



HELLENIC REPUBLIC

MINISTRY FOR THE ENVIRONMENT, PHYSICAL PLANNING AND PUBLIC WORKS

## COUNTRY PROFILE

GREECE

**National Reporting to the Fourteenth & Fifteenth Sessions of the  
COMMISSION for SUSTAINABLE DEVELOPMENT  
of the UNITED NATIONS (UNCSD 14 – UNCSD 15)**

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## ABBREVIATIONS

ACCI	Athens Chamber of Commerce and Industry
BAT	Best Available Techniques
CAP	Common Agricultural Policy
CEU	Commission of the European Union
CH <sub>4</sub>	Methane
CHP	Cogeneration of Heat and Power
CNG	Compressed Natural Gas
CO	Carbon dioxide
CO <sub>2</sub>	Carbon dioxide
CRES	Centre for Renewable Energy Sources
CSF	Community Support Framework
ECMWF	European Centre for Medium-Range Weather Forecasts
EIA	Environmental Impact Assessment
EMEP	Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe
ERDF	European Regional Development Fund
ESP	Electrostatic Precipitator
ETHEL	Athens Thermal Bus Company S.A.
ETS	Emission Trading System
EU	European Union
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
FGD	Flue Gas Desulphurisation
FGI	Federation of Greek Industries
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GHG	Greenhouse Gas (Emissions)
GSRT	General Secretariat for Research and Technology, Ministry of Development
HES	Hydro Electric Station
HFCs	Hydrofluorocarbons
HNMS	Hellenic National Meteorological Service
HTSO S.A.	Hellenic Transmission System Operator
IPCC	Intergovernmental Panel on Climate Change
IPPC	Integrated Pollution Prevention & Control
JMD	Joint Ministerial Decision
LCA	Life Cycle Assessment
LCP	Large Combustion Plant
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
LUCF	Land-Use Change and Forestry Sector
MAP / UNEP	Mediterranean Action Plan / UNEP
MD	Ministerial Decision
MDGs	Millennium Development Goals
MoU	Memorandum of Understanding
MS	Member State
Mtoeq - ktoeq	Million tones oil equivalent – Thousands tones oil equivalent
NO <sub>x</sub>	Nitrogen oxides
N <sub>2</sub> O	Nitrous oxide
NAP	National Allocation Plan
NAPCC	(2 <sup>nd</sup> ) National Action Plan for the Abatement of CO <sub>2</sub> and other Greenhouse Gas Emissions 2000-2010
(3 <sup>rd</sup> and 4 <sup>th</sup> ) NCC	(3 <sup>rd</sup> and 4 <sup>th</sup> ) National Communication of Greece to the UNFCCC
NCESD	National Centre for Environment and Sustainable Development
NCMR	National Centre for Marine Research
NEIN	National Environmental Information Network
NGO	Non Governmental Organization
NMVOCs	Non Methane Volatile Organic Compounds
NNCAP	National Network for the Control of Atmospheric quality and Pollution

NOA	National Observatory of Athens
NSSD	National Strategy for Sustainable Development
O <sub>3</sub>	Ozone
ODA	Official Development Assistance
OEP	Operational 'Environment' Programme
OJG	Official Journal of the Government
OPCOM	Operational Programme 'Competitiveness'
OPE	Operational Programme 'Energy'
PAHs	Polycyclic Aromatic Hydrocarbons
PF	Pulverized Fuel
PFCs	Perfluorocarbons
PM <sub>10</sub>	Particulate Matter less than 10 microns in diameter
PGC S.A.	Public Gas Corporation S.A.
PPC S. A.	Public Power Corporation S. A.
PPP	Public Private Partnerships
PV	Photovoltaic
R&D	Research and Development
RAE	Regulatory Authority for Energy
RES	Renewable Energy Sources
SDR	Special Drawing Right
SES	Steam Electric Station
SF <sub>6</sub>	Sulphur hexafluoride
SME	Small and Medium size Enterprise
SO <sub>2</sub>	Sulphur dioxide
TEN	Trans-European Networks
TPES	Total Primary Energy Supply
TPF	Third Party Financing
UHVC	Ultra-high Voltage Centre
UNCSD	United Nations Commission on Sustainable Development
UNECE	United Nations Economic Commission for Europe
UNFCCC	United Nations Framework Convention on Climate Change
VAT	Value-added Tax
VOCS	Volatile Organic Compounds
WB	World Bank
WSSD	World Summit on Sustainable Development (Johannesburg, August-September 2002)
YPEHODE	Hellenic Ministry for the Environment, Physical Planning and Public Works

#### SIGNS & NOTES

- . : decimal point
- , : thousands' separator
- EUR: euros (on average, as of November 2006, 1 euro = 1.28 USD)
- USD: US Dollar

## CHAPTER I: Atmosphere – Air Pollution

### ■ Status

#### Physical and climate profile

Greece has a Mediterranean climate, with mild, wet winters and hot, dry summers. The average temperature during summer is approximately 28°C in Athens and southern Greece, while lower in the north. In general, temperatures are higher in the southern part of the country. Except for a few thunderstorms, rainfall is rare from June to August, and days are dry and sunny, a typical characteristic of the Mediterranean climate. Summers in the lowlands are hot and dry with clear skies. Dry hot days are often relieved by a system of seasonal breezes. The 1990s was the warmest decade of the 20<sup>th</sup> century in Greece; evidence from meteorological observations thus indicate that in Greece the temperature over recent years has increased, while there has been a decrease in precipitation. There is evidence of more frequent incidence of heat waves and higher maximum temperatures. A 1–2 mm increase in sea level per year was recorded for the Mediterranean coast.

Because of the alkaline nature of its soils, Greece does not face large-scale acidification problems relating to domestic or transboundary air pollution. The prevailing north winds make Greece generally a net importer of most air pollutants in general and of sulphur oxides (SO<sub>x</sub>) in particular, while heavy metal deposition (chrome, nickel, copper, and manganese) from lignite fired power plants is systematically being monitored.

#### Monitoring of air pollutants/emissions

Greece, as an EU Member State (MS), has incorporated into its national legislation all air quality related EU Directives. These include: (i) Directive 1996/62 for the assessment and management of the ambient air quality, (ii) Directive 1999/30 for threshold values for SO<sub>2</sub>, nitrogen oxides (NO<sub>x</sub>) air quality standards, particulates and lead, (iii) Directive 2000/69 for threshold values for benzene and CO air quality standards, (iv) Directive 2002/3 for O<sub>3</sub> air quality standards, and (v) Directive 2004/107 for arsenic, cadmium, mercury, nickel and polyaromatic hydrocarbons (PAHs). This legislative framework, apart from setting threshold values for measuring and assessing ambient air quality, it also defines the number and location of sampling points for each air pollutant, the minimum requirements for results quality assurance as well as the measuring and reference methodologies etc.

Based on these legal enactments that set limit values and requirements for air pollution monitoring, Greece has designed a "National Network for the Control of Atmospheric quality and Pollution" (NNCAP); the modernised NNCAP was set up and put into operation in 2001. Its supply and setting up has been partially funded by the 2<sup>nd</sup> EU Community Support Framework (CSF) complemented by national funds. The NNCAP encompasses 33 automatic measuring stations in areas characterised as urban, residential, commercial and semi-industrial, located in 8 Greek cities plus 1 background station located in a rural area: Athens (16 stations), Thessaloniki (8 stations), Kozani (3 stations), Patra (1 station), Larissa (1 station), Volos (1 station), Megalopoli (1 station), Herakleion/Crete (1 station) and Aliartos (background station). Measurements of all air pollutants stated in the related legislation, including O<sub>3</sub>, NO<sub>2</sub>, SO<sub>2</sub>, CO, smoke and PM<sub>10</sub>, are measured automatically on hour and daily basis and are reported on the internet ([www.minenv.gr](http://www.minenv.gr)). Apart from measuring values and quantitative results, the operation of the NNCAP is also providing levels of specific air pollutants measured nationwide and particularly in urban areas. This specific application, that is also expected to be further expanded together with the expansion of the network in the near future, has been financially supported, inter alia, by the 3<sup>rd</sup> Community Support Framework (CSF).

The Public Power Corporation (PPC S.A.) contributes to the monitoring of ambient air quality in the vicinity of power plants under its operation, with 53 measuring stations, performing systematically air quality measurements. Most of these measurements are electronically transmitted to the interested parties, such as Prefectural Administrations and Local Authorities of the regions where PPC S.A. operates, according to the environmental terms and conditions imposed on power plants. An official report is annually submitted to the Directorate for Air Pollution and Noise Control of the Hellenic Ministry of Environment, Physical Planning and Public Works (YPEHODE). Furthermore, PPC S.A. is currently exploring possibilities for establishing an on-line connection to the database of the NNCAP, in cooperation with YPEHODE, in order to complement data from both sources.

## Overall Greenhouse Gas Emissions profile

*GHG emissions:* Greece's overall Greenhouse Gas (GHG) emissions' profile shows a clear domination by the energy sector, with CO<sub>2</sub> as the main GHG. In 1990, CO<sub>2</sub> accounted for 76% of the total GHG emissions (without taking into account the Land-Use Change and Forestry sector - LUCF), followed by N<sub>2</sub>O (13%) and CH<sub>4</sub> (8%). A similar pattern was reported in 2002, when the proportion of CO<sub>2</sub> was 78%, followed by N<sub>2</sub>O (10%) and CH<sub>4</sub> (8%). Total GHG emissions (excluding CO<sub>2</sub> from LUCF) increased by 26% between 1990 and 2002, while total GHG emissions including net removals from LUCF increased by 23%. This was mainly attributed to CO<sub>2</sub> emissions, which increased by 27% over this period. Emissions of CH<sub>4</sub> also increased by 27%, while emissions of N<sub>2</sub>O decreased by 1%. A major part of these increases was experienced during 1995–2002. Emissions of fluorinated gases accounted for about 1% of total GHG emissions in 1990 and 3% in 2002.

