OECD Environmental Performance Reviews

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FOREWORD

The principal aim of the OECD's Environmental Performance Reviews programme is to help *member countries improve their individual and collective performances in environmental management* with the following primary goals:

– to help *individual governments* assess progress;
– to promote a continuous policy *dialogue among member countries*, through a peer review process; and
– to stimulate *greater accountability* from member countries' governments towards their public opinion, within developed countries and beyond.

Environmental performance is assessed with regard to the degree of achievement of *domestic objectives and international commitments*. Such objectives and commitments may be broad aims, specific qualitative goals, precise quantitative targets or a commitment to a set of measures to be taken. Assessment of environmental performance is also placed within the context of historical environmental records, the present state of the environment, the physical endowment of the country in natural resources, its economic conditions and demographic trends.

These systematic and independent reviews have been conducted for all member countries as part of the first cycle of reviews. The OECD is now engaged in the second cycle of reviews directed at *promoting sustainable development*, with emphasis on implementation of domestic and international environmental policy, as well as on the integration of economic, social and environmental decision-making.

The present report* reviews environmental performance of Greece. The OECD extends its most sincere thanks to all those who helped in the course of this review, to the representatives of member countries to the Working Party on Environmental Performance, and especially to the examining countries (Italy, Korea and Switzerland) and their experts. The OECD is particularly indebted to the Government of Greece for its co-operation in expediting the provision of information and the organisation of the experts' mission to Greece, and in facilitating contacts with many individuals both inside and outside administrative and governmental structures. The present review benefited from grant support from Norway and Austria.

The OECD Working Party on Environmental Performance conducted the review of Greece at its meeting on 17 February 2009 and approved its conclusions and recommendations.

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Signs

The following signs are used in figures and tables:
. . : not available
– : nil or negligible
. : decimal point
*: indicates that not all countries are included.

Country Aggregates

OECD Europe: All European member countries of the OECD (Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey and United Kingdom).

OECD: The countries of OECD Europe plus Australia, Canada, Japan, the Republic of Korea, Mexico, New Zealand and the United States.

Country aggregates may include Secretariat estimates.

Currency

Monetary unit: Euro (EUR)

In 2008, EUR 0.68 = USD 1.

Cut-off Date

This report is based on information and data available up to November 2008.

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1 CONCLUSIONS AND RECOMMENDATIONS*

Between 2000 and 2008, *Greece's economy grew rapidly*, on average by more than 4% per year. Per capita GDP has risen and is now close to the OECD-Europe average. The adoption of the Euro in 2001 and the public works associated to the *Athens 2004 Olympics* are among the major drivers of this economic growth. Greece has also been a major beneficiary of *EU funds*, which have contributed to modernise and develop infrastructure networks (*e.g.* transport, energy, water), to upgrade competitiveness and human resources and to address regional disparities. Greece has an open economy, with a relatively small industrial base and as industrial production. The *tourism and construction* sectors play an important and increasing role, contributing to 18% and 8.5% of GDP respectively. Greece has a longstanding tradition of *maritime transport*.

An almost untouched natural environment and a unique and rich cultural heritage characterise wide areas of the country. The present decade has seen consolidation of the *environmental achievements* of the previous one, progress in the implementation of national and EU environmental legislation, as well as enhanced participation in international co-operation activities. However, economic growth has often led to *increased pressures on the environment*, including unplanned construction, degradation of some coastal zones and some islands, increasing air emissions from electricity generation, high material intensity and excessive use of irrigation water. Overall, further efforts are needed to achieve environmental convergence within the OECD and the EU. To meet these *challenges*, Greece will need to: *i)* thoroughly implement its environmental and land-use policies; *ii)* further integrate environmental concerns into sectoral policies; and *iii)* reinforce its international co-operation on environmental issues.

* Conclusions and Recommendations reviewed and approved by the Working Party on Environmental Performance at its meeting on 17 February 2009.

This report examines Greece's progress since the previous OECD Environmental Performance Review in 2000, and the extent to which the country has met its *domestic objectives and its international commitments*. The report also reviews Greece's progress in the context of the OECD Environmental Strategy for the First Decade of the 21st century.* Some 44 recommendations are made that should contribute to further environmental progress in Greece.

1. Environmental Management

Strengthening the implementation of environmental policies

The Greek environmental policy is largely based on environmental regulations, and on EU directives. During the review period, Greece passed important *environmental legislation* and transposed recent EU directives. Positive developments in the review period include the creation of the *ombudsman* with, *inter alia*, environmental responsibilities and of an operational *environmental inspectorate*, as well as positive results of surveillance and enforcement concerning marine pollution. Greece also made significant progress in constructing *urban wastewater treatment* infrastructure (with large financial transfers from the EU funds); all major wastewater infrastructure projects are scheduled to be completed by 2013. Considerable progress was achieved in *water pricing*, with recovery rates reaching 95% in large cities like Athens. This positive development is largely driven by the EU Water Framework Directive, which requires the implementation of water-pricing policies towards the recovery of water service costs by 2010. Greece made important strides in closing down many illegal landfills by the end of 2008. *Waste management* and recycling improved during the review period.

Lack of *enforcement* remains the Achilles heel of *environmental and land use* policy implementation, weakening the effectiveness of regulations and permitting. Despite the establishment of the new environmental inspectorate and its good start, further efforts are needed to provide it with the capacity and instruments that it requires to fulfil its mandate. Greece needs to persist in its efforts to close the remaining illegal *landfills*. In many parts of the country, local authorities have experienced difficulties in opening legal/sanitary landfills due to opposition by local communities. Overall, better understanding and

* The objectives of the Strategy are covered in the following sections of these Conclusions and Recommendations: maintaining the integrity of ecosystems in Section 1, decoupling of environmental pressures from economic growth in Section 2, and global environmental interdependence in Section 3.

implementation of the polluter-pays-principle (PPP) and user-pays-principle (UPP) should be fostered, and environmental awareness further promoted. The use of economic analysis and instruments should be expanded. Although Greece has progressively stepped up its pollution abatement and control (PAC) expenditure to 0.7% of GDP, its *environmental expenditure* represents less than 1% of GDP. This is a limited effort compared to OECD countries in a comparable development stage despite considerable EU support. The road to environmental convergence in the EU remains challenging for some issues (*e.g.* air pollution abatement from fixed and mobile sources, waste infrastructure and management). It is suggested that Greece increases significantly its *environmental financial efforts*: *i)* looking beyond 2013 and possible decreases in EU support; and *ii)* moving towards the full implementation of the PPP and UPP, thereby decreasing public support from national and EU sources. The *environmental administration*, which is significant part of the Ministry for the Environment, Spatial Planning and Public Works (YPEHODE), needs to be further strengthened.

Recommendations:

- further strengthen the visibility, human and financial resources, and influence of the *environmental administration* at all levels;
- strengthen overall *environmental financial efforts*, moving progressively towards full implementation of the polluter-pays and user-pays principles;
- implement plans to strengthen the financial and human resources devoted to the new environmental inspectorate; continue to promote *compliance with and enforcement of environmental and land use regulations*;
- review and revise prices, taxes and subsidies, with the aim of internalising environmental externalities; expand the use of *economic instruments* to serve environmental objectives;
- strengthen the analytical basis for decision-making, including *environmental data*, and *economic information* on the environment (*e.g.* environmental expenditure, environment-related taxes, resource prices, employment).

Air

Greece has considerably reduced *air pollutant emission intensities* since 2000, showing a relative decoupling from economic growth. Emissions of nitrogen oxides (NO_x) have remained below the ceiling set at European level and NO_x emission intensity is now in line with the OECD average. Improvements in vehicle fleet and fuel quality have helped reduce emissions of volatile organic compounds (VOCs), carbon monoxide (CO) and particulate matters (PM) from the transport sector. *Concentrations of pollutants in ambient air* tended to decline or stabilise. During the review period, concentrations of sulphur dioxide (SO_2) and CO were kept below their limits throughout the country, and peak values of NO_2 steadily decreased. Greece has *strengthened its inspection system*, and emissions from stationary sources and fuel quality are regularly controlled. Greek installations participate in the EU *emission trading scheme for greenhouse gases* (GHGs); this led some large sources to invest in emission reduction measures. Greece's *GHG emissions* are currently below the Kyoto Protocol target. According to the 2008 reports from the European Commission and the European Environment Agency, Greece is expected to meet its Kyoto target using existing policies and measures. Greece will need to continue to monitor its programmes to ensure that they are sufficient to meet the more ambitious EU targets to 2020. Concerning *energy*, the *energy intensity* of the economy has been reduced, and is now among the lowest in OECD. Greece has implemented regulatory and financial measures to promote the uptake of natural gas and to improve efficiency in energy end-use and electricity generation; progress has been made in opening energy markets. The share of renewables in both total primary energy supply and electricity output has increased, following the introduction of a feed-in tariff in 2001 and other support schemes. Concerning *transport*, Greece has heavily invested in extending *transport infrastructures*, using the opportunities given by the EU funds and the 2004 Olympic Games. The urban public transport system in Greater Athens was expanded and upgraded, as were pedestrian areas.

Although SO_2 emissions have started to slightly decrease in recent years, *SO_2 emission intensity* remains higher than the OECD average and among the highest in Europe, due to the dominance of domestic lignite (with very low calorific value) and oil in the fuel mix. Greece needs to strengthen its efforts in reducing SO_x and VOC emissions to reach their targets in 2010. Emissions of PM (especially from the residential and commercial sectors) and heavy metals remain of concern. Strengthened efforts are also needed to reach EU limit values for *ambient air quality* in major cities (*e.g.* NO_x, fine particles and ground-level ozone) and to mitigate related health risks. The ambient air *monitoring network* appears to be undersized and not fully efficient. Information on national emissions is not always adequate, especially for fine particles, persistent organic

pollutants and heavy metals. *Economic instruments are limited* to energy and vehicle taxation; compliance with licensing regulations and financial support remain the main drivers for improving environmental performance at stationary sources. Concerning *energy*, *electricity generation* is a major source of air emissions, and there is much scope for improving its efficiency and environmental performance: while major electricity operators have undertaken investment programmes, Greece is home to some of the most polluting power plants in the EU; electricity generation from *renewables* is still far from the 2010 EU indicative target. Relatively low *energy end-use prices* and special discounts for some consumer categories may discourage rational use of energy. Concerning *transport*, road largely dominates the modal split for both freight and passenger transport. The share of *taxes* in fuel prices has decreased, road tolls are not adequately adjusted to inflation, and vehicle taxes do not satisfactorily take account of vehicle fuel efficiency. *Navigation* is a growing source of emissions; measures are needed to improve vessel performance and shipping fuel quality, taking into account the regulatory framework developed at international level.

Recommendations:

- further *reduce air emissions*, especially SO_2 emissions from electricity generation (*e.g.* lignite fired power plants) and VOCs emissions from transport, so as to meet national emission ceilings; strengthen the *monitoring and management of particulate matter* (including $PM_{2.5}$) *and ground level ozone*;
- strengthen efforts on *energy demand-side management* and on market-oriented instruments to achieve more effective and efficient energy use: review the *energy price* levels and structure, and assess the impact of exemptions and subsidies;
- continue *the shift towards cleaner fuels* (*e.g.* natural gas, low sulphur oil) and *renewables* for electricity generation and end-use;
- continue to invest in *efficient and reliable public transport systems*, including in cities other than Athens; further develop transport demand management in urban areas;
- review *transport prices and taxes*, to better internalise environmental impacts and reflect vehicle environmental performance and fuel efficiency (*e.g.* linking vehicle taxes to the EU CO_2 vehicle labelling);
- address *air pollutant emissions from ships*, *e.g.* taking measures to improve vessel performance and fuel quality.

Water

The state of Greece's *freshwater bodies* is generally good. Water quality is commonly fit for various uses (irrigation, industry, production of drinking water). Greece has an especially good record in terms of water quality at the more than 2 000 *coastal sites* designated under the EU Bathing Water Directive: virtually all sites comply with mandatory values and 96-98% also comply with the more stringent guide values. Price structure for *urban water services* encourages the prudent use of water, and price levels increased to allow a greater degree of cost recovery. Good progress was made during the review period with the construction of *urban wastewater treatment* stations: about 65% of the total population is connected to public wastewater treatment plants, up from the 45% in the late 1990s. The Athens Metropolitan Area is now equipped with a state-of-the-art sludge drying facility. After growing significantly during the 1990s, the rate of water abstraction was stabilised in the review period. Action plans were put in place in all areas vulnerable to *nitrate pollution* from agriculture and the use of agricultural inputs of nitrogenous fertilisers and pesticides has been reduced since the end of the last decade. Greece transposed the *EU Water Framework Directive* (WFD) into domestic law in 2003; to implement the directive, it created 13 Regional Water Directorates and a specialised Central Water Agency, a governmental authority under the aegis of YPEHODE, in charge of definition and oversight of national water policy.

However, Greece still faces serious water challenges, in particular in terms of its *agricultural water use*, which represents about 85% of overall abstraction. Excessive pumping of *groundwater* has caused water levels to fall dramatically in some rural areas, as well as salt water intrusion in some coastal aquifers. *Illegal abstractions and discharges* pose a hurdle to improving water management. Enforcement of regulations and water permit conditions has not sufficiently improved. *Water losses* in urban and, in particular, irrigation water conveyance systems are too high. *Agricultural water prices* neither cover the cost of supply nor provide sufficient conservation incentives. Little attention has been paid so far to *ecological aspects of water quality*. Efforts to clean up longstanding pollution hot spots should be reinforced as a matter of priority. Implementation of a plan to control discharges of *dangerous substances*, first drawn up early in the review period, has only recently begun. None of the deadlines of the *EU Urban Waste Water Directive* were met and it will take until 2013 to fully meet the directive's targets, notably for smaller agglomerations. While there are on-going efforts to improve the monitoring systems, it is still proving difficult to produce national statistics useful for water management.

Recommendations:

- continue efforts to fully comply with the *EU Water Framework Directive*;
- formulate and implement a *national irrigation policy*, integrating agronomic, water and environmental policy objectives, which promotes the rational use of water, aims to reduce groundwater abstractions and to improve irrigation efficiency and practices in both communal and private irrigation networks, and ensures that all water abstractions are properly licensed;
- further *improve wastewater management*, in compliance with the EU Urban Waste Water Directive, and consider the wastewater treatment needs of smaller settlements; encourage utilities to improve water quality assurance (*e.g.* through participation in international benchmarking);
- intensify efforts to *reduce water pollution* by dangerous substances, to prevent illegal discharges of wastewater, and clean up pollution hot spots;
- introduce new measures to improve the *allocation of water* to ensure water flows to the highest-value uses;
- raise greater *public awareness and understanding*, particularly among farmers, of the economic, social and environmental aspects of water management.

Nature and biodiversity

Greece has an exceptionally *rich biodiversity*; an almost untouched natural environment characterises wide areas of the country. Greek policy documents (including the 2002 National Strategy for Sustainable Development) explicitly refer to the *international and EU commitment* of reducing the current rate of biodiversity loss. During the review period, a number of *new protected areas* were designated, including ten national parks; the list of Sites of Community Importance and Special Protection Areas was extended; the *Natura 2000 network* was designated to cover 21% of the land surface and 5.5% of the territorial waters. Greece improved and updated the *legislative framework* for nature conservation, moving from a strict protection approach to a more integrated and participatory management. Twenty-seven independent and multi-stakeholder *Management Bodies* were given management responsibilities over some 1.7 million hectares of protected areas. Information on the status of habitats and species is improving, for instance through the *Biodiversity Clearing House Mechanism* Website. The number of *threatened species* covered through protection projects considerably increased, with significant involvement of environmental NGOs and research institutes (*e.g.* loggerhead sea turtle,

Mediterranean monk seal). Stricter measures were implemented to control international trade of species. *Organic farming* has developed rapidly. There is no GMO cultivation in Greece. The renewed *forest legislation* adopts the principles of biodiversity conservation and multiple uses of forest lands. Further steps have been taken to promote more eco-friendly *tourism*, and the Specific Framework Plan for Tourism sets restrictions on construction of tourist facilities. Greece participates actively in *international activities* to preserve the biodiversity of the Mediterranean area and to control marine pollution.

