134.7%
Gap (-ve means overachievement of target)	10.8	10.82	10.82	9.7%
With additional P&Ms projections	139.5	139.50	139.50	124.9%
Remaining gap	-0.1	-0.09	-0.09	-0.1%
Effect of flexible mechanisms	0.0	0.00	0.00	0.0%
Remaining gap (with use of flexible mechanisms)	-0.1	-0.09	-0.09	-0.1%

Above table excludes LULUCF. LULUCF will be covered in the main report, based on the questionnaire submissions

Source for 2005 data is Monitoring Mechanism submission, June 2005. Source for 2006 and 2007 data is 4th National Communication.

* Base year data is not consistent with data reported in *The European Community's initial report under the Kyoto Protocol - Report to facilitate the calculation of the assigned amount of the European Community pursuant to Article 3, paragraphs 7 and 8 of the Kyoto Protocol (Submission to the UNFCCC Secretariat)*, EEA Technical report No 10/2006 (111.054 MtCO₂-eq). This data is currently undergoing a review procedure by UNFCCC and is therefore subject to change.

Table 11. Comparison with projections for the trading sector (EU ETS)

Table 11 provides a comparison of projections in the 4th National Communication (4NC) and National Allocation Plan (NAP). The projections differ somewhat: the base year has been revised down slightly in the NAP, from 111.7 in the 4NC to 111.04 (close to the Initial Report base year of 111.054). Total GHGs without LULUCF are predicted to be 157.13 in the NAP compared with 150.412 (with measures) in the 4th National Communication.

The differences between the 4NC and NAP projections in the table are partly due to differences in assigning sectors to the "Energy" and "Industry" sectors:

For the Energy sector, GHG totals per sector are only given in summary table III of the NAP, where 'All other sectors' includes six sectors, some of which are additional to the energy sector reported in the 4th National Communication. Hence there is a higher total for the Energy sector in the NAP.

The Industry sector totals are also slightly different between the 4th National Communication (which includes Solvents) and the NAP (which does not - Solvents are included in 'All other sectors').

	4NC projections	NAP 2 projections	Difference
Energy sector	95.57 ^a	98.28 ^b	--
Energy sector included in EU ETS	--	74.08 ^c	--
Industry sector	14.07 ^d	15.17 ^e	--
Industry sector included in EU ETS	--	8.81 ^f	--
Total Energy & Industry	109.6	113.45	103.5%

^a Included are all GHG emissions from the "Energy (total, excluding transport)" sector

^b Included are all GHG from "Energy generation" (which includes energy use by industry), "Commercial and institutional, Residential and Agricultural energy use" and "All other sectors"

^c Included are CO₂ emissions from the ETS sectors "Energy generation" (which includes energy use by industry), "Commercial and institutional, Residential and Agricultural energy use" and "All other sectors"

^d Included are all GHG emissions from the sector "Industrial processes"

^e Included are all GHG emissions from the sector "Industrial processes"

^f Included are CO₂ emissions from the sector "Industrial processes"

8. 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 methodology.

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 periods.

Details of the uncertainty assessment

Uncertainty was not considered separately.

9. PROJECTION INDICATOR REPORTING

A comprehensive time series of all indicators except transport was provided and these are summarised in Table 12. In future years, Greece should aim to also submit the numerator in addition to the indicator.

10. REPORTING OF PARAMETERS ON PROJECTIONS

Data are provided for most of the mandatory projection parameters across the time series 2005, 2010, 2015, 2020. No recommended parameters were reported.

Table 12. Indicators for projections to monitor and evaluate progress with policies and measures (2005/166/EC) Annex III

N°	Eurostat Sectors	Indicator	2005 2010 2015 2020				Numerator/denominator	2005 2010 2015 2020			
			2005	2010	2015	2020		2005	2010	2015	2020
1	Macro	CO ₂ intensity of GDP, t/Euro million	769	686	612	563	Total CO ₂ emissions, kt GDP, bio Euro (EC95)				
2	Transport C0	CO ₂ emissions from passenger cars, kt	NE	NE	NE	NE					
		Number of kilometres by passenger cars, Mkm	NE	NE	NE	NE					
3	Transport D0	CO ₂ emissions from freight transport (all modes), kt	NE	NE	NE	NE					
		Freight transport (all modes), Mtkm	NE	NE	NE	NE					
4	Industry A1	Energy related CO ₂ intensity of industry, t/Euro million	532	496	460	429	CO ₂ emissions from fuel consumption industry, kt Gross value-added total industry, Bio Euro (EC 95)				
5	Households A1	Specific CO ₂ emissions of households, t/dwelling	2.4	2.6	2.7	2.8	CO ₂ emissions from fossil fuel consumption households, kt Stock of permanently occupied dwellings, 1000				
6	Services A0	CO ₂ intensity of the services sector, t/Euro million	13	14	14	13	CO ₂ emissions from fossil fuel consumption services, kt gross value-added services, bio Euro (EC95)				
7	Transformation B0	Specific CO ₂ emissions of public and autoproducer power plants, t/TJ	304	274	260	248	CO ₂ emissions from public and autoproducer thermal power stations, kt all products-output by public and autoproducer thermal power stations, PJ				
8	Agriculture	Specific N ₂ O emissions of fertilizer and manure use, kg/kg	0.02	0.02	0.02	0.02	N ₂ O emissions from synthetic fertilizer and manure use, kt use of synthetic fertiliser and manure, kt nitrogen				
9	Agriculture	Specific CH ₄ emissions of cattle production, kg/head	80	80	80	79	CH ₄ emissions from cattle, kt cattle populations, 1000 head				
10	Waste	Specific CH ₄ emissions from landfills, kt/kt	NE	NE	NE	NE	CH ₄ emissions from landfills, kt				