Table 1: GHG emission trends by gas, 1990 and 1995-2002

	Gg CO <sub>2</sub> equivalent (eq)									Change (%) 1990–2002
	1990	1995	1996	1997	1998	1999	2000	2001	2002	
CO <sub>2</sub> <sup>a</sup>	82,818	86,705	89,041	93,637	98,289	97,594	103,429	105,506	105,504	27.4
CH <sub>4</sub>	8,994	9,734	10,065	10,187	10,812	10,838	11,415	11,207	11,440	27.2
N <sub>2</sub> O	14,144	12,865	13,437	13,882	13,901	13,655	14,494	13,993	13,962	-1.3
Fluorinated gases	1,193	3,452	3,988	4,359	4,257	4,288	4,429	3,936	4,087	242.7
Net GHG <sup>b</sup>	108,623	112,354	116,459	121,663	130,089	126,394	137,937	133,347	133,101	22.5
Total GHG <sup>c</sup>	107,149	112,756	116,531	122,066	127,259	126,375	133,768	134,642	134,992	26.0

<sup>a</sup> CO<sub>2</sub> emissions without LUCF

<sup>b</sup> Total GHG (with net CO<sub>2</sub> emissions/removals from LUCF)

<sup>c</sup> Total GHG (without CO<sub>2</sub> from LUCF)

*Carbon dioxide:* Total CO<sub>2</sub> emissions in Greece were 105,504 Gg in 2002. The major emitters were energy industries (52% of total CO<sub>2</sub> emissions), followed by transport (19%), energy use in other sectors (12%), energy use in industry (10%), and industrial processes (7%). The trend in CO<sub>2</sub> emissions between 1990 and 2002 increased steadily and broadly following the trend of CO<sub>2</sub> emissions from energy industries, accelerated growth in Gross Domestic Product (GDP) and energy consumption, with stagnation in the years 1999 and 2002 due to stable or declined coal-fired power production. Between 1990 and 2002, CO<sub>2</sub> from energy industries grew by 27% (+11,807 Gg), mainly driven by a 55% increase in power production; about two thirds of electricity was produced from domestic lignite. The trend in CO<sub>2</sub> emissions from fuel combustion also showed notable increases in transport (+32% or 4,943 Gg) and energy use in other sectors, e.g. residential and services (+53 % or 4,239 Gg).

*Methane:* Emissions of CH<sub>4</sub> amounted to 11,440 Gg CO<sub>2</sub> eq in 2002. Solid waste disposal on land (46%) and enteric fermentation (26%) accounted for the largest share. Between 1990 and 2002 overall CH<sub>4</sub> emissions increased steadily by 27%, mainly due to an increase in emissions from solid waste disposal on land (+88%).

*Nitrous oxide:* Emissions from N<sub>2</sub>O reached about 14,000 Gg CO<sub>2</sub> eq in 2002. Major sources were emissions from agricultural soils (63%) and fuel combustion (28%). During the period 1990 to 2002, total N<sub>2</sub>O emissions decreased by 1%. The main reductions were reported for the chemical industry (-147 Gg from 1990 to 2002) and for agricultural soils (-915 Gg), whereas increases were reported for energy industries (+427 Gg), transport (+282 Gg) and energy use in other sectors (+165 Gg). The main reason for declining N<sub>2</sub>O emissions from agricultural soils was a 25% decrease in nitrogen input from synthetic fertilizers and manure.

*Fluorinated gases:* Emissions of fluorinated gases increased by 243% between 1990 and 2002, when they still accounted for less than 3% of total GHG emissions. In particular, emissions of HFCs, mainly from production of HCFC, but in recent years also from consumption of halocarbons, increased notably, by 328% from 1990 to 2002 (+19% since the base year 1995). Emissions of PFCs, which originate from metal production, declined by 66% between 1990 and 2002 (+7% since the base year).

### Atmospheric concentrations of air pollutants in 2 key Greek Metropolitan areas: an indicative presentation

#### i. The Athens area

Concentrations of air pollutants in the greater metropolitan area of Athens, where approximately 50% of the population of Greece resides, have been measured and reported, in recent years, as depicted in the graphs that follow. In general, despite the various annual fluctuations, concentrations indicate a general declining or stabilisation trend. These trends can be mainly

attributed to the technological upgrade of passenger vehicles and public transport on-road fleet, the introduction of the measure of the «exhaust gas emission inspection Card» as well as the introduction of various other emissions control measures, the use of higher quality fuels, the further promotion of railway transportation, the further penetration of natural gas in the tertiary sector and households etc (see also under Section «Decision-Making, Legal and Regulatory Framework, Policy Instruments and Measures»). In particular:

*Carbon monoxide:* Atmospheric concentrations between 1984 and 2005 show decreases or stabilisation trends, especially in more recent years (1994-2005). It is noted that for 1992, measurement resulted from only a small number of stations, hence it is not regarded as representative. CO air pollution is thus evaluated as significant only as regards the city centre where the related EU threshold in force since January 1, 2005 has been exceeded only at one sampling station.

*Sulphur dioxide:* Atmospheric concentrations between 1984 and 2005 show considerable declining trends. This is mainly attributed to the decrease in the sulphur content in heating and transport diesel, the introduction of unleaded gasoline as well as the installation of 2 desulphurisation units in 2 PPC S.A. plants. Therefore, even though SO<sub>2</sub> was considered in the past as an important pollutant, in recent years no exceeding of thresholds has been reported.

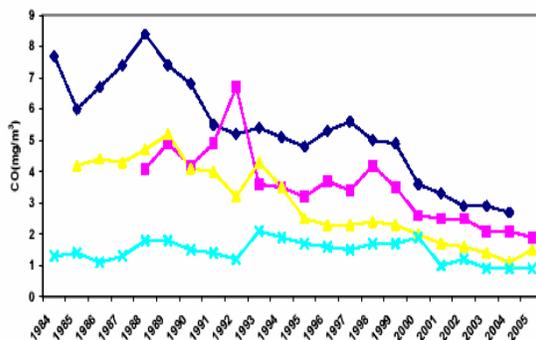
*Nitrogen dioxide:* Atmospheric concentrations between 1984 and 2005 indicate stabilisation or declining trends over recent years. However the measured values for Athens exceed thresholds that will be put into force from January 1, 2010 according to new amended EU legislation, thus, pollution arising from NO<sub>2</sub> for Athens is estimated as significant.

*Particulate matter 10 (PM<sub>10</sub>):* Between 2001 and 2005, measured values have been reported to exceed thresholds in several cases, thus pollution from PM<sub>10</sub> is considered significant. It should be, however, noted that exceedances reported for Athens, Thessaloniki and Patra in 2001 can be wholly or to a very large extent attributed to the intense construction works that were underway in those areas at the time. These works, in addition to the infrastructure works for the Athens Olympic Games 2004 as well as the consequent changes in traffic loads and routes resulted in high values for both NO<sub>2</sub> and PM<sub>10</sub>. Moreover and particularly with regard to PM<sub>10</sub>, it has been noted that in many cases measured values exceeding thresholds are attributed to south winds and transfer of dust from north Africa to Greece.

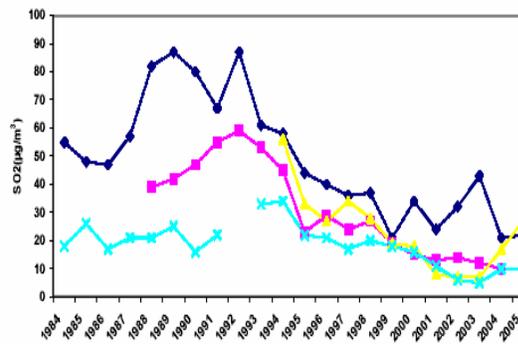
*Ozone:* Atmospheric concentrations have exceeded set limits in several cases. These exceedances are mainly attributed to the geographic location and particularities of Greece in general and of Athens in particular (i.e. intense sunshine and high temperature that contribute to ground-level photochemical ozone formation). In particular, for 1997, measured value resulted from few number of measurements, hence is not regarded as representative. Therefore, ozone pollution in Athens has been classified as substantial.

*Smoke:* Atmospheric concentrations indicate declining trends.

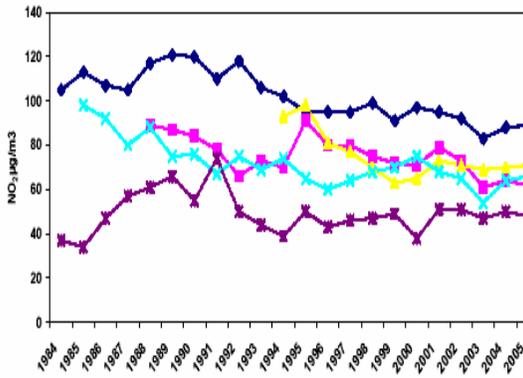
*Benzene:* Systematic measurements for this pollutant have started only recently. Pollution from benzene is considered significant for the city centre due to exceedances of set thresholds that will be put into force on January 1, 2010.



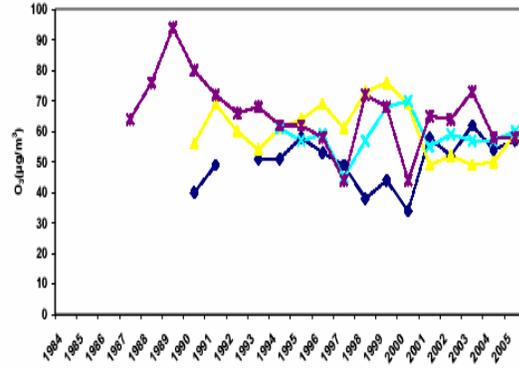
Graph 1: CO atmospheric concentrations measured at 4 stations in Athens



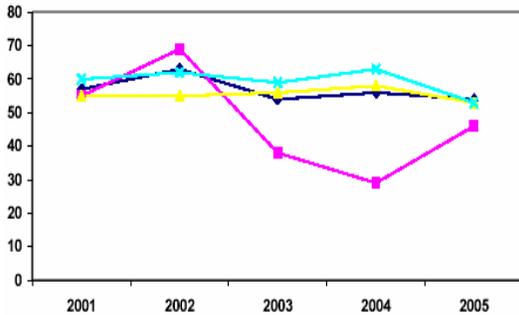
Graph 2: SO<sub>2</sub> atmospheric concentrations measured at 4 stations in Athens



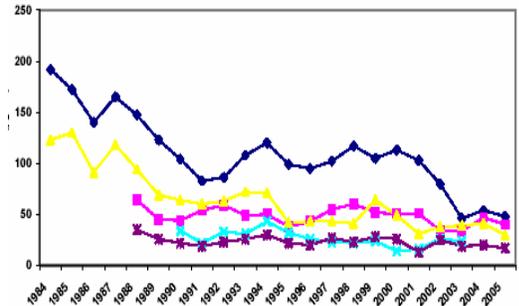
Graph 3: NO<sub>2</sub> atmospheric concentrations measured at 5 stations in Athens



Graph 4: O<sub>3</sub> atmospheric concentrations measured at 5 stations in Athens



Graph 5: Particulate Matter (PM<sub>10</sub>) concentrations (µg/m<sup>3</sup>) measured at 4 stations in Athens



Graph 6: Smoke atmospheric levels (µg/m<sup>3</sup>) measured at 5 stations in Athens

ii. The Thessaloniki area

Pollution from CO and SO<sub>2</sub> is not considered as significant for Thessaloniki since measured levels fall within set EU limits, for the period 1989-2004. However, pollution from NO<sub>2</sub>, O<sub>3</sub> and PM<sub>10</sub> is characterised as considerable due to certain exceedances of the set thresholds.