Despite this progress, additional actions are needed to mitigate the *growing pressures* on natural assets from economic activities. Greece is among the four OECD countries that have not yet submitted the *National Biodiversity Strategy and Action Plan*, thereby lacking a comprehensive framework for the protection of species and ecosystems. The National Biodiversity Strategy is currently under consultation. The *actual management of the Natura 2000 network* needs improvement: less than one fifth of the Natura 2000 surface is included in legally designated protected areas, and nearly half lacks the environmental study required to define conservation measures. Only a few marine areas are included in the network. Most protected areas still require management plans. Management responsibilities rest with many authorities at central and local levels, with consequent *overlapping and coordination problems* and weak enforcement. *Budgetary and human resources* should be reinforced. Management Bodies of protected areas have mostly relied on EU funds. Greece needs to ensure adequate long term financing, including funds to substitute for EU contributions. Many of the *mammal and freshwater fish species* living in Greece are threatened, and an increase in invasive alien species has been observed, especially concerning marine ecosystems. Inventories of species need to be extended and improved, and Red Lists of fauna and flora to be regularly updated. Conservation policy has yet to achieve an effective *mainstreaming of biodiversity* issues into other sectors. *Poor farming practices* and excessive use of water for irrigation have contributed to degrade semi-natural habitats and wetlands. The number of farmers participating in agri-environmental schemes has grown steadily, but still accounts for a small share of farmland. While forests appear relatively healthy, they are threatened by frequent and devastating summer *fires*; more resolute prevention and restoration measures need to be undertaken. *Tourism development* exerts growing pressure on ecosystems, especially in coastal zones and islands, where protective provisions have been often infringed. Further efforts are needed to build *consensus* around nature conservation, informing local communities of related ecosystems services and economic benefits.

Recommendations:

- adopt and implement the *National Biodiversity Strategy and Action Plan*, as a comprehensive action-oriented framework for ecosystem and species conservation at both national and local levels; set time-bound objectives and periodically evaluate progress;
- continue to extend *protected areas*, particularly including coastal areas and marine ecosystems; complete the implementation of the *Natura 2000 network*; ensure that all protected areas are provided with management plans and adequate conservation measures;
- further improve the *human and financial capacity* for nature conservation and the management of protected areas; review the future evolution of the funding system of biodiversity management, with substitutes to EU contributions (*e.g.* increased use of economic instruments; contribution of national and local public and private funding);
- increase and disseminate *knowledge on the conservation status of species*; carry out systematic monitoring of endangered and threatened species, and evaluate the effectiveness of protection projects;
- improve the integration of biodiversity concerns into the *agricultural sector*, through a targeted use of agri-environmental schemes and specific educational programmes.

2. Towards Sustainable Development

Integrating environmental concerns into economic decisions

In the context of rapid economic growth and structural changes, key accomplishments include the elaboration of a national sustainable development strategy, strengthening of the environmental impact assessment process, and the establishment of a strategic environmental assessment process. *Environmental impact assessments* have been in place since 1990; they have now become an operational tool most important in a period dominated by *infrastructure building* (*e.g.* transport, energy, water). *Strategic environmental assessments* (SEA) are now embedded in law; the 2004 Olympic Games went through an SEA. Environmental objectives have been largely integrated into *EU funded programmes*. In the 2000-06 programming period, about 25% of EU support (excluding agriculture-related support) was allocated to environment-related investments at large (averaging 0.8% of GDP). Progress has been made in reducing *some*

emission and resource intensities (*e.g.* NO_x and nitrogen fertilisers), showing a relative (although still limited) decoupling of environmental pressures from economic growth. The *energy intensity* of the economy has been considerably reduced, and steps have been taken to promote reliance on natural gas.

However, the *2002 National Strategy for Sustainable Development* has not been fully used to its potential as an integrative tool. The strategy has not been really influential over the past years and it has not been thoroughly monitored. It does not include targets, and focuses on the environmental dimension. The revised strategy should be more influential as an integrative policy tool with measurable targets and more operational monitoring and evaluation mechanisms. Overall *material intensity* in Greece is well above the OECD average, especially for fossil fuels (reflecting the country's large use of domestic lignite). Revenues from *environment-related taxes* as a share of GDP decreased during the review period, reaching 1.9% of GDP, among the lowest shares in OECD. *Energy and fuel taxes* are relatively low in Greece, and there is scope and need to apply economic instruments to encourage a shift to less polluting energy production. Electricity from lignite is exempted from the excise duty, and several *discounts and tax breaks on energy prices* are used for social purposes. Greece should consider revising taxes or charges to influence demand, and introducing targeted compensation schemes to address social issues. *Vehicle taxes* take account of fuel efficiency and environmental performance only to a limited extent.

Recommendations:

- include appropriate *targets and objectives* in the revised National Strategy for Sustainable Development;
- utilise fully the *institutions on sustainable development* now in place to ensure the implementation of the revised National Strategy for Sustainable Development; continue focusing sector integration and sound long-term planning with a view to achieve a low-carbon, energy and material efficient economy;
- expand the use of economic instruments as part of a green *fiscal reform* (*e.g.* energy taxation, progressive car taxation in relation to pollution);
- progressively eliminate *environmentally harmful subsidies* (*e.g.* agriculture water tariffs); consider replacing tax exemptions (*e.g.* on heating oil) with more targeted social compensation schemes;
- review the economic efficiency of *environmental subsidies* (*e.g.* to renewable energy sources) and revise them accordingly.

Integrating environmental and social decisions

Environment-related employment has increased, mainly related to large environmental infrastructure investments and to new government bodies created at national and local levels. Concerning environmental democracy, Greece ratified the Aarhus Convention in 2005 and transposed the related EU directives into national legislation, with a well-designed institutional and legal framework for *environmental information* and reporting in place. A wide range of environmental information is available free of charge and accessible through Web-based tools. The Greek legal system provides a broad recognition of individual and collective rights to a protected natural and cultural environment. *Access to courts* in environmental cases for individual citizens and NGOs is provided for in both administrative and judicial procedures. The Greek Ombudsman investigates cases of possible inappropriate administrative actions related to the environment. Mechanisms to assure *public participation* in environmental decision-making improved during the review period and public consultation is now widespread at all government levels. NGOs are full members of Management Bodies of protected areas and of Regional Water Councils and are actively involved in raising environmental awareness. *Environmental education* has received increasing attention and several projects have been implemented in primary and secondary schools. Local and national campaigns, as well as extensive media coverage of environmental themes, have raised environmental awareness. Greece has enjoyed further gains in life expectancy and reductions in infant mortality. *Health risk factors* (*e.g.* drinking water quality, ozone and PM_{10} concentrations) are monitored on a regular basis throughout the country; a national legislation to contrast tobacco-smoke is in place. Several awareness raising initiatives have been addressing occupational health.

However, *employment* opportunities in environmental sectors are not being fully exploited in Greece. A comprehensive assessment of the impact of Greek environmental policy on employment would be very useful. The potential value of *public participation* in policy-making is still weakly acknowledged. Consultations often appear to be undertaken to fulfil legal obligations (*e.g.* at local level), especially when required by EU directives (*e.g.* Environmental Impact Assessment, Strategic Environmental Assessment, Water Framework Directive). A comprehensive framework for *environmental education* at different stages of education is missing; environmental themes are integrated in school curricula and training programmes mainly on a project-basis. Gaps remain in collecting and processing *environmental health* data, and little attention has been given to cost-benefit analysis in environmental health policy design.

Recommendations:

- implement the *environmental health action plan*; priorities for action should be based upon scientific research and economic analysis (*e.g.* reduced health expenditure, improved labour productivity, improved well-being);
- further develop an active and long-term *environmental employment policy*;
- continue efforts to collect, process and disseminate *environmental information* at national and territorial government levels;
- continue to encourage more active *public participation associated with decision-making*, as well as effective implementation of provisions for access to environmental justice and follow-up to judicial decisions; enhance the effectiveness of consultation procedures;
- take further steps towards the integration of environmental themes at all stages of *education*, including professional training.

Strengthening land use and spatial planning

Considerable investments in *transport infrastructure* (*e.g.* major motorways in the west and north of the country) and *energy infrastructure* during the current review period have created better prospects for a more balanced distribution of economic development throughout Greece. Similar improvements in Athens (including a new metro and a new airport), have changed the city for the better. At the outset of the review period, Greece incorporated the principles of sustainable development in its spatial planning legislation. For the first time, the country armed itself with the *legislation* that is necessary to create a comprehensive planning framework to guide the spatial aspects of economic and social development and the protection of its natural and cultural heritage at a national, regional and local planning scale. Since then, *12 strategic Regional Framework Plans* for Planning and Sustainable Development have been adopted: one for each of the country's 13 regions except for the Athens Metropolitan Area, which already had its own master plan. The country's first national strategic spatial plan, the *General Framework*, and the Specific Framework Plan for Renewable Energy Sources were approved in 2008. The *Specific Framework Plans* dealing with the tourism and industrial sectors are expected to be approved in mid-2009. Greek authorities claim some success in bringing down the incidence of unauthorised construction, which has been a longstanding problem. Greece also made progress with the establishment of a national cadastre. The

review period saw the creation of numerous industrial parks, which in the long run will help remove industries from unsuitable locations.

It is still too early to assess the effects of all the planning activities on what is actually happening "on the ground". The reality so far has been one of spontaneous urbanisation whereby construction has often preceded planning, notably in the *coastal zone, on islands, and on the fringes of urban areas*. Policies specifically aimed at Integrated Coastal Zone Management are absent. The problem of *forest fires* is partially due to the weak planning system, including the lack of a complete *National Cadastre* and of a *National Forest Registry*. The reforestation of burned and degraded forestlands slowed down during the review period. Towns and cities suffer from a dearth of open space and green areas. Planning decisions often suffer time delays, partly because issues need to be referred to the central administration. Ombudsman reports also suggest that the *administration of planning law by local authorities* still is far from efficient, including in terms of the required environmental impact assessments, carried out *a posteriori* or bypassed altogether. Finally, the new framework plans will, by themselves, not secure good implementation and outcomes, and much will depend on a balanced interpretation of the term "sustainable development": it appears that in many decisions to date, the word "development" has been given much greater weight than the word "sustainable".

Recommendations:

- streamline the *administrative procedures* associated with environmental impact assessments and the application for planning and building permits; reduce building and housing *construction without prior planning*;
- ensure adequate control and strict enforcement of the existing legal framework regarding *construction without prior building permit*;
- complete the *National Cadastre and the National Forest Registry* as soon as possible;
- adopt and implement the proposed Framework Plans for *Coastal Areas and Islands* and for *Mountainous Areas*; set up a transparent monitoring system to *track and report on the effectiveness of the Frameworks* for Spatial Planning and Sustainable Development;
- increase the rate of *reforestation of burned and degraded forestlands*;
- raise *awareness and understanding of sustainable development* among the major stakeholder groups and in the Greek society at large.

3. International Co-operation

Although faced with the imperative of achieving near-term economic growth, Greece has embraced and promoted *long-term sustainable development* by implementing national actions to achieve, *inter alia*, the goals of the World Summit on Sustainable Development, the UN Millennium Development Goals and the EU Strategy for Sustainable Development. As a donor country, Greece's *development assistance programme* has improved substantially with the establishment of the "Hellenic Aid" Department within the Ministry of Foreign Affairs. It has supported improved environmental governance and programme effectiveness at the international level by pressing for institutional reform and better programme coherence (*e.g.* within UNEP and the UN Commission on Sustainable Development), and by ratifying virtually all major multilateral environmental conventions. Greece has also made an intensive effort to transpose the *EU environmental legislation* into domestic law. Significant progress was made in the *maritime transport* area in protecting the environment and improving the safety of life and property at sea; *fisheries management* was strengthened through national actions under the EU Common Fisheries Policy. Progress was made in protecting *endangered species* under the CITES convention, and in implementing the provisions of the Basel Convention on *transboundary movement of hazardous waste*. In the area of *climate change*, Greece has established institutional arrangements and developed analyses and plans to meet its commitments under the Kyoto Protocol and the EU burden-sharing agreement. Greece has also intensified its efforts to engage its neighbours in co-operative efforts to address water quality and water flow issues associated with *transboundary rivers and lakes*. Greece has provided effective leadership of the *Mediterranean Component of the EU Water Initiative* (MED EUWI) since its launch in 2003.

While performance improved markedly in the past few years, Greece needs to intensify its efforts to comply adequately with the *EU environmental legislation*. In a number of areas (waste, natural areas, water management) gaps exist between the high quality of analysis/planning and actual programme implementation. Greece is behind schedule in achieving EU targets for renewable energy use and reduction of energy consumption. Despite the progress in the enforcement of laws and regulations to control illegal *trade in endangered species, ozone depleting substances and hazardous waste*, Greek authorities need to remain vigilant and to be adequately staffed and equipped to carry out these tasks. Concerning *coastal waters*, while their quality is generally excellent, pollution hotspots remain problematic due to uncontrolled development and inadequate wastewater treatment; management of coastal wetlands and protected areas needs to be

improved and decoupled from EU financial support. While there are plans to progressively increase the *Official Development Assistance*, its environmental content remains quite small, and provisions do not exist for systematic environmental reviews of all proposed major development projects. Greece should be a leader within the IMO-ILO-UNEP framework on *environmentally sound shipbreaking*, commensurate with its commitment to sustainable development and its development assistance policy objectives. *Co-operation with neighbouring countries* on transboundary water and marine issues remains challenging, requiring further political and programme initiatives by the relevant countries.

Recommendations:

- continue efforts to *reduce greenhouse gases* with a view to achieving the EU emissions reduction target set for Greece; enhance efforts on energy efficiency and renewable energy sources;
- encourage Greek leadership within the IMO-ILO-UNEP framework in support of the *Convention on the Safe and Environmentally Sound Recycling of Ships*;
- strengthen the protection of *water quality in near shore marine areas and bays* through improved development siting, upgraded wastewater treatment and effective enforcement of existing national and EU environmental legislation and regulations; ensure that the environmental regulations governing water quality in the *aquaculture industry* are adequate to protect human health and environmental sustainability, and are fully enforced;
- strengthen *customs inspection and enforcement capacity* (expanded staff, improved training, better technology) to control illegal trade in endangered species, ozone depleting substances and hazardous waste;
- further utilise bilateral, regional and multilateral mechanisms to expand *co-operation with neighbouring countries* on the environmental management of transboundary waters;
- strengthen the environmental content of the *Development Assistance Programme* as it continues to grow, while ensuring that major development projects funded by Greece are subject to environmental reviews, where appropriate.

2 AIR*

Features

- High national air emissions
- Urban air quality problems (ozone, fine particles)
- Low energy intensity
- Gradual shift to cleaner fuels
- Investments in transport infrastructure
- Integrated urban transport management in Attica

* This chapter reviews progress in the last ten years, and particularly since the 2000 OECD Environmental Performance Review. It also reviews progress with respect to the objectives of the 2001 OECD Environmental Strategy.

Recommendations

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Greece:

- further *reduce air emissions*, especially SO_2 emissions from electricity generation (*e.g.* lignite fired power plants) and VOCs emissions from transport, so as to meet national emission ceilings; strengthen the *monitoring and management of particulate matter* (including $PM_{2.5}$) *and ground level ozone*;
- strengthen efforts on *energy demand-side management* and on market-oriented instruments to achieve more effective and efficient energy use: review the *energy price* levels and structure, and assess the impact of exemptions and subsidies;
- continue *the shift towards cleaner fuels* (*e.g.* natural gas, low sulphur oil) and *renewables* for electricity generation and end-use;
- continue to invest in *efficient and reliable public transport systems*, including in cities other than Athens; further develop transport demand management in urban areas;
- review *transport prices and taxes*, to better internalise environmental impacts and reflect vehicle environmental performance and fuel efficiency (*e.g.* linking vehicle taxes to the EU CO_2 vehicle labelling);
- address *air pollutant emissions from ships*, *e.g.* taking measures to improve vessel performance and fuel quality.