Municipal solid waste going to landfills, kt
--

Table 13. List of parameters on projections (Annex IV of Implementing Provisions¹)

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 and growth rate)	149.6	179.2	212.4	243.9	3.67%	3.46%	2.81%
Population (value at given years and growth rate) ('000)	11082	11261	11366	11377	0.32%	0.19%	0.02%
International coal prices at given years in \$US (2000) per tonne	39.5	37.2	36.5	37.4	-1.20%	0.30%	0.50%
International oil prices at given years in \$US (2000) per barrel	29.2	23.5	25.2	26.8	-6%	1.40%	1.30%
International gas prices at given years in \$US (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			
- 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							
<i>For Member States using macroeconomic models:</i>							
The share of the industrial sector in GVA and growth rate	22%	21%	20%	20%	2.84%	2.68%	2.17%
<i>For Member States using other models:</i>							
The production index for industrial sector							

¹ Commission Decision of 10 February 2005 laying down rules implementing Decision No 280/2004/EC of the European Parliament and of the Council concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol

1. Mandatory parameters on projections	2005	2010	2015	2020	2005 - 2010	2010- 2015	2015- 2020
Assumptions for the transport sector							
<i>For Member States using macroeconomic models:</i>							
The growth of transport relative to GDP							
<i>For Member States using other models:</i>							
The growth of passenger person kilometres (bill. pp-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%
Assumptions for buildings (in residential and commercial or tertiary sector)							
<i>For Member States using macroeconomic models:</i>							
The level of private consumption (excluding private transport)							
The share of the tertiary sector in GDP and the growth rate							
<i>For Member States using other models:</i>							
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							
<i>For Member States using macroeconomic models:</i>							
The share of the agriculture sector in GDP and relative growth							
<i>For Member States using other models:</i>							
Livestock numbers by animal type ('000) (for enteric fermentation beef, cows, sheep, for manure management pigs and poultry)							
- Dairy cattle	213	202	193	183			
- Non dairy cattle	376	375	375	375			
- Sheep	9150	9320	9493	9669			
- Goats	5810	5977	6150	6327			
- Poultry	32376	34002	35740	37593			
The area of crops by crop type ('000 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 fermentation							

1. Mandatory parameters on projections	2005	2010	2015	2020	2005 - 2010	2010- 2015	2015- 2020
and manure management (t)							
Assumptions in the waste sector							
Waste generation per head of population or tonnes of municipal solid waste (kg/head/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:							
managed forests							
unmanaged forests							

2. Recommended parameters on projections	2005	2010	2015	2020
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				

2. Recommended parameters on projections	2005	2010	2015	2020
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				
<i>For Member States using macroeconomic models:</i>				
Share of GDP for different sectors and growth rates				
Rate of improvement of energy intensity (1990 = 100)				
<i>For Member States using other models:</i>				
Index of production for different sectors				
Rate of improvement or index of energy efficiency				
Assumptions for buildings (in residential and commercial / tertiary sector)				
<i>For Member States using macroeconomic models:</i>				
Share of tertiary and household sectors in GDP				
Rate of improvement of energy intensity				
<i>For Member States using other models:</i>				
Number of households				
Number of new buildings				
Rate of improvement of energy efficiency (1990 = 100)				
Assumptions for the transport sector				
<i>For Member States using econometric models:</i>				
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				

2. Recommended parameters on projections	2005	2010	2015	2020
Assumptions for the agriculture sector				
<i>For Member States using econometric models:</i>				
Agricultural trade (import/export)				
Domestic consumption (e.g. milk/beef consumption)				
<i>For Member States using other models:</i>				
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				

11. 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 34.7% above the base year levels in 2010 for the “with measures” scenario. For the “with additional measures” scenario, emissions are projected to be 24.9% above the base year, which means Greece would meet its Kyoto Target of a 25% increase, with additional measures.

The 4th National Communication provides a good level of detail on both the policies and measures and the projections:

Most policies and measures were quantified. Presentation of the effect of policies and measures was clear and detailed, providing useful information for analysis.

Projections were presented clearly and broken down further by sub-sector. Summaries of the data were good, but the report did lack a “with additional measures” summary by gas and a breakdown of the base year (rather than 1990) by sector.