**Emission trends and projections**

The 3<sup>rd</sup> National Communication of Greece (3 NCC, 2002) to the United Nations Convention on Climate Change for reviewing the Greek National Action Plan for the Abatement of CO<sub>2</sub> and other GHG emissions, indicates that according to the "with measures" scenario, emissions will be 35.8% and 56.4% above base-year levels (1990 has been used as the base year for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O; 1995 has been used as the base year for HFCs, PFCs and SF<sub>6</sub>) by 2010 and 2020, respectively. The energy sector accounts for more than 75% of total GHG emissions while CO<sub>2</sub> emissions account for more than 80% of total emissions. However, f-gases emissions are estimated to increase with a mean annual rate more than 4 times higher than that of total emissions for the time period 2000-2020 (5.1% for the f-gases compared to 1.2% for total emissions).

Table 2: Projections of greenhouse gases emissions in the "with measures" scenario, disaggregated by gas, kt CO<sub>2</sub> eq (Source: NOA)

Gas	Base year	1990	1995	2000	2005	2010	2015	2020
Carbon dioxide	85,586	85,586	87,273	107,818	111,961	120,817	128,947	136,834
Methane	8,743	8,743	9,493	10,562	9,395	7,936	8,040	9,283
Nitrous oxide	10,624	10,624	9,900	10,979	10,909	11,148	11,285	11,430
HFCs	3,369	935	3,369	4,281	5,022	7,158	9,626	11,842
PFCs	83	258	83	148	148	148	148	148
SF <sub>6</sub>	0	0	0	0	0	0	0	0
Total	108,405	106,146	110,118	133,788	137,436	147,207	158,046	169,537
Change from base year levels	100	97.9	101.6	123.4	126.8	135.8	145.8	156.4

The main assumptions made for the projection of energy consumption and associated GHG emissions in the "with measures" scenario are presented below.

Table 3: Main assumptions in the "with measures scenario" (Source: NOA)

	Historic			Projected			
	1990	1995	2000	2000-2005	2005-2010	2010-2015	2015-2020
Population (mio)	10.16	10.53	10.87	0.5%	0.4%	0.3%	0.2%
Household size (cap/hh)	3.21	3.14	3.06	2.97	2.87	2.78	2.68
GDP (bil. Euro 2000)	96.6	102.8	121.0	4.4%	3.4%	3.0%	2.9%
International fuel prices							
Coal (USD 90/t)	51.3	40.6	28.5	31.2			
Oil (USD 90/bbl)	22.2	17.2	22.8	-7.7%	0.0%	0.8%	3.1%
Natural gas (\$90/toe)	119.1	92.5	90.1	-7.7%	0.0%	0.8%	3.1%
Transport activity							
Passenger transport (bil. p-km)	96.5	124.3	151.4	3.3%	2.3%	1.7%	1.0%
Goods transport (bil. t-km)	84.8	94.3	106.0	2.6%	2.3%	2.1%	1.9%

As a result of additional policies and measures ("with additional measures" scenario) set out in the "2<sup>nd</sup> Climate Change National Programme of Greece for the Abatement of CO<sub>2</sub> and other GHG emissions, 2000-2010" (NAPCC) prepared in 2002 and currently under revision, the increase of GHG emissions in Greece could be restricted to 24.5% by 2010, compared to base-year levels.

Table 4: Projections of greenhouse gases emissions in the "with measures" and the "with additional measures" scenarios, disaggregated by sector, kt CO<sub>2</sub> eq (Source: NOA)

Sources / Sinks	1990	1995	2000	2005		2010	
				With measures	With additional measures	With measures	With additional measures
Energy	80,789	84,386	101,062	107,787	104,441	116,890	109,404
Industrial processes	9,591	11,725	12,874	13,667	13,667	15,899	11,248
Solvents	177	156	169	173	173	177	177
Agriculture	10,448	9,737	10,227	9,736	9,702	9,668	9,604
Land-Use Change and Forestry	1,391	-307	4,138	2,030	2,030	2,030	2,030
Waste	3,749	4,422	5,319	4,042	4,016	2,542	2,473
Total	106,145	110,120	133,789	137,435	134,029	147,206	134,936
Change from base-year levels	97.9	101.6	123.4	126.8	123.6	135.8	124.5

## ■ Decision-Making, Legal and Regulatory Framework, Policy Instruments and Measures

Based on the related legislative framework, responsibility for the operation of the NNCAP in Greece are the corresponding Regional Authorities, whereas for the Attica Region, where Athens is located, responsibility falls under the jurisdiction of YPEHODE. YPEHODE is also responsible for the coordination of climate change activities in Greece, whereas other ministries are responsible for integrating environmental policy targets and implementing the existing and future NAPCCs within their respective fields. The Council of Ministers is responsible for the final approval of all policies and measures relating to the mitigation of climate change.

The national legislation for air pollution control in Greece is based on and incorporates all related EU legislative acquis. This includes EU Directives 1996/62, 1999/30, 2000/69, 2002/3 and 2004/107 for stationary sources, Directives 1991/441, 1994/12 and 1998/69 regarding emissions and limits on vehicle exhausts as well as Directives 2001/80 for large combustion plants, 2001/81 for the setting of national emissions' ceilings and 1999/13 for the use of solvents in the industrial sector.

Greece ratified the UN Framework Convention on Climate Change (UNFCCC) in August 1994 and has submitted three national communications, in 1995, 1997 and 2003, while a 4<sup>th</sup> NCC was drafted in March 2006. Greece signed the Kyoto Protocol in April 1998 and ratified it jointly with the other EU MSs in May 2002. Greece's Kyoto target under the EU burden-sharing agreement is to keep total GHG emissions during the period 2008–2012 below 125% of the 1990 level (the base year for the fluorinated gases, i.e. HFC, PFC and SF<sub>6</sub>, is 1995). In this context, the 2<sup>nd</sup> NAPCC was compiled in 2001 and adopted in May 2002 while it was consequently approved by the Council of Ministers in February 2003 (Ministerial Council's Act 5/2003). The 2<sup>nd</sup> NAPCC, which is currently been revised (see below) aims at achieving the Kyoto target and mainly built on cost-effective policies and measures that were already integral parts of national sectoral policies, including the promotion of natural gas, renewable energy sources (RES) and energy efficiency.

In December 2004, Joint Ministerial Decision (JMD) 54409/2632 entered into force transposing into the national legal order EU Directives 2003/87 and amended 1996/61 on GHG emission trading. Based on this JMD, the designing of a national system for the trading of GHG emissions allowances was initiated and a National Allocation Plan (NAP) for GHG emission was compiled, allocating 213.5 million t CO<sub>2</sub> (i.e. 71.14 million allowances per year over 2005-2007) to 141 industrial and power generation units for the period 2005-2007. This first NAP was approved by the EU with a Decision in June 2005. The NAP was enacted in Greece and set under implementation based on a JMD (Ministers of Environment and Development) that was based on the outcomes of the public consultation process launched on July 4, 2005.

Moreover, a new NAP for GHGs emissions for the period 2008-2012 was set for public consultation on June 15, 2006; the final draft has consequently been prepared and submitted to the CEU in September 2006 while its final approval is pending.

At the same time, a new updated and revised 2<sup>nd</sup> NAPCC will be set for public consultation at the end of November 2006 until end of January 2007. The Draft revised 2<sup>nd</sup> NAPCC is based on new data that emerged since its initial adoption in 2002, regarding actual progress, emission levels, trends, economic parameters etc. Therefore, the aim of adopting a Reviewed NAPCC 2 years before the commencement of the first commitment period under Kyoto, stems from the need to assess actual progress in implementation of initial measures and to re-orient policy options and priorities so as to ensure achievement of targets and, inter alia, make better use of Kyoto's flexible mechanisms.

Greece has also ratified the Montreal Protocol as well as its London and Copenhagen amendments with Laws 1818/1988, 2110/1992 and 2262/1994 respectively; the ratification of the Beijing amendment has been completed with Law 3425/2005. Regarding ozone-depleting substances, Greece is also implementing EU Regulation 2037/2000. Greece has also ratified the Geneva Convention for long-distance transboundary air pollution under the UN Economic Commission for Europe (UNECE) and has signed or/and ratified all its Protocols (see also under Section "Cooperation").

The following table presents in brief the related national legislative framework and the respective objectives set for air pollution control regarding the whole Greek territory, with particular emphasis on the main metropolitan areas, i.e. Athens, Thessaloniki and Patra.

Table 5: Overview of key objectives-measures under implementation and corresponding legislative framework to address air pollution in Greece, with emphasis on key metropolitan areas

<b>Stationary Sources</b>		
<b>Objective-Measure</b>	<b>Legislation</b>	<b>Reduction of Pollutants</b>
Setting of threshold values according to best available techniques in large and medium size industrial sites	Joint Ministerial Decision (JMD) 15393/2332/2002 JMD 11014/703/2003 Law 3325/2005	Air pollutants that are reduced vary according to the activity of the specific industrial site involved
Set up and operation of the Hellenic Environmental Inspectorate Service	Law 2947/2001	All air pollutants
Introduction of natural gas at energy intensive sites	Law 3325/2005	SO <sub>2</sub> , PM <sub>10</sub> , NO <sub>x</sub>
Introduction of Environmental Management Systems in sites of high nuisance near or at residential areas	Law 3325/2005	All air pollutants
Use of natural gas in household and tertiary sector		SO <sub>2</sub> , PM <sub>10</sub>
Setting up of specialised task forces for the control of transportation and storage of fuels	Law 3045/2002	All air pollutants
<b>Mobile Sources</b>		
Renewal of the public transportation vehicles' fleet and substitution with gas vehicles		All air pollutants
Renewal of the Taxis' fleet	Law 3109/2003	All air pollutants
Incentives for the renewal of motorcycles	Law 3333/2005	All air pollutants
Set up and operation of private Centres for the Technical Inspection of vehicles	Law 2963/2001	All air pollutants
<b>Interventions in the urban context</b>		
Upgrading of traffic lights and operation of an integrated system for traffic management and control		All air pollutants
Coordination of the urban public transportation system		All air pollutants
Creation of designated bus lanes		All air pollutants

Table 5 (continue)

Strengthening of the public transportation systems with the operation and extension of the Metro, the operation of the Tram and the Suburban railway in Athens/Attica		
Compilation of the 2 <sup>nd</sup> National Action Plan for the Abatement of CO <sub>2</sub> and other Greenhouse Gas Emissions	Ministerial Council Act (MCA) 5/2003	All air pollutants
Promotion and introduction of Renewable Energy Sources (RES) in the country's energy system	Decision of Minister of Development 1693/118/31.1.2005	All air pollutants
Funding of private investments in the energy sector for the development and utilisation of natural resources and environmental protection	Decision of Minister of Development 15074/1235/5.8.2005	All air pollutants
Power production from natural gas	Decision for the approval of environmental terms 116997/20.5.2005	All air pollutants

Moreover, regarding the implementation of EU Directives 1996/62 and 1999/30, YPEHODE has assigned 13 studies under the general title "Elaboration and designing of Operational Action Plans for the air pollution abatement throughout the country according to EU Directive 1996/62", through an international tendering procedure, that have been partially funded by the 3<sup>rd</sup> CSF/3<sup>rd</sup> Operational "Environment" Programme (OEP, 2000-2006) of YPEHODE. The implementation of the Action Plan for Athens and Thessaloniki started in 2003, whereas the respective study for Patra was completed in late 2005.