Conclusions

Greece has considerably reduced *air pollutant emission intensities* since 2000, showing a relative decoupling from economic growth. Emissions of nitrogen oxides (NO_x) have remained below the ceiling set at European level and NO_x emission intensity is now in line with the OECD average. Improvements in vehicle fleet and fuel quality have helped reduce emissions of volatile organic compounds (VOCs), carbon monoxide (CO) and particulate matters (PM) from the transport sector. *Concentrations of pollutants in ambient air* tended to decline or stabilise. During the review period, concentrations of sulphur dioxide (SO_2) and CO were kept below their limits throughout the country, and peak values of NO_2 steadily decreased. Greece has *strengthened its inspection system*, and emissions from stationary sources and fuel quality are regularly controlled. Greek installations participate in the EU *emission trading scheme for greenhouse gases* (GHGs); this led some large sources to invest in emission reduction measures. Greece's *GHG emissions* are currently below the Kyoto Protocol target. According to the 2008 reports from the European Commission and the European Environment Agency, Greece is expected to meet its Kyoto target using

existing policies and measures. Greece will need to continue to monitor its programmes to ensure that they are sufficient to meet the more ambitious EU targets to 2020. Concerning *energy*, the *energy intensity* of the economy has been reduced, and is now among the lowest in OECD. Greece has implemented regulatory and financial measures to promote the uptake of natural gas and to improve efficiency in energy end-use and electricity generation; progress has been made in opening energy markets. The share of renewables in both total primary energy supply and electricity output has increased, following the introduction of a feed-in tariff in 2001 and other support schemes. Concerning *transport*, Greece has heavily invested in extending *transport infrastructures*, using the opportunities given by the EU funds and the 2004 Olympic Games. The urban public transport system in Greater Athens was expanded and upgraded, as were pedestrian areas.

Although SO_2 emissions have started to slightly decrease in recent years, *SO_2 emission intensity* remains higher than the OECD average and among the highest in Europe, due to the dominance of domestic lignite (with very low calorific value) and oil in the fuel mix. Greece needs to strengthen its efforts in reducing SO_x and VOC emissions to reach their targets in 2010. Emissions of PM (especially from the residential and commercial sectors) and heavy metals remain of concern. Strengthened efforts are also needed to reach EU limit values for *ambient air quality* in major cities (*e.g.* NO_x, fine particles and ground-level ozone) and to mitigate related health risks. The ambient air *monitoring network* appears to be undersized and not fully efficient. Information on national emissions is not always adequate, especially for fine particles, persistent organic pollutants and heavy metals. *Economic instruments are limited* to energy and vehicle taxation; compliance with licensing regulations and financial support remain the main drivers for improving environmental performance at stationary sources. Concerning *energy*, *electricity generation* is a major source of air emissions, and there is much scope for improving its efficiency and environmental performance: while major electricity operators have undertaken investment programmes, Greece is home to some of the most polluting power plants in the EU; electricity generation from *renewables* is still far from the 2010 EU indicative target. Relatively low *energy end-use prices* and special discounts for some consumer categories may discourage rational use of energy. Concerning *transport*, road largely dominates the modal split for both freight and passenger transport. The share of *taxes* in fuel prices has decreased, road tolls are not adequately adjusted to inflation, and vehicle taxes do not satisfactorily take account of vehicle fuel efficiency. *Navigation* is a growing source of emissions; measures are needed to improve vessel performance and shipping fuel quality, taking into account the regulatory framework developed at international level.

♦ ♦ ♦

1. Policy Objectives

Greek air management objectives mainly derive from EU legislation and international commitments. The national legislation encompasses the 2010 *air emission targets* for sulphur dioxide (SO_2), nitrogen oxides (NO_x), volatile organic compounds (VOCs) and ammonia stipulated by the EU National Emission Ceilings Directive (2001/81/EC). Greece signed the Gothenburg and Aarhus Protocols to the Geneva Convention on Long-Range Transboundary Air Pollution (CLRTAP),[1] but has not ratified them yet. Under the Kyoto Protocol and the related EU burden-sharing agreement for the period 2008-12, Greece is allowed to increase its greenhouse gas (GHG) emissions by at most 25% above the base year level[2] (Chapter 8). In the framework of the 2008 EU "Climate Action", Greece will be required to cut emissions from sources outside the EU-wide emission trading scheme by 4% by 2020 compared to the 2005 level.[3]

During the review period, Greece's *ambient air quality target and limit values* were revised on the basis of the EU Air Quality Framework Directive (96/62/EC) and related daughter directives on individual substances. Following the adoption of the new EU air quality Directive (2008/50/EC), Greece will need to further adjust the national legislation to include limits on fine particles.

Curbing air emissions and mitigating climate change are priority areas of the 2002 *National Strategy for Sustainable Development (NSSD)* (Chapter 5). These policy objectives have been integrated into the Community Support Framework 2000-06 and the National Strategic Reference Framework 2007-13, which specify the use of EU Funds and national matching funds.

The policy goals and main measures identified in these strategic documents are consistent with the *recommendations of the 2000 OECD Environmental Performance Review*:

- implement with determination energy conservation programmes, and stimulate the uptake of more energy efficient technologies by power plants and industries;
- continue to encourage rapid growth in the use of natural gas (*e.g.* for power supply and household appliances) and renewables (*e.g.* in the islands);
- continue to promote the use of cleaner fuels (*e.g.* as regards sulphur content and lead content) by industry and households;
- strengthen efforts to reduce SO_x emissions (*e.g.* from lignite-fired power plants), NMVOC emissions (*e.g.* from refineries) and NO_x emissions (*e.g.* from transport);
- improve enforcement of air-related regulations through strengthened field inspectorates;

– pursue the development of a national emission inventory and expand the ambient air monitoring network, harmonising measurement methods between stations and expanding the list of pollutants monitored (*e.g.* PM_{10} and/or $PM_{2.5}$, PAHs, heavy metals);
– further develop and introduce measures aimed at replacing highly polluting road vehicles;
– further develop the use of economic instruments to integrate air management objectives into energy and transport policies and practices.

2. Air Pollution Trends

2.1 Trends in emissions of traditional air pollutants

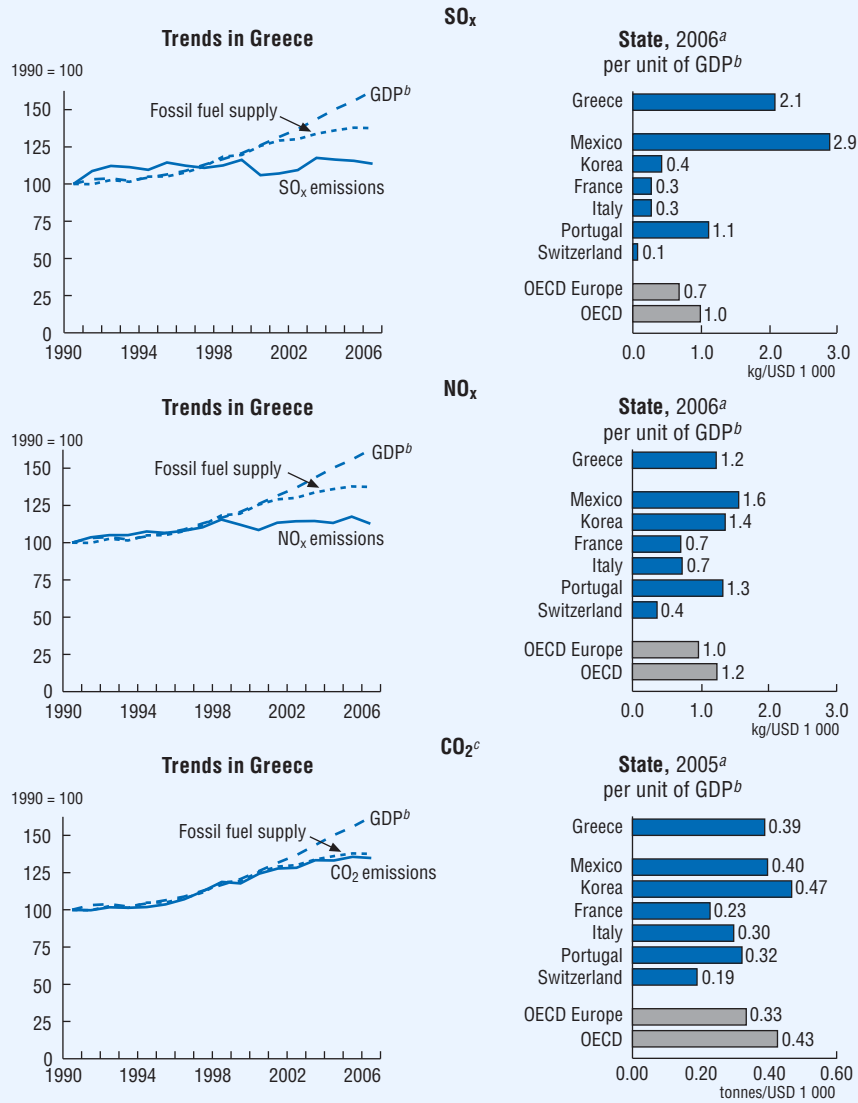
Greece has experienced an *overall improvement in emission trends*. Whilst during the past decades emissions of SO_x, NO_x and CO_2 grew faster than GDP, since late 1990s emissions have increased more slowly than Greek economy, resulting in a relative decoupling.

SO_2 emissions increased by 7.3% between 2000 and 2006, reaching 535.6 kilotonnes (kt)/year, slightly above the 2010 target set by the EU National Emission Ceilings Directive (523 kt/year). Emissions from mobile sources and from households and services experienced the highest increase (+25% and +30.5% respectively), but they still represent less than 10% of total emissions (Table 2.1).[4] The energy sector continues to be the major source of SO_x, due to heavy reliance on lignite and high sulphur oil for electricity generation. The SO_x-intensity of the Greek economy has decreased, but it remains twice OECD average and among the highest in Europe, seven times the figures for Italy or France (Figure 2.1). Greece has become a net exporter of SO_x to neighbouring countries (Chapter 8).

NO_x emissions increased slightly between 2000 and 2006 (3.9%) (Table 2.1). Nonetheless, they have remained below the 2010 ceiling (344 kt/year) and the NO_x-intensity of the economy has decreased, being now in line with OECD average (Figure 2.1). Transport remains the major source of NO_x, and non-industrial combustion (mainly households) represents a growing source of emissions.

Non-methane *VOC* emissions decreased considerably (–18%), from 354 kt in 2000 to 291 kt in 2006, placing Greece on track to reach its EU commitments (262 kt/year by 2010). Emissions from mobile sources declined by 30%, due to the renewal of the vehicle fleet. However, transport remains the major source of VOCs, followed by industrial processes (*e.g.* emissions from refineries and fuel distribution) and solvent use.

Figure 2.1 **Air pollutant emissions**



a) Or latest available year.
b) GDP at 2000 prices and purchasing power parities.
c) Emissions from energy use only; excludes international marine and aviation bunkers; sectoral approach.
Source: OECD-IEA (2007), *CO_2 Emissions from Fuel Combustion*; OECD (2007), *OECD Economic Outlook No. 82*; OECD-IEA (2008), *Energy Balances of OECD Countries*.

Ammonia emissions arise almost entirely from the agriculture sector, and remained stable over the review period, at a level equal to the 2010 ceiling (73 kt/year).

GHG gross emissions increased by about 4% during the first half of the review period and stayed broadly constant afterwards. In 2006, GHG emissions (excluding emissions and removals from land use, land-use change and forestry) were about 133 million tonnes of CO_2 equivalent, about 24.4% above the base-year level and slightly below the Greek Kyoto target (+25%).[5] According to Greece's projections, existing policies and measures will allow emissions to remain below the Kyoto target during the commitment period 2008-12 (EEA, 2008a). The carbon intensity of the Greek economy has decreased substantially, but remains above the OECD-Europe average (Figure 2.1). CO_2 emissions amounted to around 110 million tonnes in 2006, accounting for 82% of the GHG total. CO_2 emissions from energy production have stabilised, due to declining coal-fired power production, but remain the major share of emissions (45%). Emissions from transport and from households and services rose by

Table 2.1 **Atmospheric emissions,** by source, 2000-06

		SO_2		NO_x		NMVOC		CO		PM_{10}		CO_2	
		1 000 t	(%)	1 000 t	(%)	1 000 t	(%)	1 000 t	(%)	1 000 t	(%)	10^6 t	(%)
Power stations	2000	339.4	*68.0*	68.7	*22.6*	5.6	*1.6*	45.4	*3.5*	15.8	*21.0*	51.5	*49.7*
	2006	358.1	*66.8*	82.5	*26.1*	5.7	*2.0*	46.8	*4.9*	18.1	*20.7*	50.9	*46.5*
Industrial	2000	99.8	*20.0*	29.5	*9.7*	6.1	*1.7*	11.4	*0.9*	14.3	*18.9*	14.0	*13.5*
combustion	2006	106.0	*19.8*	30.3	*9.6*	5.3	*1.8*	10.4	*1.1*	19.7	*22.5*	13.3	*12.2*
Non-industrial	2000	16.4	*3.3*	7.0	*2.3*	14.5	*4.1*	178.1	*13.8*	14.3	*18.9*	8.3	*8.1*
combustion	2006	21.4	*4.0*	7.9	*2.5*	12.6	*4.3*	155.1	*16.3*	19.7	*22.5*	11.1	*10.2*
Industrial	2000	17.4	*3.5*	2.0	*0.7*	81.5	*23.0*	23.4	*1.8*	5.8	*7.7*	7.8	*7.6*
processes	2006	17.3	*3.2*	2.1	*0.7*	78.7	*27.0*	24.3	*2.6*	6.1	*7.0*	7.7	*7.0*
Mobile sources	2000	26.3	*5.3*	195.1	*64.3*	193.5	*54.6*	999.7	*77.7*	14.4	*19.1*	21.7	*20.9*
	2006	32.9	*6.1*	191.4	*60.7*	135.4	*46.4*	684.9	*72.2*	12.7	*14.6*	26.2	*23.9*
Solvents	2000	–	–	–	–	53.2	*15.0*	–	–	0.0	*0.0*	0.1	*0.2*
	2006	–	–	–	–	53.7	*18.4*	–	–	0.0	*0.0*	0.1	*0.1*
Miscellaneous	2000	–	–	1.2	*0.4*	–	–	29.2	*2.3*	10.8	*14.3*	–	*0.1*
	2006	–	–	1.2	*0.4*	–	–	27.6	*2.9*	11.3	*12.9*	0.1	*0.1*
Total	2000	499.4	*100.0*	303.5	*100.0*	354.4	*100.0*	1 287.2	*100.0*	75.4	*100.0*	103.6	*100.0*
	2006	535.6	*100.0*	315.4	*100.0*	291.4	*100.0*	949.0	*100.0*	87.5	*100.0*	109.6	*100.0*
Change (%) 2006/2000			*7.3*		*3.9*		*–17.8*		*–26.3*		*16.1*		*5.8*

Source: Inventory submission to the UNFCCC, September 2008; EMEP expert estimates.

more than 20% and 30% respectively, between 2000 and 2006 (Table 2.1). Methane and nitrous oxide emissions decreased slightly, and in 2006 amounted to about 8 and 10 million tonnes, respectively. On the other hand, emissions of F-gases have further increased, mainly because of the growth in air-conditioning equipments in dwellings and passenger cars.

Particulate matter (PM_{10}) emissions increased by 16% between 2000 and 2006. Emissions from all sources rose, with the exception of those from mobile sources, thanks to the improvement in vehicle performance standards and fuel quality. Combustion of fossil fuels for electricity generation, as well as in the industrial and residential sectors, remains the major source of PM emissions (Table 2.1). Emissions of $PM_{2.5}$ from non-industrial combustion increased by 44% and represent one third of total particulate emissions.

Carbon monoxide (CO) emissions decreased by 26% (Table 2.1). Improvements in vehicle performance brought a reduction in CO emissions from mobile sources, although transport remains the largest source of CO-related pollution. Emissions from power stations and industrial processes showed a slight increase.