In more detail, based on the above mentioned legislative framework and taking into account the objectives set by Greece for air quality control, specific measures can be further analysed as follows:

#### **Plans to deal with severe air pollution incidents**

In the case of severe air pollution incidents in the Athens area, YPEHODE is responsible for implementing preventive and abatement measures to address intense air pollution exceedances aiming mainly at protecting human health and in particular vulnerable groups (e.g. overage people, patients, children, infants). For pollution incidents in other parts of Greece, the responsibility for immediate measures falls under the jurisdiction of the various Regional Authorities.

Urgent measures are also taken in the case where measured values exceed or are at the emergency limits (population information level) in combination with specific climatic conditions that favour maintenance of such levels during the following day/s. According to the extent of exceedance, urgent measures follow a 2-step approach: (i) recommendations for controlling of emissions and safeguarding population from exposure to atmospheric pollution, and (ii) restrictive measures regarding the circulation of private vehicles, transportation of fuels and solvents, operation of industrial plants etc. Such strict measures are taken alone or in combination with other restrictive measures according to the magnitude of the incident. It should be, however, noted that since 1997, no emergency measures were required and taken in Greece. It should also be noted that according to legislation, data is widely and publicly provided for ozone exceedances over 180 µg/m<sup>3</sup> and measures are taken in case of exceedance of 240 µg/m<sup>3</sup> for more than 3 hours.

#### **Control of air pollution from stationary, mobile and other pollution sources**

##### ***Transport***

The increase in demand in the transport sector in Greece today accounts for 40% of total energy consumption and a continuously increasing share in GHG emissions and noise levels, like in most other EU countries; in 2002 in Greece, fuel combustion in domestic transport accounted for 15.5% of total GHG emissions, while emissions from international bunker fuels (mainly marine transport) equalled to 9.1%. Even though transportation demand in Greece is below the 40% of EU average, the need for decoupling transportation from economic growth is still a major challenge. To this end, a series of interventions aiming mainly at reducing air pollution have been introduced over recent decades in the largest metropolitan areas of the country with great success.

Since the mid 1980s an alternate licence plate system in Athens (odd-numbered plate cars used only on odd numbered-days and even-numbered plate cars used only on even-numbered days) restricts the use of private passenger cars in the central city between 7am-8pm Monday through Thursday and between 7am-3pm on Fridays. Moreover, in the early 1990s, the introduction of an extended vehicle scrapping

programme to reduce the number of old-technology vehicles in the fleet resulted in a considerable fleet renewal through significant discounts on the purchase of new catalytic converter cars. Furthermore, the introduction of the "exhaust gas emission inspection Card" for in-use road vehicles put in place in mid 1990s by YPEHODE and the Hellenic Ministry of Transport and Communications, is still in operation and extended in almost all Prefectures of the country.

As previously mentioned, Greece, as an EU MS has transposed into its national legislation and implements all vehicle exhaust emission limits Directives, i.e.: EURO I (EU Directive 1991/441), EURO II (EU Directive 1994/12), EURO III (EU Directive 1998/69), EURO IV (EU Directive 1998/69, under implementation since January 1, 2005).

Regarding the quality of fuels and in particular the specific measures designed to reduce the lead content in gasoline, the following are, inter alia, implemented:

- Segregation of diesel in heating diesel and transport diesel (1992)
- Reduction of the sulphur content in heating diesel and transport diesel from 0.3% to 0.2% (1994)
- Reduction of benzene content in gasoline from 5% to 4% (1995)
- Reduction of the sulphur content in transport diesel to 0.05% (1996)
- Implementation of EU Directive 1998/70 regarding fuel standards in Greece (2000) included, inter alia, the reduction of sulphur content in unleaded gasoline to 150 ppm and reduction of sulphur content in transport diesel to 350ppm
- Reduction of benzene content in gasoline from 4% to 1% (2000)
- Abolition of the use of leaded gasoline
- Implementation of EU Directive 2003/17 regarding zero sulphur fuel content (2003); since January 1, 2005 sulphur content in unleaded gasoline reached 50ppm whereas on January 1, 2009 will be further reduced to 10ppm.

Regarding railway transport, the Hellenic Ministry of Transport and Communications, seeking to increase the share of railway transport in Greece, promotes the modernization of railway infrastructure, mainly through EU funding, with a view to increase the competitiveness of railway transport and the upgrade of their role compared to road transport. During the last decade, even though a rapid increase of the total transport demand has occurred, railway transport in Greece had been rather neglected over the ever increasing flexibility of road transport. The sustainability and maintenance as well as the further expansion of the railways share in the transport market requires the improvement of services (better transport quality, faster transport, reliability, safety) as well as the reduction of functional costs. One of the main national development objectives, at the moment, entails the modernization of the Greek railway system which includes an upgraded infrastructure combined with the proper vehicular material and its development to a modern competitive mean of transport able to provide high level services to users.

The construction of an extended high speed Suburban railway network in the area of Athens, in 2003-2004, resulted in reducing travelling time (e.g. Piraeus to International Airport Eleftherios Venizelos: 47 minutes, Athens city centre to International Airport Eleftherios Venizelos: 35 minutes), improvement of traffic conditions, improvement of environmental conditions in the urban areas due to lower exhaust emissions, lower noise levels, decongestion of on-road traffic as well as energy savings.

The Athens Metro that was constructed between 2000-2003, entailed the construction of 2 new lines (lines 2 and 3) that complemented the existing old and only line until 2000 (line 1). In 2003 and 2004, a major reconstruction and refurbishment was conducted for all stations of line 1. The ever expanding Athens Metro is planned to be coupled, in 2007, with 6 new stations (3 of which intermediary) for line 3 and 2 new stations for line 2. By 2009, the Athens Metro will be further expanded with 4 additional stations for line 2 and 3 additional stations for line 3. Currently, approximately 580,000 passengers use the metro lines 2 and 3.

The impact of the operation of the extended Athens Metro system to the city's air quality was extensively documented in year 2000, right after the commencement of its operation (lines 2 and 3). At that time, Metro operations substituted about 100,000 car trips per day. The positive impact on pollutants' reductions from its operation is indicatively depicted in the following table (Table 6), where pollutant concentrations from the period from January 30, 1999 to January 29, 2000 (before the opening of Metro lines 2 and 3) are being compared to those of period from January 30, 2000 to January 29, 2001 (after the opening of Metro lines 2 and 3); for each pollutant, the average value of all measurements from all stations in the Athens region has been calculated, in order to cancel out any deviations that occur due to differences in location. Further positive impacts from the Metro's operation since, can thereafter be extrapolated.

Table 6: Pollutants concentration before and after the operation of the Athens Metro

Emissions	BEFORE METRO (Construction of lines 2 and 3) ( $\mu\text{g}/\text{m}^3$ )	AFTER METRO (Construction of lines 2 and 3) ( $\mu\text{g}/\text{m}^3$ )	DIFFERENCE %
Sulphur Dioxide ( $\text{SO}_2$ )	18,3	17,5	- 4
Carbon Monoxide (CO)	2,43 ( $\text{mg}/\text{m}^3$ )	2,25 ( $\text{mg}/\text{m}^3$ )	- 7
Nitrogen Dioxide ( $\text{NO}_2$ )	58,3	54,3	- 7
Atmospheric Ozone – Smog ( $\text{O}_3$ )	55,7	49,7	- 12
Smoke	52,6	50,0	- 5

Figures demonstrate a reduction in all pollutants. This reduction is more evident in the pollutants that are emitted almost exclusively from on-road traffic (carbon monoxide, nitrogen dioxide, and smog). These results should be viewed in the context of the 8% increase of the car fleet size in Athens during the same period. The Athens Metro network has grown even further in size since the above measurements were made (new additional stations, air-rail link with the International Airport Eleftherios Venizelos). In view of its further expansion, it is expected that it will constitute an extensive fixed route transit network that will greatly contribute to the further improvement of the air quality of the greater Attica region.

Currently, the initiation of the construction of a similar Metro system for the city of Thessaloniki is underway.

In July 2004, 2 Tram lines were put to circulation in Athens, with a total track length of 25.5 km and 47 stops. The vehicle fleet is composed of 35 vehicles with carrying capacity of 200 persons each. Athens modern tramway started its commercial operation in August 2004 and is currently carrying around 55,000 passengers per day.

According to the related environmental impact assessment and by comparing the scenarios "Without" and "With" the Athens Tram, air quality around the Tram area is relatively improved due to a decrease of on-road traffic, reduction of bus lines in the region and attraction of new users. This reduction is expected to rise annually and be highest by year 2020.

Table 7: Air emissions' estimates with and without the Athens Tram based on the study of the local road network in the area of the project

Emissions	Scenario "Without Athens Tramway"-2004	Scenario "With Athens Tramway"-2004
Carbon Monoxide (CO)	3.5 (kg/day) *	3.4 (kg/day) *
Nitrogen Oxides (NOx)	1.4 (kg/day) *	1.3 (kg/day) *
Volatile Organic Compounds VOCs	398 (kg/day) *	383 (kg/day) *

\* Atmospheric emissions were calculated according to the Yearly Mean Daily Traffic Flow

Regarding interventions and measures taken to improve the energy performance of buses and the reduction of corresponding air pollution emissions, a drastic renewal of the buses fleet started in 1993 with the procurement of new thermic buses and is still on-going: between 1993 – 1995, 628 diesel buses according to EURO I standards were put into circulation; between 1998 – 2000, 750 diesel buses according to EURO II standards were put into circulation; between 2000 – 2001, 295 natural gas buses were put into circulation; in 2004, 283 diesel buses according to EURO III standards were procured while at the end of 2005, procurement of 120 additional natural gas buses was made.

The renewal of the electrified buses' (trolleys) fleet started in 1998, with the procurement of 224 vehicles and another procurement, in 2004, of 142 more vehicles.

The improvement of the country's passenger vehicles of public use (TAXIs) energy performance is carried out according to Law 3109/2003 that revised the age limits for the withdrawal of Taxis, that are now varying from 10 to 21 years depending on the vehicle's engine/cylinder capacity (cc), the region of operation and its population. The same law introduced financial incentives to Taxi owners (purchase subsidies) in order to replace their vehicles with modern ones. The output, since the implementation of the measure, was the replacement of approximately 9,300 vehicles, while the total number of Taxis that circulate nationwide today is around 35,000.

The use of hybrid vehicles for the needs of YPEHODE and the promotion of their use in other parts of Public Administration, is a measure that is contributing further to the reduction of atmospheric pollution. More specifically, since July 2004, YPEHODE has procured and is using 10 hybrid on-road vehicles. This activity has been completed in March 2006 with a total cost of EUR 214,582. This activity aiming to introduce the use of cleaner and environmental-friendlier vehicles in public authorities, is expected to be extended to other Ministries apart from YPEHODE.

Other highly important policies and measures regarding on-road vehicles recently introduced indicatively include:

- Law 2963/2001 that introduced the establishment of private Centres for the Technical Inspection of vehicles. Up to date, 9 such Centres are in operation, whereas at least 30 more Centres are under licensing procedure. At the same time, the modernization of the existing Public Vehicle Technical Inspection Centres devices and machinery is being promoted and upgraded.
- The establishment of a programme for the renewal of the circulating motorcycle and moped fleet. The programme combines incentives for permanent withdrawal from circulation and destruction of motorcycles (carrying engines over 50 cc) and moped and which have been used for more than 10 and 12 years respectively and their replacement by new modern technology motorcycles and motorbikes. This programme was introduced by Law 3245/2004 as amended by Law 3333/2005 and JMD 37687/4039/2004 as amended by JMD 8304/895/2006.

Similarly, fiscal and financial measures implemented in Greece in the fuels and on-road vehicles fields that are being promoted by YPEHODE and the Hellenic Ministry of Economy and Finance include, inter alia:

- road vehicles that do not respect exhaust limits may be fined; revenue from fines goes to the Green Fund managed by YPEHODE to help finance environmental investment;
- annual vehicle circulation fees are applied to passenger cars, motorcycles and trucks according to engine's capacity; a one-time fee is paid to obtain a licence plate after purchasing a car;
- lower and differentiated consumer tax rates for unleaded gasoline in comparison to unleaded gasoline with special additives that substitutes conventional/leaded gasoline since 2002;
- excise taxes are applied to gasoline and diesel fuel; part of revenues are channelled to the Green Fund to help finance air pollution control measures;
- reduction in the taxation and classification fees for new on-road passenger vehicles and motorcycles aiming at a faster fleet renewal;
- exemptions from classification fees for electric and hybrid on-road passenger vehicles as well as for electric trucks;
- promotion of biofuels: the construction and operation of two biodiesel plants in Kilkis and in Volos with a total capacity of 80,000 tons is completed as well as the use of compressed natural gas (CNG) for bus fleets are recently adopted measures based on the EU Directive for the promotion of biofuels. Law 3340/2005 introduced in Greece the exemption of excise duty for certain amounts of biodiesel.

Finally, regarding combating aviation emissions (mainly GHGs), Greece has fully adopted Annex 16 of the «Chicago Convention» of the International Civil Aviation Organisation, part of which refers to air emissions/pollution from aircrafts, with Presidential Decree 252/1986 on «Monitoring and Control of air pollutants and smoke emissions from aircrafts». The Greek Civil Aviation Service, being a member of the European Aviation Safety Agency, fully complies with related EU Regulations (e.g. Regulations 1592/2002, 1702/2003, 2042/2003) concerning, inter alia, the certification of aircrafts and engines regarding emissions levels. In the years to come and within the formulation of a more specialised EU legislative framework, Greece's activities regarding monitoring and analyses of aviation emissions as well as regarding certification of aircrafts according to their respective emissions, will be further developed and enhanced.

### **Energy**

In 2002, the energy sector (including energy production industry, energy use in residential and commercial sector, energy use in industry and energy use in transport) in Greece accounted for 77% of total GHG emissions.

The reduction of GHG emissions from the energy sector has been one of the key objectives of the Operational Programmes for "Energy" (OPE) during 1994-2001 as well as of the Operational Programme for "Competitiveness" (OPCOM) that encompasses a Sub-Programme (i.e. 2 priority axes) on "Energy" for the period 2000-2006, partially funded by the 3<sup>rd</sup> CSF. Its main aims include: reduction of carbon intensity in power production, improvements in the conventional power system, introduction of natural gas, promotion of RES, promotion of combined heat and power systems, improvements in the thermal

behaviour of existing buildings, promotion of energy-efficiency appliances and heating equipment as well as introduction of related incentives and environmental management systems (see Chapter II: Energy).

Regarding emissions reduction from existing large power production combustion plants operated by PPC S.A., under EU Directive 2001/80 for Large Combustion Plants (LCP), measures taken include: (i) units I and II of the Megalopolis A plant will enter the status of limited hours of operation (20,000 hours) from 01.01.2008 till 31.12.2010 at the latest, (ii) immediate measures for addressing the operational problems of the flue gas desulphurization plant in unit IV of the Megalopolis plant, (iii) by the end of 2007, all necessary modifications for using low sulphur heavy fuel oil, in certain existing oil fired plants, will be implemented. These emission reduction measures have been incorporated in the "National Scheme for Emissions Reduction", complied according to the provisions of the abovementioned EU Directive.

In order to reduce dust emissions from lignite power plants, PPC S.A. implements a programme for the replacement and upgrading of the existing Electrostatic Precipitators (ESPs) as well as for the installation of new state-of-the-art high performance ESPs. The implementation of the programme so far has led to an improvement in the quality of the ambient air in the power plants' regions. In order to reduce dust produced at the mines during transportation of the excavated materials with conventional means, PPC S.A. has also constructed special permanent wetting networks along the main road networks or special tanker trucks for secondary roads are used. In addition, large sections of the mines secondary roads are being asphalted.

PPC S.A. has also cooperated, in line with the EU legislation and European Investment Bank's requirements, for the installation of flue gas desulphurization (FGD) plants in lignite fired units aiming at the effective abatement of sulphur dioxide emissions. Two FGD plants are already in operation: (i) at Unit IV, 300 MW, in the Megalopolis Steam Electric Station (SES) and (ii) at the new Meliti SES, 330 MW, in the Florina region (Northern Greece).

Since 1996, a special tax of 0.4% has been applied to the revenue of PPC S.A.; the proceeds fund environmental protection and economic development activities in regions where the PPC S.A. operates its lignite-fired power stations.

The above measures, coupled with measures for the introduction of natural gas to the national energy balance (see below), resulted in the reduction of particulates emission specific factor from large combustion plants by approximately 85% (1990-2002).

Greece has been actively supporting the development of natural gas sector. Introduction and sale of natural gas into Greece commenced in 1997 by the Public Gas Corporation, PGC S.A. owned by Greek State and Hellenic Petroleum Corp. with stakes 65% and 35% respectively. Gas is being purchased from Russia as pipegas and from Algeria as LNG at an approximate portion of 80% to 20%. Sales in 2005 totaled about 2,7 billion m<sup>3</sup>. Almost 70% of total gas quantity is consumed in gas fired power generation plants, another 20% is being consumed by industrial sector and the remaining 10% is consumed by the Local Gas Distribution Companies, the so called Gas Supply Companies already established for the areas of Attiki, Thessaloniki and Thessaly (see also Chapter II: Energy).

Significant progress in the introduction of natural gas in Athens for the year 2005 is reported as follows: (i) number of new Business-to-customer signed contracts: 6952, (ii) number of new Business-to-business signed contracts: 89, (iii) total number of m<sup>3</sup> of natural gas consumed: 125 million, of which 20% replaced heating diesel, 30% replaced transport diesel, 12% replaced electricity and/or Liquefied Petroleum Gas (LPG) and 38% replaced heavy fuel oil.

The above success rate are indicative of the efforts for improving air quality in the broader Athens area, since with each converted customer, from diesel or heavy fuel oil to natural gas, a significant decline is achieved in terms of: (i) particles, by 24 and 1.5 times respectively, (ii) nitrogen oxides, by 1.7 and 1 times respectively, (iii) sulphate dioxide, by 4,700 and 733 times respectively and (iv) carbon monoxide, by 3 and 3 times respectively. The promotion of natural gas in electricity generation was estimated to reduce GHG emissions by 9.64 Mt CO<sub>2</sub> eq in 2010; plans to further increase these efforts would result in emission reductions of additional 3.35 Mt CO<sub>2</sub> eq.

### **Industry**

Energy use in manufacturing industries and construction accounted, in 2002, for 7.9% of total GHG emissions, while emissions from industrial processes (including use of solvents and other products and emissions of fluorinated gases) accounted for 9.1%. In detail, direct GHG emissions from industrial

processes in 2002 were reported as follows: CO<sub>2</sub> from mineral products, mainly cement production, (5.4 % of total), HFCs from HCFC-22 production (2.4 % of total), HFCs from HFC consumption (0.6 % of total) in residential refrigeration and air-conditioning, and N<sub>2</sub>O from chemical industries (0.4 % of total).

Measures under implementation aiming to reduce these emissions include, inter alia, the closure of a HCFC-22 production plant before 2008, which is estimated to reduce emissions by 3.7 Mt CO<sub>2</sub> eq per year as well as the recovery of fluorinated gases from discarded equipment, with an estimated mitigation effect of 0.9 Mt CO<sub>2</sub> eq in 2010. The implementation of the proposed EU-wide regulation on certain fluorinated gases is expected to support efforts in this field.

Regarding emissions of CO<sub>2</sub> and of particulates from cement production plants, they have been reported to increase in Greece by 33% between 1990 and 2002. However, these emissions are projected to remain stable between 2002 and 2010 due to the provision that cement or clinker will be imported in the likely case of continued increases in cement consumption up to 2010 based on the constraints imposed by the Emission Trading System (ETS) that is being put in place in Greece.