As for *persistent organic pollutants* (POPs), estimated emissions of dioxins and furans decreased from 279 grams I-TEQ/year in 2000 to 135 grams I-TEQ/year in 2006,[6] but annual average air concentration remained high (EMEP, 2008). Emissions of polycyclic aromatic hydrocarbons (PAHs) slightly increased. Concerning *heavy metals*, estimates for 2005 and 2006 indicate that Greece presents deposition levels of lead and mercury among the highest in Europe; national emissions contribute about 80% to the depositions of these metals. Greece is also a large contributor to long-range transport of lead and mercury (380 and 11 tonnes/year, respectively) (EMEP, 2007 and 2008).[7]

2.2 Ambient air quality

In 2001, Greek cities (in particular Athens, Thessaloniki, Larisa, Patra and Volos), were among the top 20 European cities with severe ambient air pollution problems (EC, 2007a). Nonetheless, *concentration levels have tended to stabilise or decline* since 2000, owing to the technological upgrade of road vehicles, the switch to higher quality fuels (including natural gas) and the investment in rail and public transport. Persisting high levels of ozone and particulate matters in ambient air represent major exceptions, with their associated health risks and costs to the society (Chapter 6).

Despite the increase in emissions, *concentrations of SO_2* have remained substantially stable since late 1990s, and Greece has managed to meet SO_2 limit

values for health at all monitoring points. This is mainly due to the lower sulphur content in diesel fuel for transport and heating purposes, and the installation of desulphurisation units at two large power plants.

Concentrations of NO_2 have not shown a consistent decreasing trend. The annual average of 40 microgram/m^3 ($\mu g/m^3$) was exceeded in major cities (Athens, Thessaloniki, Piraeus, Patra) for seven consecutive years, due mainly to heavy traffic and proximity to major roads. However, peak (hourly) values heave steadily decreased and have not exceeded the limit of 200 $\mu g/m^3$ beyond the permitted frequency (18 times) since 2003 at all measurement stations but one in Athens (Table 2.2).

Table 2.2 **Exceedances of air quality standards in major cities**

(number)

City	Monitoring station	Type of station and area	NO_2 1-hour limit (200 $\mu g/m^3$)[a]		PM_{10} 24-hour limit (50 $\mu g/m^3$)[b]		O_3 maximum daily 8-hour mean (120 $\mu g/m^3$)[c]	
			2000	2006	2001	2006	2001	2006
Athens	Aristotelous	Traffic, urban	9[d]	7	186	178	. .	. .
	Athinas	Traffic, urban	38[d]	2	. .	. .	27[e]	5
	Goudi	Traffic, urban	. .	1	159	21[d]	. .	. .
	Patision	Traffic, urban	234	36	. .	. .	0	0
	Votanikos	Industrial, suburban	8	0	. .	. .	29	31
Heraklion	Heraklion	Traffic, urban	. .	. .	60[e]	23[d, h]	61[e]	38[d, f]
Patra	Patra-1	Traffic, urban	. .	. .	140	29[d]	10	0[c]
	Patra-2	Traffic, urban	. .	. .	139	14[d, g]	. .	. .
Pireas	Pireaus-1	Traffic, urban	11	0	114[d]	59[d, g]	0	21
	Pireaus-2	Background, urban	. .	0	. .	. .	105	0
Thessaloniki	Agia Sofia	Traffic, urban	. .	. .	210	21[d, g]	9	3[d, g]
	University	Traffic, urban	. .	0	. .	. .	88	19[d]
Volos	Volos	Traffic, urban	. .	0	96[d, f]	121	15[e]	0

a) Permitted exceedances: 18 hours per year.
b) Permitted exceedances: 35 days per year.
c) Permitted exceedances: 25 days averaged over 3 years.
d) Statistics based on data coverage less than 75 %.
e) 2002.
f) 2003.
g) 2004.
h) 2005.
Source: EEA Airbase.

Suspended *particulate matter* is of major concern. The urban population exposure fluctuated around 40 μg/m^3, above the EU25 average (30 μg/m^3 in 2006) and among the highest in Europe.[8] Between 2001 and 2007, the annual average limit (40 μg/m^3) was exceeded at most monitoring stations, although with large annual fluctuations. Despite the reduction in exceedances of the 24-hour limit (50 μg/m^3) at most monitoring stations (Table 2.2), still in 2007 this limit was exceeded beyond the allowed frequency (35 days per year) at many PM measurement points.[9] One third of exceedances were due to natural sources, *i.e.* transport of natural particles from dry regions (mainly North Africa). However, high PM concentrations were primarily linked to heavy traffic in urban areas. Further efforts are needed to fully comply with the limit values set by the EU Directive 1999/30/EC, which should have been met by 2005, as well as the limits for $PM_{2.5}$ stipulated by the new air quality Directive (2008/50/EC).

Ground-level ozone is an extensive problem throughout the country. Between 2000 and 2005, the urban population exposure increased by 38%; despite a sharp decrease in 2006; urban exposure remains the second highest in Europe.[10] At most monitoring stations, ozone concentrations have peaked in 2002 and 2003 and tended to stabilise at a lower level in the following years, showing a strong correlation with climatic conditions (high solar radiation, high temperature and extensive dry periods). Nonetheless, between 2004 and 2007, ozone information threshold was exceeded at two thirds of Athens measurement points; the health protection long term objective (120 μg/m^3 maximum daily 8-hour mean) was exceeded at most assessment stations throughout the country, and especially in the suburban areas of Athens and Thessaloniki (Table 2.2): the vast majority of the population is exposed to concentrations above the limits.[11] Ecosystem impacts were equally important: the target value for vegetation protection was exceeded at 8 sampling points in 2007. Further efforts are needed to fully comply with the 2010 target values set by the EU Ozone Directive (2002/3/EC).

There is only one monitoring station for *benzene*, which is located in the centre of Athens. In 2003-07, this sampling point recorded benzene levels above the yearly limit value (5 μg/m^3).[12] *Carbon monoxide* was kept below its limit value throughout the country.

3. Measures to Prevent and Control Air Pollution

Greek *national legislation* on ambient air quality integrates all air quality related EU directives,[13] setting limit and target values for substances in ambient air quality, defining number and location of monitoring stations, and laying down methodological

and measurement standards. The air quality plans required by EU directives to tackle excessive pollution have been implemented in Athens and Thessaloniki since 2003, whereas in other major cities the definition of plans has been lagging behind. The legislative framework includes national emission ceilings,[14] fuel standards, performance standards for vehicles, licensing requirements for large combustion plants and industrial installations. Greek air management policy is based on a *regulatory approach* and on infrastructure investments; businesses and households benefit from financial support to improve their environmental performance; economic instruments are limited to energy and vehicle taxation (Chapter 5).

In line with OECD recommendations, Greece put in place in 2001 the *National Network for the Control of Atmospheric Pollution* (NNCAP), with the contribution of EU funds. The Ministry for the Environment, Physical Planning and Public Works (YPEHODE) is responsible for the monitoring system in Attica and for taking immediate action in case of severe air pollution (*e.g.* restricting vehicle traffic, transport of fuels and solvents, and operation of industrial plants) (YPEHODE, 2006a). Attica's data are made available daily on YPEHODE's Website. In the rest of the country, the operation of the NNCAP and the emergency measures are under the responsibility of regional authorities. The system consists of 34 automatic stations, including 16 points in Attica, and covers all major pollutants. However, benzene and $PM_{2.5}$ are monitored only in Greater Athens, at one and three stations respectively, and there are no assessment points for lead and other heavy metals. In 2003-04 measurement were conducted at 30 locations throughout the country, including fine particles, heavy metals and PAHs. The network appears to be undersized,[15] and data coverage is often below 75%, especially in regions other than Attica, due to financial difficulties of local authorities.

Statistical information on national emissions is not always adequate. Reliable data on particulate matter emissions are lacking. Greece has never reported POP data to the Geneva CLRTAP, and official national data on heavy metals (lead, cadmium and mercury) were last reported in 1996. In 2008, the Compliance Committee of the Kyoto Protocol declared Greece non compliant with the emission accounting and reporting obligations. This decision was reversed in November 2008 (Chapter 8).

Licensing of power plants and industrial installations is conditional on specific requirements related to air emissions, including the adoption of best available technologies, the use of low sulphur fuel, and the switch to natural gas whenever connection to the network is available.[16] Large installations are required to report on their emissions pursuant to the EU Integrated Pollution Prevention and Control obligations. Since mid-1980s, a moratorium on the installation of new industrial activities in Athens has been in place; many existing industrial and power plants have

been moved from Athens to its outskirts. The moratorium has recently been lifted. The Specific Framework Plan for Industry (expected to be approved in 2009) will clarify localisation requirements for industrial plants, and will allow to better consider cumulative impacts on air pollution and the environment (Chapter 7).

Following OECD recommendations, Greece has improved the *inspection system* with the establishment of the Hellenic Environmental Inspectorate (HEI) and its regional divisions (Chapter 5). Emissions from stationary sources, including industrial factories, heating systems, bakeries, swimming pools and hospitals, are regularly monitored. Since 2002, special inspections on fuel quality have been carried out at refineries, industrial installations, storage facilities and retail stations. Non-compliance with prescribed emission abatement measures and product standards implies fines and may lead to revocation of the license.

A large part of public pollution abatement and control investments in air protection has been supported by *EU funds*. The Operational Programme (OP) "Environment" 2000-06 allocated EUR 12.5 million (2.4% of OP budget) for mitigating air pollution and improving the monitoring network. The network is expected to be expanded and upgraded (including monitoring of heavy metals and the establishment of a centre for data quality assurance) with the financial support of the OP "Environment and Sustainable Development" 2007-13. This OP allocates overall EUR 23 million (1% of OP budget) for air and climate change, also for conducting studies and improving implementation of national legislation. EU funds have supported several investments in the energy and transport sectors that have potential positive impacts on air pollution (Box 2.1).

As for GHG emissions, the Second National Climate Change Programme 2000-10 was adopted in 2002 and reviewed in 2007. Greece participates in the *EU emission trading scheme (ETS) for CO_2*, which has been operational since 2005. The National Allocation Plan (NAP) 2005-07 covers about 140 installations (including power plants) and emissions for 223.3 $MtCO_2$, implying a 2.1% cut of projected emissions of concerned installations. Over the first trading phase, Greek installations reached full compliance, and their verified emissions matched allocated allowances (despite the increase in participating operators) (EEA, 2008b). The NAP 2008-12, as approved by the European Commission, covers emissions for 341.5 Mt CO_2 (allocated to 140 installations and set aside for new entrants), *i.e.* a 16.7% decrease of projected emissions. In 2006, a Bureau for GHG Emissions Trading was set up within YPEHODE, and the National Centre for the Environment and Sustainable Development was assigned responsibility for the management of the national registry. The operation of the registry is financed through an annual maintenance fee (ranging between EUR 100 and EUR 300) charged to operators (EEA, 2008b). Despite the slight

Box 2.1 EU financial support to energy efficiency and renewable energy sources

Support from EU funds has been critical for the generation of private investment in renewable energy sources (RES) and energy saving in Greece (GHK, 2006). During the *2000-06 programming period*, about EUR 820 million of public funds (including EUR 470 million of EU contribution) were allocated to energy-related investments and to environment-friendly technologies and production processes through the *National Operational Programme* "*Competitiveness*" (OPC).

About 40% of these public funds (EUR 360 million) were allocated for *securing energy supply* and promoting liberalisation of energy markets: infrastructure for securing supply of natural gas and enhancing reliability of the natural gas system; infrastructure for the transport and distribution of electric power to the islands, and for connecting RES and combined heat and power (CHP) plants; supervision and operation of the energy sector. The OPC also provided financial aid (EUR 460 million) to develop CHP and RES power plants, as well as subsidies to firms (in all economic sectors) to implement *energy efficiency programmes* and adopt environment-friendly technologies. The subsidy rate for RES varied depending on the energy source, ranging from 30% of investment costs for wind parks to 50% for photovoltaic units.

For the *2007-13 programming period*, the Strategic National Reference Framework allocates about EUR 625 million (excluding national matching funds) for supporting the energy sector, corresponding to 3% of available EU resources for Greece. The majority of resources are assigned to investments in renewables (47%) and natural gas (23%); a relatively low share of these financial resources (11%) is earmarked to energy efficiency investments.

over-allocation and the relatively low CO_2 allowance prices, the EU ETS has stimulated the Public Power Corporation (PPC) to undertake large-scale efficiency improvement programmes at lignite-fired power stations (IEA, 2006).

4. Air Management and Energy Policy

4.1 Framework

The *main objectives of Greek energy policy* are: securing the country's energy supply (including diversification of the fuel mix and exploitation of domestic energy sources), assuring environmental sustainability of the energy sector, enhancing competitiveness of the national economy and regional cohesion. Greek legislation encompasses EU targets

on renewable energy sources (RES), energy efficiency and biofuels: 20.1% of electricity produced from RES in gross electricity consumption by 2010 (Directive 2001/77/EC); 9% energy saving target by 2016 (Directive 2006/32/EC); 5.75% share of biofuels in overall transport fuels placed on the market by 2010 (Directive 2003/30/EC). Greece should be prepared to meet the *more ambitious EU targets for 2020*, which imply a binding 10% share of renewables in domestic automotive fuel consumption, and a national target of 18% of renewables in gross final energy consumption (from 6.9% in 2005).[17]

The Ministry of Development (YPAN) is in charge of *energy policy-making*, and shares with YPEHODE the responsibilities over energy-related environmental issues, including climate change. YPEHODE is responsible for formulating the national climate change policy and for official accounting and reporting of GHG emissions. Several other institutions are involved, including local and regional authorities for the licensing of power installations. The Centre for Renewable Energy Sources (CRES) is the national agency for the promotion of renewables and energy savings; it conducts research on energy technologies, and provides technical support to YPAN. A National Energy Strategy Council was established in 2006, as an advisory body to YPAN for long-term energy policy planning. In 2007, the Council submitted to the Parliament and the Prime Minister the first report on the long-term energy planning of Greece 2008-20.[18] However, the *institutional framework* for integrating air management, climate and energy policy needs to be reinforced and stronger coordination is needed to avoid duplication of responsibilities and tasks. The analytical bases for decision-making need to be strengthened, assuring harmonisation between energy and GHG statistics (IEA, 2006). A major step in this direction was the reorganisation of the GHG national inventory system, completed in February 2008 (Chapter 8).

In line with national policy objectives and EU relevant directives, Greece has taken *significant steps* to provide a comprehensive regulatory and legislative framework to liberalise energy markets,[19] to promote energy efficiency and renewables, to foster penetration of natural gas and extend the gas distribution network, and to develop interconnections (*e.g.* electricity and gas) with neighbouring countries. However, Greek energy policy appears to be primarily supply-side oriented and based on regulatory measures and financial support schemes. Stronger effort should be put on the demand side and on more market-based instruments, to moderate the increase in energy consumption linked to the high economic growth.