### **Agriculture**

Agriculture (without CO<sub>2</sub> emissions from agricultural soils) accounted, in 2002, for 9.4% of total GHG emissions. It accounted for 31.6% of total CH<sub>4</sub> emissions, mainly from enteric fermentation of animals, and for 65.2% of N<sub>2</sub>O emissions, mainly from the use of nitrogen fertilizer on agricultural soils. Between 1990 and 2002, GHG emissions from this sector decreased by 6.4 per cent due to a 24% decrease in the use of synthetic nitrogen fertilizers between 1990–2000 and the lack of changes in the livestock populations.

Adopted and implemented policies and measures in the agricultural sector are in line with the provisions of the EU Common Agricultural Policy (CAP) and have already resulted in restrictions on agricultural activity and thus on corresponding emissions' reduction. In particular, measures include, among others, the better manure management and the use of organic farming practices. The mitigation effect of these planned policies has been estimated at 0.1 Mt CO<sub>2</sub> eq.

Regarding LUCF, net GHG emissions from this sector totalled 1,607 Gg CO<sub>2</sub> eq in 1990 and 4,587 Gg CO<sub>2</sub> eq in 2000, whereas in 2001 and 2002 the net removal from this sector equalled 1,233 Gg and 1883 Gg CO<sub>2</sub> eq, respectively. It should be however noted that emissions of CO<sub>2</sub> from LUCF, in 1990 and 2000, were mainly attributed to forest fires, a phenomenon which is gradually in recent years being contained, with the exception of the extensive fires, in summer of 2006, especially in the Chalkidiki area, in Northern Greece.

### **Waste Management**

GHG emissions from waste management (including waste-water handling) accounted, in 2002, for 4.5% of total GHG emissions. It accounted for 49.5% of total CH<sub>4</sub> emissions, mainly from solid waste disposal on land, and for 2.7% of N<sub>2</sub>O emissions, mainly from wastewater handling.

The requirements under the EU Landfill Directive (1999/31) were introduced into Greek law with JMD 29407/3508/2002. The implementation of this legislation has been estimated to reduce emissions from waste management by 5.9 Mt CO<sub>2</sub> eq by 2010.

Legislative measures for solid waste management also include the recently adopted JMD 22912/1117/2005 on waste incineration and JMD 37591/2031/2003 on the management of medical and hospital waste; the implementation of these enactments is also contributing to the reduction of air emissions from this sector.

Moreover, in 2004, CH<sub>4</sub> collected from municipal solid waste disposal sites, covering about 80% of total managed sites, was flared while using CH<sub>4</sub> collected for energy production, especially in large engineered landfill sites, is in the planning stage.

The construction of municipal wastewater plants and CH<sub>4</sub> recovery from wastewater treatment are also included in the adopted measures in this field. Because of an increase in aerobic wastewater treatment plants and CH<sub>4</sub> recovery, emissions are projected to decline by 89% during 2000–2010.

According to the current National Strategy for Sustainable Development (NSSD,2002) and in the context of the Sixth EU Environmental Action Programme, Greece has also promoted further measures for the expansion and organization of related infrastructure, while delegating the responsibility of planning and management of waste to the administrative Regions. Also, a "National Plan for the Integrated and

Alternative Management of Solid Waste" has been completed and is being implemented, according to Law 2939/2001. This plan aims at the safe disposal of waste and the maximization of recycling, as well as a reduction in the total amount of solid waste in the long term.

Fiscal and financial measures implemented in Greece and promoted by the Hellenic Ministry of Economy and Finance include the exemption from Value Added Tax (VAT) for the enterprises that buy or collect recyclable material aiming at their reselling according to Law 3091/2002.

Education and training of local municipalities and raising the awareness of decision-makers and the general public completes the national waste management policy.

#### ***Other measures***

In addition to the abovementioned measures, a major step forward in air pollution control was the establishment of the "Hellenic Environmental Inspectorate", under the competences of YPEHODE, according to article 9 of Law 2947/2001. Recognising the need for putting in place an adequate and integrated inspection and enforcement mechanism in Greece, the Hellenic Environmental Inspectorate, is responsible, inter alia, for inspection and monitoring of compliance with environmental conditions set for the realisation of projects and operation of activities by the public sector, the private sector and local authorities as well as for the proposal for the application of sanctions in cases of violation of the set environmental standards including air emissions. The Inspectorate, which jurisdiction covers all environmental inspection requirements foreseen in the whole EU acquis, is also responsible for the collection and evaluation of data resulting from inspections concerning compliance as well as for the proposal of models and measurement methods of all emission types, including those with adverse effect on ambient air quality. Air pollution fines are imposed on stationary combustion sources that are found to exceed air pollution limits.

Other measures designed include the reduction of VOCs emissions at all stages of storage and transportation of fuels with the introduction of a vapours recovery system as well as the quality control of fuels through the establishment of specialised mobile inspection units.

YPEHODE also gives particular emphasis on the extension of existing green spaces in the urban grid, particularly in Athens; the extension of pedestrian streets network in the city centres; the creation of high capacity parking areas; the rehabilitation of non in-use quarries especially in urban and peri-urban spaces etc. Moreover, systematic emission control and inspections are being conducted at stationary/area sources that encompass combustion units or large heating systems (e.g. bakeries, swimming pools, hospitals). In particular, the control of air pollution sources from combustion units has been reinforced, inter alia, through the procurement of around 60 integrated mobile exhaust gases analyser systems, and their consequent allocation to the country's Regions, for controlling pollution emissions from central heating installations, industrial boilers, bakeries etc. This activity commenced on July 2006 whereas its completion is scheduled for the end of 2006. The activity's budget rises to around EUR 400,000. The utilisation of the equipment still requires the setting up of related Perfectural Control/Inspection Units and the rendering of the equipment's ownership to the country's Regions.

### **■ Strategies, Plans, Programmes and Projects**

The existing National Strategy for Sustainable Development (NSSD) of Greece, elaborated and adopted in 2002 and now under revision, besides the aim of economic development has three main objectives: environmental protection, social cohesion and the integration of sectoral policies. Air pollution abatement and climate change mitigation were two of the 7 targets for action of the NSSD for the reduction of environmental pressures in Greece. According to the NSSD, the introduction of adequate economic instruments aiming at "getting the prices right" and, on the long-run, the change of unsustainable consumption and production patterns were considered, in this respect, as key priorities.

The 2002 NSSD gives emphasis to the reduction of air pollutants, since their increased concentrations are responsible for the phenomena of acid rain and eutrophication that threaten the equilibrium of ecosystems, while air pollutants are also proven to be related with severe adverse effects on human health. The target of the current NSSD of 2002 for the abatement of air pollution generally coincides with the targets resulting from the implementation of NECD EU Directive for the period ending at 2010. In order to ensure a continuous reduction of air pollutants and to achieve the targets that have been set by EU and nationally, further progress is, however, needed. Although most pollutants' concentrations in Greece (with the exception, in some cases, of O<sub>3</sub> and PM<sub>10</sub>) are lower than the respective levels for the whole of the EU, a fact that reflects the level of development and the structure of the energy system of Greece, the compliance with these measures have led to the designing and implementation of the

"National Scheme for Emissions Reduction" with specific measures per sector aiming at promoting environmental friendlier practices. Special attention is paid, in this context, to the releases of non methane volatile organic compounds (NMVOCs) that show the greatest divergence from the target that is set for 2010.

The existing NSSD will soon be revised in order to readjust national targets and better encompass national priorities and particularities, also in line with new EU acquis and standards.

The key fields for action of the NSSD regarding air pollution abatement are:

- Reform and diversification of energy offer
- Rational use and conservation of energy in the building sector
- Measures for the transport sector
- Measures for industry
- Institutional and organisational measures

Measures taken within the above key fields aim at radically changing the existing trends and achieving a substantial de-coupling of improved energy quality and other relative services from the increase of negative effects on air quality.

The NSSD also aims at incorporating these measures under a long term planning scheme that will effectively manage the transportation system, along the directions of EU's Common Transport Policy. Within this scheme, the designed activities include: development and extension of public transport infrastructure with special focus on the promotion of fixed route transportation modules i.e. train, metro and tram; upgrading and extension of road networks for decreased traffic congestion and increased on-road safety; promotion of more environmentally friendly fuels and technologies (e.g. electric cars, use of fuel cells); promotion of rail and sea transports (e.g. short sea shipping); enhancement of traffic flows management with the introduction of more bus lanes, one-way streets and use of telematics; as well as introduction of measures for regulating the use of private passenger cars and the long-term change of behavioural and consumption patterns of drivers. These measures, coupled with awareness raising campaigns, public dialogues and information dissemination will additionally lead to an increased spatial and social cohesion, since special focus is given on the integration of all areas including disadvantaged ones (e.g. mountainous and island regions) in a new integrated viable transport system. The means for implementing this scheme are being provided mainly from the 3<sup>rd</sup> CSF (2000-2006). Specific parts of this scheme have been integrated, since 2000, into the various Operational Programmes of the co-competent Ministries in Greece, i.e. OEP managed by YPHODE as well as Operational Programmes "Railways, Airports and Urban Transports" and "Road axes, Ports and Urban Development" managed by the Hellenic Ministry of Transport and Communications.

Regarding specific interventions in the transport sector and in particular aiming at promoting the share of railway transportation in Greece, the Hellenic Railway Organisation is implementing a programme for developing and modernizing the main railway axes in Greece with special focus on the Patra - Athens - Thessaloniki connection. The biggest part of the scheduled activities have been financially supported through the 1<sup>st</sup> and 2<sup>nd</sup> EU CSF or are currently being funded through the 3<sup>rd</sup> EU CSF as well as through national resources. One of the main objectives of the works that are being carried out, is the completion of the Athens - Thessaloniki axis in full extend with a double high-speed lane (200 km/h), according to European standards. This lane is being complemented by proper signalling (more than 70% of which is already completed), telemanagement, telecommunication and electro motion. The modernisation of the regional railway network of Peloponnesus and Northern Greece are also underway. The construction of the new high-speed double lane for the Athens - Patra section is also being completed.

Realisation of specific railway works have also been carried out for reorganising the transport system and developing a new railway network, replacing the old existing one, in regional parts of Athens. Works include the extension of the new modernised Suburban Railway network for the connection of Athens with its neighbouring cities i.e. Korinthos (this connection line has already been completed since late 2004), Thebes and Chalkida.

Programmes for old on-road vehicles, motorcycles and Taxis scraping, in terms of incentives and discounts for fleet renewal, have been introduced at various stages since the early 1990s in Greece with significant results with regard to air pollution emissions reduction (see also Section "Decision-Making, Legal and Regulatory Framework, Policy Instruments and Measures").

Regarding the abatement of air pollution from the energy and industry sectors, a specific Operational Programme has been compiled for 2000-2006 managed by Hellenic Ministry of Development, namely Operational Programme "Competitiveness" (OPCOM) with a Sub-Programme on "Energy" (i.e. 2 priority axes).

Regarding power production, since 1987, PPC S.A. has initiated a programme for the replacement and upgrading of the existing ESPs, as well for the adding of new state-of-the-art high performance ESPs: at 4 lignite units of the Kardias SES; at 4 units of Ptolemais SES; at 2 units of the LIPTOL SES; and both the fly ash and lignite ESPs at 1 unit of the Megalopolis SES. These replacements have been coupled with interventions to the electronic and construction features of several existing ESPs; in 2004, the ESPs at the 4 lignite fired Units of Agios Dimitrios SES were upgraded and a new one was added. Furthermore, a project for the reduction of particulate matter emitted from oil-fired plants was implemented through the use of combustion improvement additives as well as the replacement of the existing oil burners with new ones (of the steam atomization type). In parallel, PPC S.A. implements the following projects, regarding FGD, at 2 of the Megalopolis SES units, for the further improvement of environmental quality at Megalopolis area: (i) Retrofitting of flue gas with a desulphurization plant with a budget of EUR 80 million and (ii) Upgrading of the flue gas desulphurization plant, with a budget of EUR 10 million (see also Section "Decision-Making, Legal and Regulatory Framework, Policy Instruments and Measures").

PPC S.A. also conducts several specific studies aiming at achieving full compliance with the legislation in force, such as, indicatively:

- Elaboration of the Emissions Reduction Plan under EU Directive 2001/80 for the emission of SO<sub>2</sub>, NO<sub>x</sub> and particulates emitted from the large combustion plants of PPC S.A.
- Elaboration of Safety Studies for Thermoelectric Power Plants, pursuant to the EU Directive SEVESO II (1996/82).

As an EU MS, Greece participates to the EU-Emission Trading System (ETS) (see also under "Decision-Making, Legal and Regulatory Framework, Policy Instruments and Measures"). JMD 54409/2632/2004 established an emissions trading scheme in Greece according to the EU Directive 2003/87 and in mid 2005 the first NAP for CO<sub>2</sub> emission allowances under the EU-ETS for the period 2005-2007 was established. The NAP covers installations in the sectors of electricity generation (73% of total allowances), cement production (15%), refineries (5%), and some other sectors (7%), including the production of iron and steel, lime, glass, ceramic, and paper, as well as sintering and other combustion processes. Of the 71.14 million allowances allocated per year as an average of the period 2005-2007, 96% were granted free of charge to 141 existing installations, while the remaining 4 per cent were reserved for 27 known and for unknown new entrants. According to the NAP, the number of total allowances was 2.1% below the CO<sub>2</sub> emissions in a business-as-usual scenario for the period 2005-2007. The participating entities are expected to achieve these reductions in CO<sub>2</sub> emissions through the implementation of domestic measures in the framework of the 2<sup>nd</sup> NAPCC. Moreover, a new NAP for GHGs emissions allowances for the period 2008-2012 has been set for public consultation on June 15, 2006, a final draft was consequently prepared and submitted to the CEU and its final approval is now pending. The installation and operation, according to the EU standards and specifications, of the national Registry system for emissions trading was launched in Greece in April 2006, under the National Centre for Environment and Sustainable Development (NCESD) (see more details in Chapter II: Energy).

Aiming at reducing ozone-depleting substances and promoting alternatives under the Montreal Protocol and EU Directive 2037/2000, YPEHODE is implementing a specialised programme for addressing national obligations for the protection of the stratospheric ozone layer that has been incorporated into the OEP of YPEHODE. The programme is expected to finish during the first half of 2007. It includes, inter alia:

- creation of a national information bank, including data on the production, use and transportation of specific ozone-depleting substances;
- establishment of an integrated system for the recovery, recycling and destruction of controlled substances;
- systematisation of the compilation of national reporting regarding implementation of Montreal Protocol and related EU legislation as well as proposals for specific activities and measures that should be designed and implemented in Greece for the ozone-layer protection;
- measurements of the ozone-layer width and UV radiation soil levels as well as the creation of related databases.

## ■ Information, Capacity-Building, Education, Training and Awareness-Raising

YPEHODE is responsible for managing the National Environmental Information Network (NEIN) which is a horizontal mechanism for storing, processing and providing environmental information. Its content concerns mainly state-of-the-environment data for 10 environmental topic areas with their respective legislative framework, including analytical and spatial data on air pollution in Greece. It is a wide area network including nodes at YPEHODE, 3 Regional Authorities and 2 environmental institutions in the country. NEIN aims at supporting environmental policy planning and efficiency assessment as well as assisting Regional Authorities in implementing national environmental policy. Moreover, as a pool of and an interface to environmental information it serves the Aarhus Convention requirements for public information as well as the environmental part of the obligations resulting from the EU INSPIRE initiative. NEIN is currently being reviewed in order to be updated based on innovative information technologies and to extend its geographical coverage. Another new dimension of NEIN is the ongoing development of the Hellenic EIONET network encompassing the national Main Component Elements of the respective European Network and the environmental components of the INSPIRE. NEIN plays also a role in supporting administrative functions like the issuing of environmental permits. The Network can be publicly accessed through YPEHODE's website "www.minenv.gr"; data is also presented by means of a Geographic Information System which can be accessed through <http://hermes.edpp.gr>.

YPEHODE is also responsible for preparing and reporting Greece's GHG inventory. On behalf of YPEHODE, the National Observatory of Athens (NOA) collects and archives the data, compiles the inventory and develops its quality assurance/quality control (QA/QC) system. The National Statistical Service and other organizations provide NOA with activity data and emission factors. The national inventory provides data on the GHG emission for CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs, as well as for NO<sub>x</sub>, CO, SO<sub>2</sub>, and NMVOCs. The national GHG emissions inventory is currently further complemented with more detailed data on emissions of SF<sub>6</sub>, emissions from all industrial processes, HFCs from refrigeration in commercial and industrial use as well as CH<sub>4</sub> recovery from landfills.

Data collected by the NNCAP are also publicly available. In particular, for the area of Athens, where responsibility lays within the competencies of YPEHODE, measurement values (on an hourly or daily basis, according to the pollutant) are made available on-line through [www.minenv.gr](http://www.minenv.gr); thus, the public can be automatically informed for the levels of key air pollutants (O<sub>3</sub>, NO<sub>2</sub>, SO<sub>2</sub>, CO, smoke, PM<sub>10</sub>) measured at various stations in the area. YPEHODE's website also provides threshold values per pollutant, general assessments of the emissions levels as well as projections and guidance / recommendations in case of exceedances.

Various information reports and printed material compiled by YPEHODE in collaboration with other competent Ministries and Agencies on related issues, e.g. "2<sup>nd</sup> National Action Plan for the Abatement of CO<sub>2</sub> and other Greenhouse Gas Emissions 2000-2010" (NAPCC, 2002), "National Allocation Plan for GHG allowances for 2005-2007" (NAP, 2005), are also made publicly available in hard copy and in electronic format through the Ministry's website to interested parties.

Measure 5.2 of the OEP 2000-2006 is dedicated to the funding of environmental awareness activities, with a total budget of EUR 2.8 million. In this context, activities aiming at public awareness and information regarding the ozone-layer depletion and ways to protect it (e.g. organisation of conferences, meetings for the general public and specialised professionals, printing of brochures and books) have been incorporated and are under implementation by YPEHODE. On June 2002, YPEHODE launched an awareness campaign and widely disseminated a "do your bit" brochure containing educational material, questionnaires etc, focusing on awareness raising of all ages, with emphasis on providing school children with practical information for protecting the environment, in everyday life. Awareness raising on air quality protection and simple tips for emissions reduction from everyday habits are included in the brochure and campaign that has been repeated on an annual basis since 2002.

Publication and diffusion of information material as well as information exchange through related activities, e.g. organisation of meetings and public dialogues, websites' keeping, is also carried out by the NCESD and several NGOs and Institutes throughout the country. The NCESD has also published a comprehensive report entitled "Environmental Signals: A report on Sustainability Indicators". This report provides substantial information by means of various simple or synthetic indicators to highlight environmental status and pressures, trends, performance as well as assessment of weaknesses and strengths. The report encompasses indicators on 5 environmental and sectoral issues including air pollution, climate change, energy, transport and industry as well as recommendations, policy options and guidance for improving performance and decoupling economic growth from environmental pressures

according to findings per field, aiming at strengthening the environmental pillar of sustainable development in Greece. The report has been widely circulated in greek and english and is expected to be republished and updated.

Greece participated in several international programmes concerning environmental education for students, and environmental education has been introduced as a specific course mainly in the Education Faculties of Universities. Moreover, the Ministry of Education and Religious Affairs has incorporated into its planning the establishment of 20 Centres of Environmental Education throughout the country. Services at these centres included special programmes of environmental education for groups of students, training seminars for teachers and other interested population groups, the publication of tutorial material, coordinating networks of environmental education and cooperating with the regional administration, universities and environmental organizations at the national and international level.

School and university curricula provide an understanding of environmental problems and actions, and include reference to air pollution, climate change and their impacts. Important aspects of climate policy and GHG mitigation, including energy security, energy conservation and RES, are in the list of curricula topics. The National Centre for Renewable Energy Sources (CRES), the PPC S.A. and other industry players actively integrate public information activities in their environmental performance, e.g. through the publication and dissemination of informational materials.

Public participation in addressing air pollution and climate change also takes place through a number of environmental and business NGOs. Press articles, TV and radio programmes, TV commercials, brochures, CD ROMs and other media have been used to raise public awareness (e.g. promotion of use of public transport). The level of public awareness of climate change in Greece's population has risen significantly recently due to the occurrence of international and regional extreme weather events.

Headed by the Hellenic National Meteorological Service (HNMS), Greece also takes part in the systematic observation of climate-related parameters in the fields of hydrology, oceanography, ground characteristics and landmass. The HNMS operates a network of 26 GSN stations, all of which were equipped with updated devices in 2003/4. Greece is a member of the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) and the European Centre for Medium-Range Weather Forecasts (ECMWF), and supported neighbouring Balkan countries bilaterally in the establishment and operation of a monitoring network.