4.2 Energy intensity and efficiency

Both *total primary energy supply* (TPES) and *total final energy consumption* (TFC) increased during the review period (Table 2.3). The transport sector and

residential/commercial activities account for more than 70% of TFC (Figure 2.2). The growing economic role of the tertiary sector, as well as the diffusion of air-conditioning systems,[20] the inadequate energy performance of buildings and appliances, and discounts on energy prices have contributed to boost consumption by commerce, public services and households. On the other hand, consumption by industry declined, indicating the decreasing role of energy-intensive industry in the Greek economy (Box 5.1), as well as efficiency gains in several industrial activities (*e.g.* food and beverages). Energy consumption for end-use remained based on oil (69% of TFC in 2006) and electricity (about 20% of TFC). In particular, oil accounts for about 45% of household and service final energy consumption, the highest share in OECD, despite the increasing penetration of natural gas.[21]

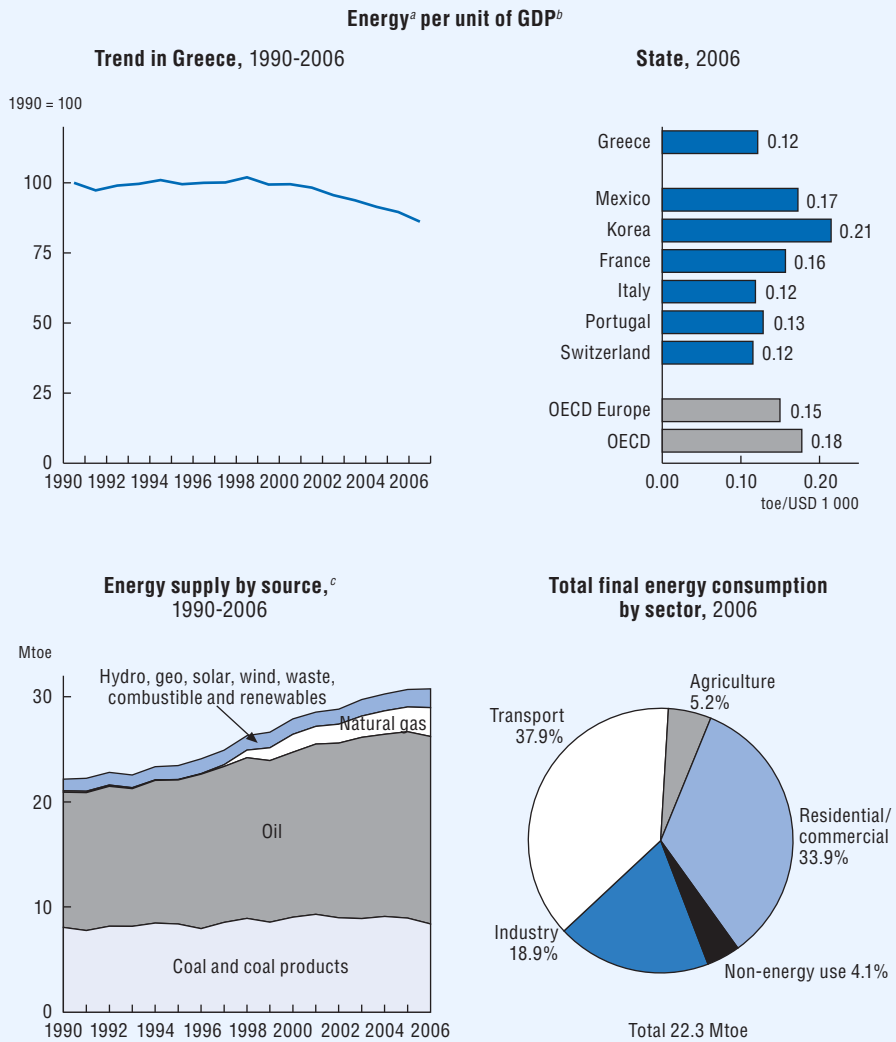
Greek *energy intensity* (TPES per unit of GDP) decreased by 13.4% in the 2000-06 period, showing a relative decoupling of economic growth from energy use. In 2006, the energy intensity was 0.12 tonnes of oil equivalent (toe) per USD 1 000, among the lowest in OECD. Regulatory and incentive measures for the use of natural gas, and financial support to firms' investments in energy efficiency programmes, have contributed to this accomplishment (Table 2.4 and Box 2.1). YPAN estimates that these

Table 2.3 **Key energy statistics,** 2000-06

	2000		2006		Change (%) 2006/2000
	Mtoe	(%)	Mtoe	(%)	
Total supply (TPES)	27.9	*100.0*	31.1	*100.0*	*11.5*
Coal and coal products	9.0	*32.4*	8.4	*27.0*	*–7.1*
Oil	15.7	*56.2*	17.8	*57.3*	*13.6*
Natural gas	1.7	*6.1*	2.7	*8.8*	*61.2*
Renewable sources	1.5	*5.3*	1.8	*5.7*	*21.7*
Electricity trade	0.0	*0.0*	0.4	*1.2*	*0.0*
Heat	0.0	*0.0*	0.0	*0.0*	*0.0*
Total final consumption (TFC)	19.3	*100.0*	22.3	*100.0*	*15.8*
Industry sector	4.4	*23.0*	4.2	*18.9*	*–5.0*
Transport sector	7.2	*37.4*	8.5	*37.9*	*17.2*
Other sectors, *of which:*	6.9	*35.8*	8.7	*39.2*	*26.6*
Residential	4.5	*23.3*	*5.5*	*24.6*	*22.5*
Commerce and public services	1.3	*6.8*	*2.1*	*9.3*	*58.4*
Non-energy use	0.7	*3.7*	0.9	*4.1*	*26.1*

Source: OECD-IEA (2008), *Energy Balances of OECD Countries.*

Figure 2.2 **Energy structure and intensity**



a) Total primary energy supply.
b) GDP at 2000 prices and purchasing power parities.
c) Breakdown excludes electricity trade.
Source: OECD-IEA (2008), *Energy Balances of OECD Countries*; OECD (2007), *OECD Economic Outlook No. 82*.

Table 2.4 **Measures to support energy efficiency and renewable energy sources,** 2000-08

Programme/law	Objective	Measures
Law 2773/1999	Liberalisation of electricity market in line with Directive 1996/92/EC	– Maintenance of the feed-in tariff regime for RES introduced in 1994. – Dispatch priority to new renewable electricity producers (within 50 MW installed capacity). – 2% levy on the pre-tax proceeds from renewable electricity sales in favour of local governments.
Law 2941/2001	Promotion of RES	– Regulations for RES installations in forests, scrubland, and in areas outside the existing zoning plans. – Expropriation of private land for RES projects and related infrastructures (works of public interest). – Entitlement of investors to construct connecting lines to grids.
Law 3175/2003	Liberalisation process, promotion of natural gas, geothermal energy	– New framework for exploration of geothermal fields and use of geothermal energy (no longer under the stricter rules of the 1973 "mining code"). – Simplified procedures for expropriation for power transmission network development. – Mandatory connection to the gas network of new buildings in urban areas and larger buildings in Attica.
Law 3296/2004 "Corporate and income tax"	Promotion of natural gas and RES	– Tax deduction of 20% of investment costs for the installation of appliances or heating systems using natural gas or RES (*e.g.* solar thermal) in the residential and tertiary sectors. – Tax incentives to connect to the natural gas network.
Law 3340/2005 and Law 3423/2005	Biofuels; introduction of the EU target (Directive 2003/30/EC)	– Establishment of a Biofuel Distribution Licence. – Annual excise-free quotas of biodiesel. – Obligations for refineries to buy tax-free biodiesel for blending in automotive fuels. – Introduction of fuel standards EN 14214, EN 590:2004 and EN 228:2004 into national legislation.
Law 3468/2006	Endorsement of EU RES target (Directive 2001/77/EC); promotion of electricity from RES and high-efficiency CHP	– Differentiation of the feed-in tariff according to energy source and location. – Simplified licensing process, with strict terms (6 to 12 months) for approval. – Increase of capacity thresholds allowing for exemption from installation and operating permits (depending on energy source and geographical location) and for benefitting from feed-in tariffs (for hydroelectric plants). – Extension of the dispatch priority to renewable electricity produced by large plants. – Strict monitoring of authorised RES plants. – Mandatory measurements of RES potential by a certified body. – Establishment of two intra-ministerial bodies to co-ordinate licensing. – Possibility of installing offshore wind farms. – Improvement of power purchase contractual terms (possible extension from 10 to 20 years).

Table 2.4 **Measures to support energy efficiency and renewable energy sources,** 2000-08 *(cont.)*

Programme/law	Objective	Measures
Law 3468/2006	Endorsement of EU RES target (Directive 2001/77/EC); promotion of electricity from RES and high-efficiency CHP	– Increase from 2% to 3% of the levy on the pre-tax proceeds from RES electricity sales (photovoltaic excluded) in favour of local governments.
Development Minister Decisions D6/F1/oik.8684/2007 and D6/F1/oik.15450/2007	Promotion of photovoltaic power	– Targets on photovoltaic power capacity in 2007-10 and allocation of targets among administrative regions.
Joint Ministerial Decisions D5/EL/B/F1.a/9021/2005, D5/EL/B/16954/ 2005, D5/EL/B/oik.20168/2006 and 7625/378/2007	Promotion of energy efficiency and use of natural gas in the public sector	– Energy performance standards in electric installations, electric appliances (including lamps and lighting) and air-conditioning equipments in public sector buildings. – Mandatory connection to the gas network of public buildings for heating purposes (substituting for heating oil).
Operational Programme "Competitiveness" 2000-06	Funding RES projects, natural gas and energy efficiency	– Funding of energy saving investments in the industrial and tertiary sector. – Funding of RES plants.
Development Law 3299/2004 amended by Law 3522/2006 (Public investment programme)	Funding RES and energy saving projects and natural gas in buildings	– Subsidies for energy saving investments in the industrial and tertiary sector and for the production of electricity from RES and CHP (up to 55% of investment costs). – Income tax rebate (up to 700 EUR) for the expenses of installing heating system using natural gas and decentralized CHP systems.
Law 3661/2008	Transposition of the EU Building Directive (2002/91/EC)	– Energy efficiency requirements for new buildings and major renovation of existing large buildings. – Energy performance certification procedures. – Mandatory inspections of boilers and air-conditioning systems. – Registry of energy auditors.
Joint Ministerial Decision D6/EL/B/14826/2008	Promotion of energy efficiency in the public sector	– Consolidation of all provisions concerning energy efficiency in the public sector

Source: Ministry of Development.

measures, as well as emergency measures to force industries to cut consumption during summer, have contributed to reduce severe peak loads, which would have required an additional power generation capacity of 400 MW/year. Further measures were introduced in early 2009 (Law 3734/2009) to support investment in combined heat and power (CHP) plants (financial support and simplifying licensing procedures). However, these initiatives have not been taken in the framework of an energy efficiency strategy. The national action plan for end-use energy efficiency pursuant to Directive 2006/32/EC was submitted to the European Commission only in June 2008.

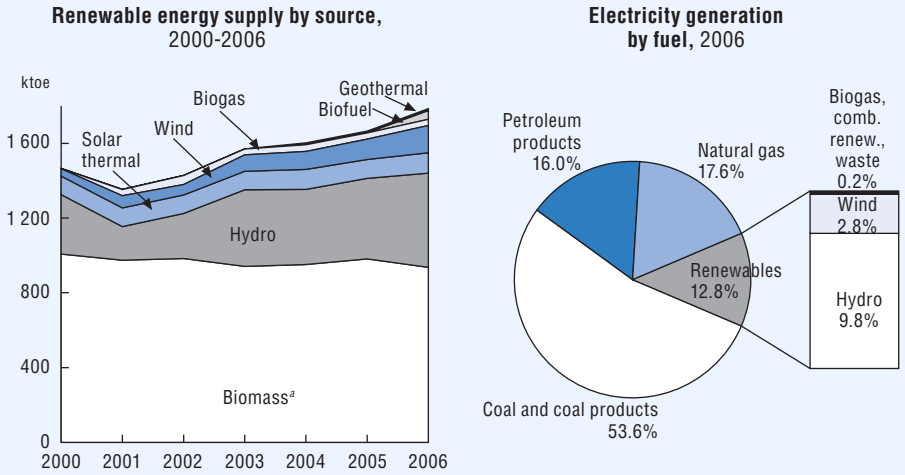
Concerning *buildings and the public sector*, Greece transposed all EU energy efficiency standards for electric appliances; specific measures and energy performance standards were introduced for public sector buildings (*e.g.* mandatory connection to the gas network for heating purposes, efficiency standards for lamps and lighting, minimum efficiency requirements for public procurement contracts) (Table 2.4). A 2008 Joint Ministerial Decision sets the timetable for the implementation of these measures and requires the designation of energy managers in all public and governmental buildings. Law 3661/2008, transposing the EU Building Directive (Directive 2002/91/EC), introduces minimum energy efficiency requirements for new buildings and major renovation of existing large buildings, energy performance certification procedures, and mandatory inspections of boilers and air-conditioning systems; a registry of energy auditors is also envisaged. Further efforts are needed to ensure that the EU Building Directive is effectively implemented.[22]

4.3 Energy mix

The structure of the TPES shows a *dominance of fossil fuels (93%), including oil, coal and natural gas* (Table 2.3 and Figure 2.2). The share of coal products in TPES has declined, compensated mainly by the increase of natural gas. Between 2000 and 2006, energy supply from renewables increased by 21.7% (Box 2.2). Lignite is the main domestic energy source, whereas Greece is highly dependent on import of oil products.

The share of lignite and other coal in domestic *electricity generation* declined considerably (from 64% in 2000 to 54% in 2006), whereas the share of natural gas and RES increased (Figure 2.3). Oil-fired power stations in the mainland are gradually being converted to natural gas, to increase efficiency of generation and reduce environmental impacts. Nonetheless, the electricity sector remains highly dependent on low-quality domestic lignite and oil, the latter being used especially for power generation in the numerous non-interconnected islands. Greece needs to develop the electricity generation capacity and the transmission network, to secure supply, reduce grid instability and increase usage of RES, especially in the islands (IEA, 2006).[23]

Figure 2.3 **Renewable energy**



a) Includes waste.
Source: OECD-IEA (2008), *Energy Balances of OECD Countries.*

During the review period, Greece made commendable *efforts to promote renewable energy sources* to meet EU targets. Direct subsidies for the installation of RES plants and tariff incentives have contributed to the acceleration of investments (Table 2.4 and Box 2.1). The feed-in tariff scheme was modified in 2006, introducing a differentiated tariff depending on energy source and location of the plant, to better support underexploited sources (*e.g.* photovoltaic and off-shore wind farms) and installation of RES plants in islands.[24] These support schemes may lead to over-subsidisation and cost-benefit analyses would help to evaluate overall impacts.

Despite approval and financial support, *many RES projects have not been completed*. As other energy infrastructure, RES projects have been hampered by long and complex administrative procedures, and by a strong local opposition, often leading to legal actions (GHK, 2006). To address these problems, and in line with the International Energy Agency's recommendations (Box 2.3), the Government recently introduced several measures to simplify the permitting procedures for RES plants (Table 2.4), established two inter-ministerial committees to coordinate the licensing process and provide guidance to local authorities, launched the definition of a spatial planning framework for RES (Chapter 7), and required a regular monitoring of implementation of RES projects (conducted by the Regulatory Authority for Energy).

Box 2.2 **Renewable energy sources**

Greece as a *remarkable potential for renewable energy sources* (RES), especially for wind and solar. Despite the rapid increase between 2000 and 2006 (+21.7%), renewables account for a small share of total TPES (Table 2.3). Biomass and hydropower are the main sources, accounting respectively for 52.5% and 28.2% of renewable energy supply in 2006. Wind power is the fastest growing renewable source, and it reached 8.2% of renewables supply (from 2.7% in 2000) (Figure 2.3). Solar thermal has been also traditionally used in Greece (6% of TPES), and the related Greek industry is the third largest among EU countries. It is estimated that Greece has the third highest installed solar thermal capacity per inhabitant in EU (295.5 m2 of installed solar collectors per 1 000 inhabitants) (Observ'ER, 2007)

Electricity production from RES nearly doubled from 4.1 TWh in 2000 to 7.7 TWh in 2006. The main renewable source for electricity generation remains hydropower (primarily based on large scale plants), which is influenced by hydraulicity conditions and determines high variability of overall RES electricity output. Electricity from wind grew almost four fold, reaching 22% of RES electricity generation and nearly 3% of overall electricity output (Figure 2.3). A limited number of RES plants have been located in the islands. Despite the growth, in 2005 RES electricity accounted for 10% of gross national electricity consumption (below the target of 20.1% by 2010). The Ministry of Development (YPAN) indicates that reaching the target would imply producing 14.45 TWh of electricity from RES in 2010, and to nearly double installed capacity (from 4 GW to 7.7 GW). The overall investment requirement is estimated at EUR 8.4 billion (GHK, 2006). Wind farms are expected to cover most of the necessary capacity (from 0.85 to 3.6 GW). Photovoltaic is expected to contribute 790 MW, including 200 MW in the islands; foreseen capacity is primarily based on small scale installations, and is shared among regions (one fifth of the capacity will be located in the sparsely populated Peloponnese). YPAN estimates that the RES target is achievable only under optimistic assumptions and with additional measures (*e.g.* further development of the grid and additional subsidies). Under the most conservative scenario, RES electricity output is foreseen at 15.3% of gross electricity consumption (YPAN, 2007).

Biofuels were introduced in the Greek market in late 2005, following the introduction of the tax exemption regime (YPAN, 2008). Only biodiesel is produced and distributed through the existing fuel distribution network. Bioethanol is expected to be distributed in early 2010, and some investments are planned on the production side (e.g. Hellenic Sugar Industry plans to convert two units for bioethanol production). Biodiesel is blended in automotive diesel (about 4% by volume). There are plans to distribute blended fuels with higher biodiesel content for public transport vehicles, as well as pure biodiesel. The first domestic biodiesel plant started production in late 2005; as of 2008, ten biodiesel production plants were operating, for an overall production capacity of 575 000 tonnes/year. Greek plants mainly use imported oils, and to a lesser extent local crops (cottonseed, sunflower, rape seed). There are plans to increase the use of domestic energy crops. Biodiesel consumption for transport was about 46 ktoe in 2006, i.e. 0.7% of overall automotive fuel consumption, far below the indicative EU target of 2% by 2005. Biodiesel consumption is estimated to have nearly doubled in 2007 (Observ'ER, 2008). Nevertheless, reaching the 5.75% target by 2010 appears to be challenging.

Box 2.3 **Selected recommendations from the International Energy Agency**

- Ensure consistency between energy and environmental policies, and enhance the co-operation between relevant organisations.
- Establish organisational arrangements between NOA, CRES or other organisations to achieve effective co-ordination in data analysis, quantitative forecasting and policy evaluation activities for energy demand and supply and energy-related GHG emissions.
- Place greater overall emphasis and attention on energy efficiency and the demand side in energy policy-making.
- Pursue social policy objectives by means other than energy taxation and pricing.
- Consider the introduction of stronger and more concrete GHG reduction policies in the residential, commercial and transport sectors, taking into account recent developments in Greek energy markets.
- Address non-CO_2 GHG emissions, in particular HFCs from cooling appliances.
- Formulate a comprehensive and clearly structured policy framework for improving energy efficiency with measurable targets as an integral part of a long-term energy policy strategy.
- Ensure the speedy implementation of the EU Directive on the Energy Performance in Buildings by publishing the new building code and training sufficient numbers of building energy auditors.
- Consider the introduction of more market-oriented instruments. These could include cost-reflective energy pricing and information and awareness initiatives.
- Consider the removal of preferential tariffs for particular sectors and groups if these distort consumption behaviour.
- Consider a rapid introduction of already planned tax measures aiming to reduce fraud, and monitor the situation closely, preparing to introduce further tax alignments where these are required.
- Reduce administrative barriers to renewables development by in particular: putting in place a one-stop shop for licensing renewables projects; establishing clear guidelines for authorisation procedures with a clear attribution of responsibilities to all institutions involved; establishing pre-planning mechanisms that require regions and municipalities to assign locations for renewables (spatial planning); introducing more simplified procedures for small projects.
- Optimise the current feed-in tariff scheme to improve cost-effectiveness, with a view to reflecting the technology learning curve and limiting the duration of the subsidy, while ensuring investor confidence.
- Consider incorporating more market-oriented elements in the national renewables support scheme, taking into account the experience of other countries.

Box 2.3 **Selected recommendations from the International Energy Agency** *(cont.)*

- Formulate a comprehensive strategy and policy framework for the introduction of biofuels in order to take advantage of their possible benefits.
- Ensure cost-reflective electricity pricing eliminating cross-subsidies among consumers, and evaluate the negative effects of geographically uniform tariffs.
- Continue the efforts to achieve modal shifts, by *e.g.* improving public transport and transport infrastructure, and by introducing cost-reflective pricing.
- Consider the introduction of efficiency-related vehicle taxation, linking to EU vehicle labelling.
- Evaluate the possibility to further increase the use of alternative fuels in the public and private trucking and bus sectors.

Source: IEA (2006).

4.4 Energy prices and taxes

Greek electricity prices for households and industry are among the lowest in OECD. The current *tariff structure* is almost 40 years old and does not include incentives to reduce consumption (IEA, 2006). Despite the high cost of production and distribution of electricity to grid-isolated islands, a uniform electricity tariff applies throughout the country, implying a cross-subsidy between different categories of consumers. Recognising the social and regional dimensions of the issue, this practice may be reviewed and revised, as it represents a high cost to the Greek government (Chapter 5) and discourages the uptake of more efficient solutions for providing islands with energy (*e.g.* with RES). Reduced rates are granted to farmers, Public Power Corporation (PPC) employees and larger families (Chapter 3).

Concerning *energy taxation*, the same excise tax rate on fuels applies to households and commercial/industrial activities. Electricity and natural gas are exempted from excise duties and benefit from a lower VAT rate; since 2001 households have benefited from a tax relief on oil during the heating season (Table 5.7). To address the problem of tax frauds (substituting heating oil for more expensive diesel in vehicle), Law 3634/2008 (amending the National Customs Code) equalised the tax rates on diesel oil and replaced the original tax discount on heating oil with a tax refund mechanism.[25] Nonetheless, these exemptions and discounts may discourage the efficient use of energy and the uptake of natural gas, and create market

distortions. The PPC is subject to a 0.4% levy on annual turnover of lignite-generated electricity; revenues are earmarked to environmental protection and economic development investments in prefectures where lignite power plants are located. Local authorities collect a 3% duty on pre-tax proceeds from renewable electricity sales (with the exclusion of photovoltaic);[26] revenues are invested for local development. Management bodies of protected areas benefit from a 1% levy on pre-tax proceeds from sales of hydroelectric power from plants located in Natura 2000 areas.

4.5 Impacts on air emissions

The *energy production sector is a major source of air emissions* (Table 2.1). The dominance of lignite for electricity generation largely explains the high intensities of SO_2 and CO_2. The average efficiency of lignite-fired power plants is very low; high sulphur oil was used at several units until mid-2007, when Greece banned the use of oil with sulphur content higher than 1%.[27] Still in 2004, four PPC plants were among the five largest PM emitters in the EU and the Megalopolis plant was the second largest emitter of SO_x (EC, 2007b).[28] PPC contributes to the monitoring of ambient air quality,[29] and is undergoing an investment programme, including the installation and upgrading of flue gas desulphurisation equipments and electrostatic precipitators, and the implementation of environmental management systems at all plants.[30] Together with the use of low sulphur oil, the measures taken by PPC are expected to lead to a substantial decrease in national SO_2 emissions in the near future. Nonetheless, between 2000 and 2006 emissions of SO_2, NO_x and PM from power plants grew by 5.5%, 20% and 14%, respectively. In the same period, CO_2 emissions from energy production were stabilised. More significant increases occurred in emissions of PM (38%), CO_2 (33%), and SO_2 (30%) for households and services, as a consequence of growing energy consumption, suggesting that support to the penetration of natural gas should be coupled with demand-side measures.

5. Air Management and Transport Policy

5.1 Framework

Transport planning in Greece is closely linked to strategic planning in the framework of EU structural and cohesion funds; objectives are not set out in formal transport policy documents. The central *objectives of the Greek transport policy* are in line with EU priorities:

– completing the national transport system, focussing on Trans-European corridors, to secure accessibility throughout the country and to make Greece a major transport node for Eastern Mediterranean;

– promoting combined transport (road, sea and rail), including the operation of commercial freight centres, and the modal shift from road to rail in both urban and intercity contexts;
– restructuring the system for design and monitoring of transport services, including alignment with EU practice and legislation;
– reducing the environmental impacts of land and sea transport and protecting areas of great environmental importance.

The Ministry of Transport and Communications (YME), YPEHODE and the Ministry of Mercantile Marine, Aegean and Island Policy share *responsibilities over the transport sector*, with sometimes overlapping and coordination problems, leading to difficulties in policy implementation. Deficiencies in project preparation and lengthy expropriation procedures (including judicial litigations) have often led to delays in implementing transport projects (ECORYS, 2006).

5.2 Infrastructure development

During the review period, *Greece extended and upgraded its road and railway infrastructures*, and developed transport systems in urban areas, particularly in Attica (Box 2.4), also in connection with the 2004 Athens Olympic Games.[31] The extension and upgrading of road infrastructure has helped reduce road accidents and fatalities, and is also supporting Greece's increasing economic role in south-east Europe. The introduction of high quality rail intercity services has reduced travel time, making railways more attractive for passengers. Nonetheless, motorway and railway densities are lower than European averages. The efficiency and the rate of utilisation of rail infrastructure remain low, and the network allows only low speed travel. Greece has an impressive infrastructure for maritime transport, with 138 major ports; however, these infrastructures are not always adequate, especially to face summer peaks, and further efficiency gains might be reached (ECORYS, 2006). The development of connections between the networks of railways, roads and seaports remains a priority. Because of its peripheral geographic location in Europe and its remaining infrastructure gap, Greece has the highest total transport cost in Europe, about 20% above that of the more centrally located countries (Golub and Tomasik, 2008).[32]

Concerning *EU funds*, EUR 8.3 billion (excluding national matching funds) were allocated to transport priorities in Greece through the 3rd Community Support Framework 2000-06. Two major EU funded Operational Programmes (OP) concerned the transport sector in 2000-06: the OP "Road axes, ports and urban development", managed by YPEHODE, and the OP "Railways, airports and public transport", managed by YME. About EUR 6 billion are devoted to transport

Box 2.4 **Urban transport and traffic management in the Athens Metropolitan Area**

The Urban Transport Organization of Athens (OASA) was established in 1993 under the control of the Ministry of Transport and Communication. OASA is the *integrated public transportation* authority in Athens Metropolitan Area and Attica, and has responsibilities of planning, organisation, coordination, control and provision of public transport. The service is provided by different operators for each transport mode. OASA operates in the framework of the new Athens Transportation Map launched in 2004, with the overarching goal of developing an integrated network of public transport in Attica and reducing the use of private vehicles. In 2008 OASA conducted a series of analyses to prepare the Attica Transport Development Master Plan. Transport operators are subsidised by the central government, and the recovery of operational costs through fares is less than 50% (OASA, 2007).

Remarkable progress has been made in extending the public transport network throughout the Athens Metropolitan Area. The *metro system* was significantly extended on the occasion of the 2004 Olympic Games, adding two lines and upgrading the pre-existing one. It is now one of the most advanced in the world. A new *suburban rail line* (stretching from Piraeus to Athens International Airport) has allowed to dramatically reduce travel time. A *tram* service connecting the city centre with the southern suburbs entered into operation in 2004. Some stations allow passenger interchange between metro, tram and bus. The *bus fleet* was increased and renewed, and now includes mini-buses for the city centre (providing greater frequency and flexibility) and over 400 compressed natural gas (CNG) vehicles; a CNG filling station was installed. Athens has the largest fleet of CNG buses in Europe. The bus network includes more than 300 lines covering the city and the suburbs; the network of bus-lanes has been steadily expanding, contributing to reduce travel time. Nonetheless, average travel speed remains relatively low (ECORYS, 2006). To improve the service, bus lanes are constantly monitored through traffic cameras and by the Road Traffic Police. A new information technology system was put in place to control traffic conditions and to provide information to passengers at some 150 smart stops. Regular inspections are carried out to prevent fare evasion.

Major road arteries of Athens were improved, and a computerised system for the control of the traffic lights was set up. Since mid-1980s, an alternating traffic system has restricted the *use of passenger cars* in central Athens,* and access to the city centre by diesel private cars has been forbidden. Park-and-ride facilities have been made available and more are planned in the future (*e.g.* in the areas of Karaiskaki Stadium, Olympic Stadium, suburban railways station of Tavros).

The "Unification of Archaeological Sites" project expanded the *major pedestrian zone in the heart of Athens*. This pedestrian zone is one of the largest in European cities, including archaeological sites, green areas, commercial and residential districts. Increasing attention is being given to the extension of green areas within Attica. Land freed by the move of the Airport from Central Athens to the east is being devoted for a large part to a green area.

Box 2.4 **Urban transport and traffic management in the Athens Metropolitan Area** *(cont.)*

These measures contributed to improve traffic conditions and, in combination with the development of the integrated public transport system, to stimulate demand for public transport. Since the new metro lines started operation, there has been a steady increase in public transport use (+17% between 2000 and 2006) and a redistribution of passenger from buses to rail-track transport (Table 2.5). The positive effects on ambient air quality are visible, although limit values continue to be frequently exceeded (Table 2.3). Many Athenians believe that the development of public transport has represented a major improvement in their *quality of life*; the vast majority is satisfied with the urban transport service and consider it affordable (Eurostat, 2007).

* During peak traffic periods, cars with odd-numbered plates may be used only on odd days and cars with even-numbered plates only on even days.

Table 2.5 **Urban public transport use in Athens Metropolitan Area,** 2000-06

	Number of passengers (million)							Change (%)	Share (%)
	2000	2001	2002	2003	2004	2005	2006	2006/2000	2006
Bus	391.6	384.6	369.9	379.3	369.6	362.3	356.9	*–8.9*	*47.0*
Electric trolley-bus	73.3	83.6	80.2	81.1	80.2	78.4	81.0	*10.5*	*10.7*
Metro line 1	113.8	109.9	108.7	104.7	113.3	116.8	124.7	*9.6*	*16.4*
Metro lines 2 and 3	70.2	119.1	132.4	149.5	164.0	166.8	178.8	*154.8*	*23.6*
Tram	0.0	0.0	0.0	0.0	3.3	12.9	14.5	*341.2*[a]	*1.9*
Suburban railways	0.0	0.0	0.0	0.0	0.6	2.9	2.7	*356.9*[a]	*0.4*
Total	649.0	697.1	691.3	714.5	731.0	740.1	758.6	*16.9*	*100.0*

a) 2006/04.
Source: OASA (2005); OASA (2007).

investments in the 2007-13 period; 70% will go to the road network, mainly through the OP "Improvement of accessibility". It will be important to establish plans for future investment once EU funds are reduced.

5.3 Traffic and modal split

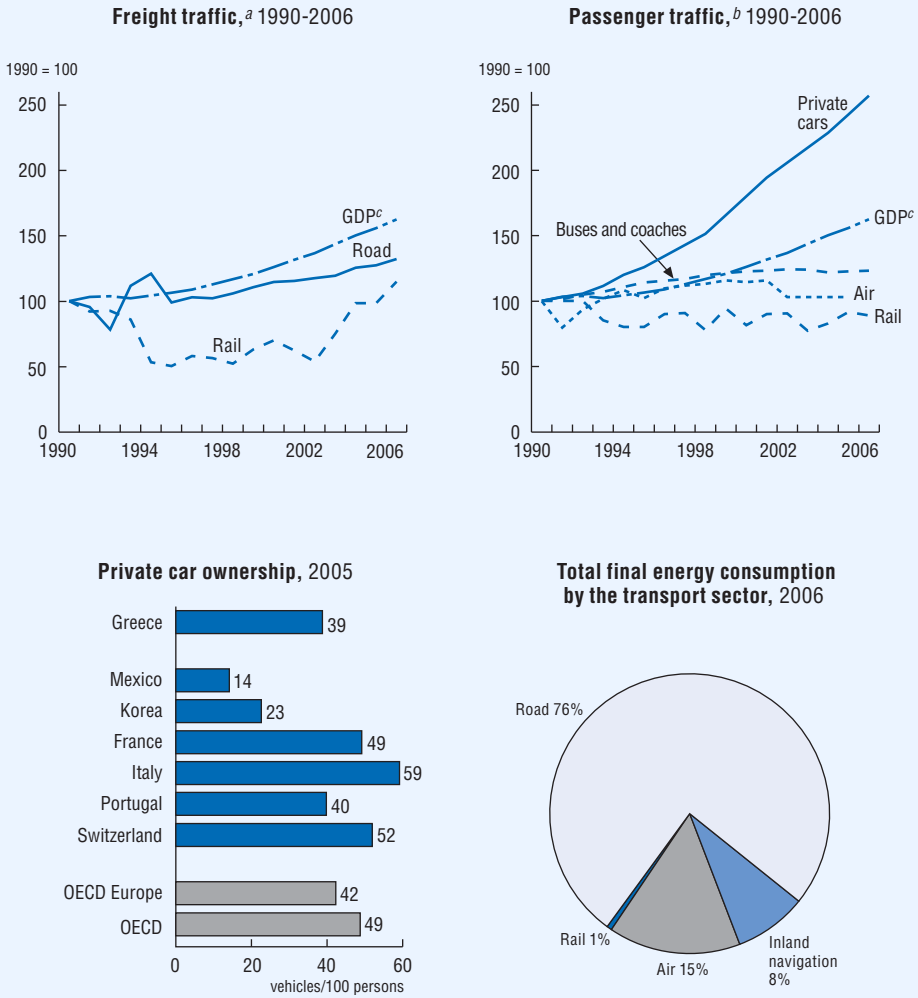
Both *passenger and freight transport volumes* increased during the review period. As for passenger transport, travels by private cars (in passenger-kilometre) steadily increased (Figure 2.4). Road transport accounts for 97% of land passenger travels, but buses have lost part of their market share in favour of cars, whose share is now 78%. Railway share in the modal split is much below European average. Being an islands and peninsular country, sea shipping plays an important role for both passenger and freight. About 40 million tonnes of goods transit in Greek seaports every year, and two ports (Paloukia Salaminas-Perama and Piraeus) are among the top five European ports for passenger transport (Chapter 8). Transport by pipeline has grown four-fold since 2002, in connection with the operation of new oil and gas pipelines and the increasing demand for natural gas. Since 2002 rail freight transport (in tonne-kilometre) has increased at a much higher rate than Greek GDP (Figure 2.4). Nevertheless, rail role in freight transport remains negligible.