## ■ Research and Technology

Within the framework of the 3<sup>rd</sup> CSF and under the umbrella of the OPCOM, the General Secretariat for Research and Technology (GSRT) of the Ministry of Development supported projects promoting collaboration between business enterprises and research entities. In 1999, the overall amount spent for research equalled 0.68% of GDP. Two of the main GSRT research programmes were particularly related to climate change: "Natural Environment and Sustainable Development" (total budget EUR 32.7 million) and "Renewable Energy Sources and Energy Saving" (total budget EUR 15.8 million).

Advanced research on air quality related issues is carried out by most Greek Universities, e.g. the School of Sciences of the National and Kapodistrian University of Athens, the National Technical University of Athens, Aristotle University of Thessaloniki, the University of Thessaly and other academic institutes.

Two national research centres, the NOA and the National Centre for Marine Research (NCOM) are undertaken specific climate-related research. In 2001, GSRT provided funds to NOA for improving its modelling capability for both short-term prediction (3–5 days) and longer-term climatic forecasts (3–6 months). In 2003, a Climate Change Observatory, comprising 15 researchers plus support staff, was established at NOA. In addition, CRES carries out advance research on energy efficiency and RES whereas the National Agricultural Research Foundation of the Hellenic Ministry of Agriculture carries out research on the impact of air pollution and climate change on agricultural activities.

PPC S.A. is also implementing a series of projects in collaboration with Universities and academic institutions, aiming at assessing certain specific environmental issues related to the operation of power plants as well as developing innovative pollution abatement technologies. One of the most recently completed research projects regards the Investigation of the possibilities for the development of Clean Development Mechanism Projects in Mediterranean countries within the scope of the SYNERGY European project. Moreover, the PPC S.A. participation in EU's integrated projects is currently in progress for the

development and implementation of innovative emission control technologies (CAFENOX project) and increase in energy efficiency of power plants (LOTHECO, etc). Other scientific research projects underway include development and implementation of best available techniques (BATs) at the Aliveri SES, application of the BREF Document "Economics and Cross - Media Effects" under EU Directive 96/61 on Integrated Pollution Prevention Control (IPPC) at the Amyntaion SES, operational analysis of the flue gas desulphurization plant for Unit IV of Megalopolis SES, etc.

Finally, YPEHODE participates at various technical Committees of the CEU for the implementation of EU Directive 96/61 on IPPC, aiming inter alia at promoting the introduction of BATs in the industrial sector for air emissions reduction or abatement.

## ■ Financing

Greece's 3<sup>rd</sup> Operational "Environment" Programme (OEP) under the 3<sup>rd</sup> CSF (2000-2006) includes Priority Axis 4 on "Air and noise pollution". The major objective under this priority is the reduction of air (Measure 4.1) and noise (Measure 4.2) pollution in the largest urban and tourist centres of the country. Specific additional measures were put in place in Athens, in the context of preparations for the Athens 2004 Olympic Games. OEP also includes provisions for control measures of air and noise emissions for vehicles in large cities. OEP is co-funded by the European Regional Development Fund (ERDF) and national funds. Responsibility for its implementation falls under YPEHODE. The total volume of investments for OEP amounts to EUR 449.2 million, with EUR 321 million (71.46%) coming from the ERDF. Total budget for Priority Axis 4 amounts to EUR 21.47 million with ca EUR 16.11 million coming from the ERDF.

Operational Programme "Road axes, Ports, Urban development" for 2000-2006 of the Hellenic Ministry of Transport and Communications is another operational programme/financial package that supports air pollution abatement-related activities. EU support amounts to EUR 3.03 billion, Greece contributes from national funds an extra EUR 2.85 billion, while the private sector is expected to contribute an amount of EUR 3.43 billion, through public-private partnership schemes (PPP). The global financial package, therefore, amounts to EUR 9.37 billion. The approved programme covers practically the whole of Greece and its objectives are the completion of Trans-European Networks (TEN) road axes in Greece, the improvement of main port facilities and maritime transport safety, as well as the improvement of transport conditions in major urban centres such as Athens and Thessaloniki.

Operational Programme "Railways, Airports and Urban Transports" for 2000-2006 under the responsibility of the Hellenic Ministry of Transport and Communications is supported by the ERDF with EUR 1.47 billion, the national contribution is EUR 1.22 billion, while the private sector is expected to contribute an amount of EUR 250 million, through PPP schemes. Its main objectives cover: the implementation of a Business Plan for the Greek Railways Organisation and the completion of the Patra-Athens-Thessaloniki railway axis in Greece, the improvement of main airport facilities as well as the improvement of transport conditions in the urban area of Athens.

Finally, Ministry of Development implements Operational Programme "Competitiveness" (OPCOM) a major development programme in Greece for the period of 2000-2006. EU assistance amounts to EUR 1.97 billion while the total budget of the investment expected to be mobilised for its implementation amounts to more than EUR 6 billion, including through national/public and private funding. The Programme includes sub-Programme on "Energy" (OPE) (with 2 priority axes on "Energy and Sustainable Development" and "Securing the energy supply and promoting energy market liberalisation") as well as Measures for improving the competitiveness and environmental performance of businesses and industry. Improving ambient air quality is included in both the direct and indirect targets of the OPCOM.

## ■ Cooperation

Greece has acceded to regional conventions regarding air pollution, i.e. Co-operative "Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe" (EMEP) as well as Conventions under the UNECE. It has ratified the Geneva Convention (1979) for long-distance transboundary air pollution, as well as the Protocols of Sofia for nitrogen oxides emissions and Oslo for sulphur emissions with Laws 1374/83, 2543/97 and 2542/97 respectively. More recently, Greece ratified the Rotterdam Convention (PIC) with Law 3176/2003, the Montreal and Beijing Amendments to the Montreal Protocol on ozone layer protection have also been recently completed (Law 3425/2005) as well

as the Aarhus Convention and respective Protocols on access to environmental information, public participation in decision making processes and access to justice with Law 3422/2005.

Greece has signed and ratified Memoranda of Understanding (MoUs) on cooperation on environmental issues, with Cyprus (ratification July 4, 1996), Turkey (entry into force June 30, 2001), Bulgaria (entry into force July 15, 2005) and Albania (entry into force July 19, 2005). MoUs have also been signed, but not yet ratified, with Georgia and FYROM.

The Greek Government represented by the Ministry of Economy and Finance contributed to Global Environment Fund's (GEF) Replenishments as following:

- To the First Replenishment of GEF for the period from July 1, 1994 to June 30, 1998, Greece contributed USD 5 million, allocated in four equal yearly installments;
- For the Second Replenishment of GEF (July 1, 1998 to June 30, 2002), Greece contributed SDR 4 million while for the Third Replenishment (July 1, 2002 to June 30, 2006), Greece's contribution amounted to EURO 5.73 million, allocated also in four equal yearly installments;
- Finally, for the Fourth Replenishment of GEF (July 1, 2006 – June 30, 2010), Greece committed to contribute EURO 5.73 million, allocated in four equal yearly installments.

Financial resources have been provided by Greece to bilateral and regional funding, as well as to multilateral institutions and programmes including on capacity-building activities relating to technology transfer for limiting/reducing GHG emissions, implementation of the Convention and preparations for effective participation in the Kyoto Protocol. In particular, contributions to United Nations Conventions and their Secretariats are channelled through various competent Ministries, like YPEHODE. YPEHODE contributes annually with the amount of around USD 86,000 to the UNFCCC Fund. Moreover, during 2000-2004, it has contributed annually with the amount of USD 10,000 to the FI Trust Fund for participation in the UNFCCC process. In 2005, it contributed with USD 36,000 for the support of the Kyoto Protocol implementation and in 2006 with USD 65,631. YPEHODE has contributed to the Vienna Convention for the Protection of the Ozone Layer with USD 2,429 in 2004, with USD 5,597 in 2005 and with USD 2,693 in 2006; to the Trust Fund for the Montreal Protocol for substances that deplete the Ozone Layer with USD 12,098 in 2004, USD 18,435 in 2005 and USD 21,567 in 2006; to the Multilateral Fund for the Implementation of the Montreal Protocol with USD 531,134 in 2004, EUR 623,621 in 2005 and EUR 1.056 million in 2006; to the UNECE EMEP with USD 25,149 in 2004, USD 26,890 in 2005 and USD 29,151 in 2006; to the UNECE Convention on Long-Range Transboundary Air Pollution with USD 26,955 in 2005.

Greece's net bilateral Official Development Assistance (ODA) disbursements have increased almost fourfold from USD 27 million to USD 99 million since 1996 to reach over USD 226 million in more recent years, representing 0.2% of its GDP. Greece's contribution to bilateral development assistance is centred on its geographic region, the security and welfare which are closely aligned with stability and economic prosperity in the countries of the Balkans, the Black Sea and the Mediterranean. Atmosphere protection and air pollution has been one of the field areas of the HELLENIC AID's (under the Hellenic Ministry of Foreign Affairs) "Second Medium Term Five-Year Development Cooperation Programme" (2002-2006). Funds that have been channelled mainly through YPEHODE, NGOs and Scientific Institutions to partner countries for development assistance and cooperation projects relating to atmosphere and air pollution amount to around USD 4.08 million, for the period 1999 – 2003. Some examples of such projects include the participation in the reconstruction of Chernobyl "Sarcophagus" in Ukraine and the contribution to the closing down of units 3 & 4 in Kozloduy in Bulgaria. In the context of YPEHODE's activities on development assistance and cooperation in the field of environment and sustainable development funded by HELLENIC AID, overall 22 projects were initiated in 1999. These projects had a total budget of EUR 1.87 million and covered several fields, including protection of atmosphere and natural environment, promotion of adaptation measures in water resources sector, reduction and monitoring of emissions of VOCs. Additionally, in 2000, 38 new projects worth EUR 6.16 million were initiated and implemented over a four-year period; out of these, 6 projects, representing an 18% of the total 2000 budget, focused on assisting the efforts of 6 Balkan countries to develop the required capacities, infrastructure and institutions to address climate change, in the framework of the Kyoto Protocol requirements, including assessment of possibilities for developing Kyoto Protocol's flexible mechanisms between Greece and partner countries.

In the context of the World Summit on Sustainable Development (WSSD) Type II initiatives and the Johannesburg Plan of Implementation, Greece leads, funds, coordinates and participates in the assessment of climate change impacts in African countries; this Type II initiative promoted by Greece (with a start up budget by YPEHODE of EUR 125,000) and implemented by NOA, aims to contribute to the implementation of the UNFCCC in Africa.