Urban public transport has been massively enhanced in Athens and more broadly Attica, which represents about half of Greece's GDP and one third of national population (Box 2.4). However, it needs to be further enhanced elsewhere in Greece. The relatively low level of service, with long travel time and lack of reliable time schedules, discourages city-dwellers from using public transport (ECORYS, 2006). The construction of a metro network in Thessaloniki started in 2006. The construction of tramways is under consideration in several major Greek cities (*e.g.* Ioannina, Volos and Patra).

5.4 Vehicles and fuels

The number of passenger cars has dramatically increased (+42% between 2000 and 2006), reaching 407 *passenger cars* per 1 000 inhabitants, slightly below OECD-Europe average (431) (Figure 2.4). Similarly, since 2000 the motorbike and heavy good vehicle fleets have grown by 54% and 15%, respectively. The renewal of the car fleet continued during the review period, leading to higher fuel efficiency and lower emissions: more than 60% of cars are less than 10 years old, over three-quarters are equipped with catalytic converters, and half meet Euro 2 and Euro 3 performance standards (YPEHODE, 2008).

Figure 2.4 **Transport sector**



a) Index of relative change since 1990 based on values expressed in tonne-kilometres.
b) Index of relative change since 1990 based on values expressed in passenger-kilometres.
c) GDP at 2000 prices and purchasing power parities.
Source: OECD, Environment Directorate; OECD-IEA (2008), *Energy Balances of OECD Countries*.

The *technical inspection scheme for vehicles* was strengthened in 2001, with the introduction of private technical inspection centres, and the upgrade of equipments at one fifth of public centres. Since 1994, an annually renewed exhaust gas control card is required for all vehicles; since 2000, the authorised maintenance shops have been supplemented to cover the entire Greek territory. Non compliance with exhaust gas emission limits lead to a fine; fine revenues feed the YPEHODE Green Fund for environmental investments (YPEHODE, 2006a). Stricter age limits for taxi vehicles and financial incentives for their replacement were introduced in 2003, and have contributed to a fast renewal of the taxi fleet: 45% of taxi circulating in Athens are 5 years old or younger (YPEHODE, 2006b). A similar scheme was introduced for motorcycles and moped in 2006.

Sulphur content in *automotive fuels* was gradually reduced pursuant to EU directives, and in 2005 it reached 50 ppm in unleaded gasoline. Sulphur content is envisaged to be further reduced to 10 ppm starting in 2009. Benzene content was reduced from 4% to 1% in 2000. Leaded gasoline was phased-out in 2002, but unleaded gasoline with anti-valve wear additives (lead replacement gasoline) is still sold. Greece is in the initial stage of introducing biofuels in the local fuel market (Box 2.2).

5.5 Transport prices and taxes

Whilst pre-tax transport *fuel prices* are higher than in many other countries, after-tax prices are among the lowest in OECD. However, road fuel prices at purchasing power parities are just below the OECD-Europe average. The share of taxes in total price has steadily decreased, and represents the lowest rate in OECD Europe (Figure 5.4). A share of fuel tax revenues is earmarked to the YPEHODE Green Fund to support air pollution control measures. Between 2005 and 2007, biofuels were exempted from excise duties to promote their wider use, on the basis of a quota system. In 2007, 114 million litres of biofuels were entitled to the tax relief.

An annual *road tax* is applied to passenger cars, motorcycles and heavy good vehicles depending on engine capacity, but not on fuel efficiency; a one-time fee is paid on registration of the car according to cylinder capacity and the anti-pollutant technology of the vehicle. Electric and hybrid vehicles are exempted from both the registration and the road tax (Table 5.9). The entire motorway network has long been a toll system (since 1970s), with usage fees based on distance travelled and vehicle type. However, toll levels are not commonly adjusted to inflation rates.

5.6 Impacts on air emissions

The transport sector continues to be a major source of air emissions (Table 2.6), as improvements in vehicle and fuel quality have been outweighed by increasing transport volume. Whilst the share of transport in TFC remained broadly constant at 37% between 2000 and 2006, energy consumption from transport increased by 17%. Accordingly, CO_2 emissions rose by 22%, mostly due to emission growth by road transport and navigation. Road and air account for 76% and 15% of energy use by the transport sector, respectively (Figure 2.4). Road transport is the major source of all emissions, with the exception of SO_x, which are mostly due to navigation. Owing to the renewal of the road vehicle fleet, between 2000 and 2006 CO and VOC emissions fell by over 30%, and NO_x and particulate matter decreased by 5% and 12% respectively. SO_x emissions increased (+28%) as a result of maritime transport, indicating the need of measures for improving vessel performance and shipping fuel quality.

Table 2.6 **Air emissions from transport,** 2000-06

		SO_x		NO_x		NMVOC		CO		PM_{10}		CO_2	
		1000 t	(%)	1 000 t	(%)	1 000 t	(%)	1 000 t	(%)	1 000 t	(%)	10^6 t	(%)
Road	2000	5.1	*21.4*	122.7	*77.9*	182.7	*99.2*	904.9	*99.2*	7.0	*48.7*	16.0	*84.1*
	2006	0.7	*2.3*	103.1	*68.9*	124.2	*98.1*	608.1	*98.6*	5.9	*46.1*	19.8	*84.9*
Change (%)			*–86.0*		*–16.0*		*–32.0*		*–32.8*	. .			*23.7*
Railways	2000	0.8	*3.3*	1.6	*1.0*	0.2	*0.1*	0.4	*0.0*	. .	. .	0.13	*0.7*
	2006	0.8	*2.7*	1.6	*1.1*	0.2	*0.2*	0.4	*0.1*	. .	. .	0.13	*0.6*
Change (%)			*2.5*		*2.3*		*2.2*		*2.8*		. .		*0.2*
Navigation	2000	17.6	*73.4*	28.4	*18.1*	1.2	*0.6*	3.7	*0.4*	. .	. .	1.5	*8.3*
	2006	28.7	*93.8*	40.9	*27.3*	1.7	*1.4*	5.3	*0.9*	. .	. .	2.3	*9.8*
Change (%)			*63.3*		*43.7*		*43.7*		*43.7*		. .		*44.4*
Aviation	2000	0.4	*1.8*	4.7	*3.0*	0.2	*0.1*	3.2	*0.4*	. .	. .	1.3	*7.0*
	2006	0.3	*1.1*	4.0	*2.7*	0.5	*0.4*	2.7	*0.4*	. .	. .	1.1	*4.8*
Change (%)			*–20.2*		*–16.0*		*163.9*		*–15.5*	. .	. .		*–16.5*
Total transport	2000	23.9	*100.0*	157.5	*100.0*	184.3	*100.0*	912.2	*100.0*	14.4[a]	*100.0*	19.0	*100.0*
	2006	30.6	*100.0*	149.5	*100.0*	126.6	*100.0*	616.6	*100.0*	12.7[a]	*100.0*	23.3	*100.0*
Change (%)			*27.8*		*–5.1*		*–31.3*		*–32.4*		*–11.7*		*22.4*
Share[b] (%)	2000		*4.8*		*51.9*		*52.0*		*70.9*		*19.1*		*18.4*
	2006		*5.7*		*47.4*		*43.4*		*65.0*		*15.1*		*21.3*

a) Total mobile sources.
b) Transport in total emissions.
Source: Inventory submission to the UNFCCC, September 2008; EMEP expert estimates.

Notes

1. Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (Gothenburg, 1999), Protocol on Heavy Metals (Aarhus 1998) and Protocol on Persistent Organic Pollutants (Aarhus, 1998).
2. The base year for emissions of carbon dioxide, methane and nitrous oxide is 1990; the base year for total emissions of F-gases (hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride) is 1995.
3. European Commission, "20 20 by 2020 – Europe's climate change opportunity", Brussels, 2008; European Commission, "Proposal for a Decision of the European Parliament and of the Council on the effort of member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020", Brussels, 23 January 2008 [COM(2008) 17]. The European Commission's proposal was followed by a legislative resolution of the European Parliament in December 2008.
4. Households generate 80% of emissions from non-industrial combustion, and their emissions have increased by 20%; emissions from the commercial and institutional sectors have a minor role, but have more than doubled since 2000.
5. The base year level of total Greece's emissions of GHGs (as determined by the review of the Greek initial report under Article 7 of the Kyoto Protocol and related decisions of the Conference of the Parties) is 106.99 million tonnes CO_2 equivalent.
6. Emissions are measured according to the International Toxic Equivalents (I-TEQ) scheme. A toxic equivalency value is calculated by evaluating the relative toxicity of the individual dioxin and furan compared to the most toxic one. I-TEQ values can then be summed up.
7. In 2005 and 2006, annual average deposition fluxes of lead were between 1.5 and 2 kg/km^2/year, and that of mercury were between 25 and 28 g/km^2/year (EMEP, 2007 and 2008).
8. This indicator measures the population weighted annual mean concentration of PM_{10}. The comparison with the EU average is indicative, because of differences among monitoring networks in countries.
9. In 2007, 17 measurement points collected PM data, and at 13 stations the 24-hour limit was exceeded more than 35 days.
10. This indicator measures the population weighted yearly sum of maximum daily 8-hour mean ozone concentrations above the threshold of 70 µg/m^3. The comparison with other EU countries is indicative, because of differences among national monitoring networks.
11. The long term objective for the protection of human health was exceeded at 17, 13, 15 and 18 ozone assessment stations in 2004, 2005, 2006 and 2007, respectively.
12. The limit value for benzene is to be attained by 2010.
13. Air Quality Framework Directive 1996/62/EC and daughter directives: Directive 1999/30/EC for threshold values for sulphur and nitrogen oxides, particulates and lead; Directive 2000/69/EC for limit values for benzene and carbon monoxide; Directive 2002/3/EC on ozone pollution; Directive 2004/107/EC for arsenic, cadmium, mercury, nickel and polyaromatic hydrocarbons.

14. In 2008 Greece adopted the National Programme for the reduction of emissions required by the EU National Emission Ceilings Directive.
15. The Greek network has a territorial coverage of 2.6 monitoring points per 10 000 km^2, compared to an average of 12 stations/10 000 km^2 in OECD-Europe; in terms of population covered, there are 3 stations per million inhabitants, compared to the OECD-Europe average of over 11 stations/million inhabitants.
16. In 2004 Greece submitted to the European Commission the National Emission Reduction Plan, required by the EU Large Combustion Plant Directive 2001/80/EC for existing installations. The Plan was revised in 2008.
17. The 2020 EU targets are: 20% reduction in EU wide energy consumption; 10% share of renewable fuels and biofuels in each member State's automotive fuel consumption; 20% contribution of renewables to EU final energy consumption (to be shared among member States).
18. In August 2007, the first part of the report was presented, illustrating current trends and long-term scenario. In May 2008, the second part of the report was presented to the Cabinet, illustrating policy measures to achieve strategic energy targets. The document is still provisional.
19. The legislative framework for liberalisation of electricity and gas markets was completed in 2005. Nonetheless, incumbents (the majority state-owned Public Power Corporation and Public Gas Corporation) maintain a central position in energy markets. Similarly, the low degree of independence of the energy regulator and the network operators represents barriers to effective competiveness and transparency of energy markets (IEA, 2006).
20. It estimated that the use of air-conditioning in office buildings leads to an average annual energy consumption increase of 40 to 50 kWh/m^2 (Balaras, 2006).
21. Diesel oil is an important heating fuel in the parts of Greece that are not connected to the natural gas grid, including several islands. In 2006, natural gas accounted for about 7% of consumption from households and services, compared to less than 1% in 2000.
22. According to a survey conducted on nine EU countries and based on 2001 data, Greek office buildings are the most energy intensive, with about 360 kWh/m^2 (including electricity and heat) compared to an average of 210 kWh/m^2 (the other surveyed countries are: Austria, Denmark, France, Germany, Portugal, Slovakia, Sweden, UK). Space and water heating accounts for about 70% of energy consumption in non-residential buildings in Greece, the highest share in the country sample (Balaras, 2006).
23. The business plan 2009-14 of the Public Power Corporation (PPC) foresees the construction of nearly 3 900 MW of new highly efficient thermal power plants (burning lignite, coal and gas) and of 640 MW of large hydroelectric plants, to compensate for the closedown of old oil-fired and lignite-fired plants (2 400 MW). Power units for a total capacity of 990 MW will enter into operation in the non-interconnected islands. As for renewables, the PPC is undergoing investment in 950 MW of wind, solar, small hydro and geothermal units, aiming at a 20% RES market share. The interconnection of the Cyclades to the mainland is also envisaged.
24. As of 2007, the feed-in tariff varies from EUR 75.82/MWh for combined heat and power (CHP) and all renewable sources excluding solar, to EUR 452.82/MWh for small photovoltaic units located in areas connected to the grid. The tariff is increased to EUR 87.42 and EUR 502.82/MWh, respectively, for plants located in non-interconnected islands. A special tariff of EUR 92.82/MWh is provided for off-shore wind farms. The tariffs are updated yearly.
25. Households continue to benefit from the reduced tax for home heating oil during the winter season; the tax difference is reimbursed from the State to the filling stations, after fiscal control on oil sale and purchase data.

26. This levy represents a way of overcoming local opposition to localisation of RES plants.
27. Thereby implementing the limit that had been in force in the European Union since 2003 (Directive 1999/32/EC).
28. The National Emission Reduction Plan (prepared pursuant to EU Large Combustion Plant Directive 2001/80/EC) requires that two units at the Megalopolis plant reduce their operating time between 2008 and 2010. The closedown of two lignite-fired units by 2011 is also foreseen.
29. The PPC monitoring system includes 53 measuring points located in the neighbourhood of power plants. Collected data are automatically transmitted to prefectures and local authorities, and an annual report is submitted to YPEHODE. Heavy metal deposition (chrome, nickel, copper and manganese) from lignite-fired power plants is systematically being monitored.
30. *E.g.* the installation and upgrading of electrostatic precipitators at four lignite-fired units of the Agios Dimitrios power plant, and the retrofitting of two units of the Megalopolis plant with flue gas desulphurisation equipments.
31. Major developments on the highway network are undergoing or are planned throughout the country (*e.g.* the Ionian Highway and the E65 Central Greece Motorway), in accordance with the General Framework Plan (Chapter 7).
32. The estimates of country-specific international transport costs are based on direct measures of air, maritime, and road transport costs per kilogram shipped (Golub and Tomasik, 2008).

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3 WATER*

Features

- Water use in agriculture
- Coastal bathing waters
- Progress in sewage treatment
- Unauthorised abstractions and discharges
- Water allocation

* This chapter reviews progress in the last ten years, and particularly since the 2000 OECD Environmental Performance Review. It also reviews progress with respect to the objectives of the 2001 OECD Environmental Strategy.

Recommendations

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Greece:

- continue efforts to fully comply with the *EU Water Framework Directive*;
- formulate and implement a *national irrigation policy*, integrating agronomic, water and environmental policy objectives, which promotes the rational use of water, aims to reduce groundwater abstractions and to improve irrigation efficiency and practices in both communal and private irrigation networks, and ensures that all water abstractions are properly licensed;
- further *improve wastewater management*, in compliance with the EU Urban Waste Water Directive, and consider the wastewater treatment needs of smaller settlements; encourage utilities to improve water quality assurance (*e.g.* through participation in international benchmarking);
- intensify efforts to *reduce water pollution* by dangerous substances, to prevent illegal discharges of wastewater, and clean up pollution hot spots;
- introduce new measures to improve the *allocation of water* to ensure water flows to the highest-value uses;
- raise greater *public awareness and understanding*, particularly among farmers, of the economic, social and environmental aspects of water management.

Conclusions

The state of Greece's *freshwater bodies* is generally good. Water quality is commonly fit for various uses (irrigation, industry, production of drinking water). Greece has an especially good record in terms of water quality at the more than 2 000 *coastal sites* designated under the EU Bathing Water Directive: virtually all sites comply with mandatory values and 96-98% also comply with the more stringent guide values. Price structure for *urban water services* encourages the prudent use of water, and price levels increased to allow a greater degree of cost recovery. Good progress was made during the review period with the construction of *urban wastewater treatment* stations: about 65% of the total population is connected to public wastewater treatment plants, up from the 45% in the late 1990s. The Athens Metropolitan Area is now equipped with a state-of-the-art sludge drying facility. After growing significantly during the 1990s, the rate of water abstraction was stabilised in the review period. Action plans were put in place in all areas vulnerable to *nitrate pollution* from agriculture and the use of agricultural inputs of nitrogenous fertilisers and pesticides has been reduced since the end of the last decade. Greece

transposed the *EU Water Framework Directive* (WFD) into domestic law in 2003; to implement the directive, it created 13 Regional Water Directorates and a specialised Central Water Agency, a governmental authority under the aegis of YPEHODE, in charge of definition and oversight of national water policy.

However, Greece still faces serious water challenges, in particular in terms of its *agricultural water use*, which represents about 85% of overall abstraction. Excessive pumping of *groundwater* has caused water levels to fall dramatically in some rural areas, as well as salt water intrusion in some coastal aquifers. *Illegal abstractions and discharges* pose a hurdle to improving water management. Enforcement of regulations and water permit conditions has not sufficiently improved. *Water losses* in urban and, in particular, irrigation water conveyance systems are too high. *Agricultural water prices* neither cover the cost of supply nor provide sufficient conservation incentives. Little attention has been paid so far to *ecological aspects of water quality*. Efforts to clean up longstanding pollution hot spots should be reinforced as a matter of priority. Implementation of a plan to control discharges of *dangerous substances*, first drawn up early in the review period, has only recently begun. None of the deadlines of the *EU Urban Waste Water Directive* were met and it will take until 2013 to fully meet the directive's targets, notably for smaller agglomerations. While there are on-going efforts to improve the monitoring systems, it is still proving difficult to produce national statistics useful for water management.

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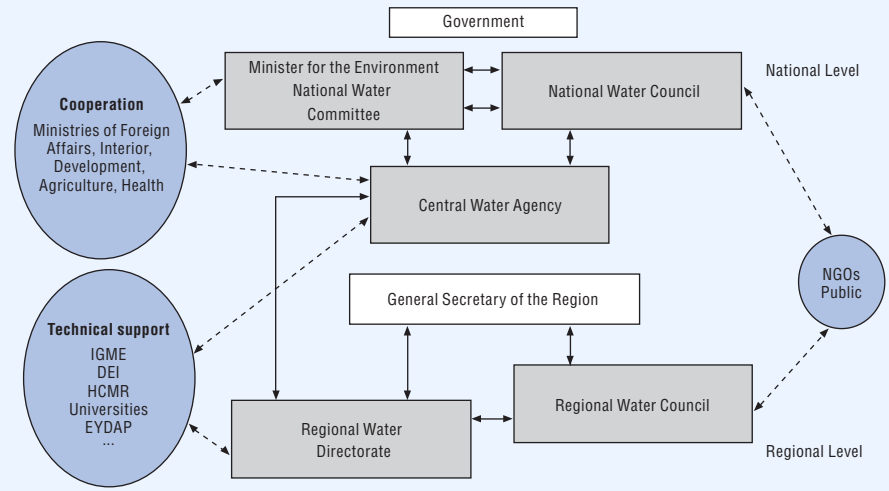
1. Modernising the Water Management Framework

1.1 Legislative and institutional reforms

Greece updated its water management framework during the review period by adopting a *new water law* (Law 3199/2003) in December 2003, as well as the measures and procedures for integrated water resource management in 2007 (Presidential Decree 51/2007). The new legislation is based on the EU Water Framework Directive 2000/60/EC (WFD), with its emphasis on ecological functions of water, river basin management approach, economic evaluation and full-cost pricing of water services, and can be expected to supplant the supply management paradigm that has long prevailed.

The Ministry for the Environment, Physical Planning and Public Works (YPEHODE) has overall policy, regulatory, monitoring and control responsibilities of water utilities. At the *national level*, Law 3199 created or renewed a number of

Figure 3.1 **Institutional structure for water management**



Source: Ministry of the Environment, Physical Planning and Public Works.

institutions. A new Central Water Agency (CWA) was established within YPEHODE in 2006, with responsibilities of definition and oversight of the national water policy; the CWA reports directly to the environment minister (instead of the director-general of the ministry, as was the case previously). The National Water Committee is a political body consisting of six ministers and responsible for setting water policy and overseeing implementation; the Committee meets once a year. The National Water Council assists the Committee; it consists of 24 members, including representatives from political parties and Municipal Water Supply and Sewerage corporations[1] (Figure 3.1).

At the *regional level*, Regional Water Directorates (RWD) in each of Greece's 13 regions are responsible for the formulation and implementation of the basin plans. A Regional Water Council, consisting of about 30 members (stakeholders, NGOs), provides a consultative function in each region.

Municipalities, either directly (mainly in small towns) or through municipal water and wastewater enterprises, in towns with more than 10 000 inhabitants (DEYA),[2] are responsible for water supply, sewerage and wastewater treatment. In Athens-Piraeus and Thessaloniki, two large companies deliver these services: EYDAP in Athens, which is a private company listed on the stock exchange (but

supervised by YPEHODE), and EYATH in Thessaloniki, which is a public sector company. With the exception of EYDAP, there is no private sector involvement in water supply and wastewater treatment, but the 2005 legislation on Public Private Partnerships opens the way for such cooperation in the water sector.

Greece has worked on improving the provision of *national water information* since 1995 and has established various national databases, monitoring networks, and national and municipal laboratories. It is currently adapting its monitoring systems to the requirements of the WFD. The number of monitoring stations and parameters measured seems appropriate for the requirements. Nonetheless, still in early 2008, very few monitoring results had found their way into published reports[3] or had been transmitted to international databases (*e.g.* OECD and Eurostat databases).

1.2 Water management objectives

Greece's water-related objectives are laid down in different policy documents. Greece has not formulated separate national water goals, so that *objectives are exclusively focussed on the implementation of the various EU water-related directives*.

The *National Strategy for the Management of Water Resources* (NSWR) is the implementation mechanism of the water law and the WFD. It aims to achieve: *i)* the sustainable use of existing water reserves; *ii)* an efficient protection of water ecosystems; and *iii)* high quality standards for all surface and ground water bodies by the year 2015. *Regional objectives* will be set out in the 14 river basin management plans, to be finalised by the end of 2009 (as required by the WFD).[4]

The *2002 National Strategy for Sustainable Development* contains water-related objectives: *i)* integrated approach to water management; *ii)* decentralisation of water management authorities; *iii)* upgrading and expansion of infrastructure; *iv)* socio-economical consideration of water resources management; and *v)* protection from hazardous substances.

The country's strategic water-related objectives during the review period have been integrated into the *Environment Operational Programme 2000-06* and the *Operational Programme for Environment and Sustainable Development 2007-13*, which specify the use of EU funds and Greek matching funds.[5] Both programmes contain broad goals on the implementation of EU directives, concerning drinking water, wastewater treatment, nitrates, bathing water, and river basin management. They allocated to water management about EUR 207 million in 2000-06 (including prevention of natural risks) and EUR 1 010 million in 2007-13 (including national co-financing in the range of 20-25%), corresponding to 40% and 45% of overall programme public funds, respectively.

Table 3.1 **Performance against the recommendations of the 2000 OECD Environmental Performance Review**

Recommendations	Performance
Develop an overall water resource management strategy by water basin, addressing both quantity and quality issues; establish basin councils to reinforce co-operation and partnership among all relevant authorities and water users.	A water resource management plan was developed for Crete in 2002. Draft basin plans for all of Greece's 14 basins are set to be completed in the course of 2009. The WFD deadline for this phase is December 2009.
Improve enforcement of water legislation through strengthened field inspectorates.	The Hellenic Environmental Inspectorate has been operational since December 2003, but it is expected to be fully staffed only in early 2009. Unauthorised water abstractions and wastewater discharges remain a serious problem.
Raise tariffs for water services to better cover their costs, with appropriate attention given to income disparities.	Urban water tariffs increased significantly during the review period and are structured to encourage water conservation. No such progress has been made in terms of agricultural water pricing. Efforts are needed to ensure cost recovery by 2010, as required by the WFD, particularly for irrigation water.
Continue to develop sewerage networks, wastewater treatment capacity and connection of the population to these services; train skilled personnel to operate municipal and industrial wastewater treatment plants.	Good progress was made in the construction of sewerage networks and treatment stations, but none of the deadlines of the Urban Waste Water Directive was met. A proportion of completed municipal facilities are not fully operative, mainly because of incomplete sewerage networks or quality assurance problems. Also some industrial factories do not use their wastewater facilities to save on operating cost.
Continue the transfer to users of irrigation facilities, and establish mechanisms to strengthen cost recovery.	Limited progress has been reported pending the completion of the economic studies required under the WFD.
Pursue efforts aimed at protecting zones around vulnerable aquifers.	A first register of protected areas, including vulnerable aquifers, is available. All necessary Programmes of Measures for the protection of these areas will be determined in accordance with the WFD requirements, in the framework of the development of River Basin Management Plans, by the end of 2009.
Pursue efforts to monitor surface water quality and strengthen and extend monitoring of groundwater quality.	Greece is currently adapting the monitoring networks to the WFD requirements.
Make full use of EIA procedures and cost-benefit analysis before major new water projects are undertaken.	Greece has transposed all relevant EU legislation concerning Environmental Impact Assessment and Strategic Environmental Assessment. The WFD also requires economic analysis of all programmes of measures.

Source: OECD, Environment Directorate.

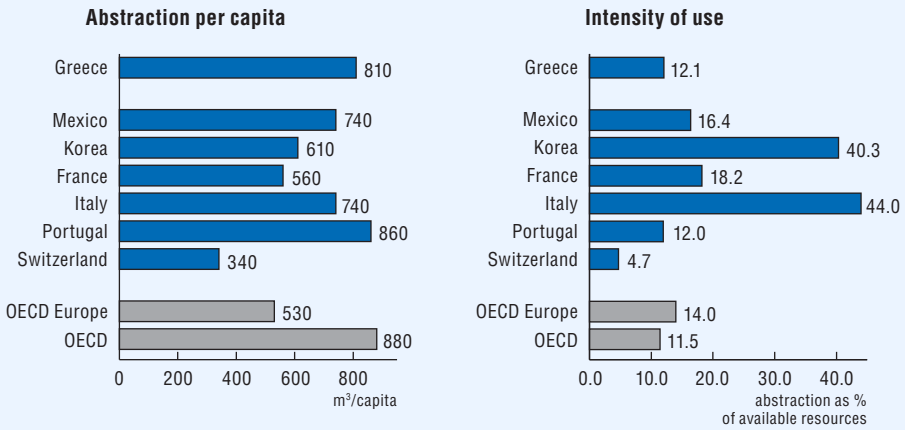
Despite the attention given to EU water-related directives, *Greece has lagged behind schedule in their implementation*. Concerns have also been expressed about the incomplete manner in which these directives have been transposed into Greek law (Alexopoulou *et al.*, 2005). Both issues have led to warnings by the European Commission, as well as referrals to, and decisions by, the European Court of Justice. Since its establishment, the Central Water Agency has helped to improve the pace and the degree of implementation of the water legislation.

Performance can also be assessed against the *recommendations of the 2000 OECD Environmental Performance Review* of Greece, some of which anticipated the requirements of the EU Water Framework Directive. Progress has been good with respect to some recommendations, but has been uneven on others (Table 3.1).

2. Making Better Use of Water Resources

Water stress in Greece is relatively low for a Mediterranean country[6] (Figure 3.2), but this average national figure veils seasonal and geographical differences that cause acute water scarcity problems in many areas. Most of Greece is either semi-arid or sub-humid on UNESCO's dryness scale, with only the regions

Figure 3.2 **Freshwater use,** 2006[a]



a) Or latest available year.
Source: OECD, Environment Directorate.

west of the Pindos mountains being classed as humid.[7] Some 80-85% of total freshwater resources are surface waters.

The overall *water demand* of 7 907 million m^3 per year has remained fairly stable during the review period, after having grown significantly in the 1990s (Table 3.2). However, a marked shift has occurred towards a greater use of groundwater. Agriculture (mainly irrigation) is the dominant user of water, accounting for about 85% of total withdrawals. Domestic drinking water accounts for 11%, industry for 2% and the energy sector for 1%.

Notwithstanding the dearth of water in much of the country, *water losses in supply systems* (especially in small and medium towns) are reported to be a key problem. No systematic studies about water losses are available, but this appears to be so in respect of both drinking water supply (national average of losses is estimated in the range of 30-40% compared to the EU25 average of 18%) and water supply for irrigation (losses reported at an average of 47-50%) (GHK, 2006).

Table 3.2 **Water demand in river basin districts,** mid-2000s

River basin district	Population[a]	Area (km^2)	Domestic demand for water	Demand for irrigation water	Industrial water demand
			(million m^3/year)		
West Peloponnese	331 180	7 301	23.0	201.0	3.0
North Peloponnese	615 288	7 310	36.7	395.3	3.0
East Peloponnese	288 285	8 477	22.1	324.9	0.0
West Sterea Ellada	312 516	10 199	22.4	366.5	0.3
Epirus	464 093	10 026	33.9	127.4	1.0
Attica	3 737 959	3 207	400.0	99.0	1.5
East Sterea Ellada	577 955	12 341	41.6	773.7	12.6
Thessaly	750 445	13 377	69.0	1 550.0	0.1
West Macedonia	596 891	13 440	43.7	609.4	30.0
Central Macedonia	1 362 190	10 389	99.8	527.6	80.0
East Macedonia	412 732	7 280	32.0	627.0	0.3
Thrace	404 182	11 177	27.9	825.2	11.0
Crete	601 131	8 335	42.3	320.0	4.1
Aegean Islands	508 807	9 103	37.2	80.2	1.2
Greece	10 963 654	131 962	931.6	6 827.2	148.2

a) 2001.
Source: YPEHODE – CWA.

2.1 Water use in agriculture

With about 1.4 million hectares, *Greece has the fifth-largest irrigated area in OECD-Europe* (after Turkey, Spain, Italy and France). During the review period, the share of agricultural land served by irrigation systems remained stable at 17%, one of the largest shares in OECD (although as much as one-third of that area is not actually irrigated). Most of Greece's irrigated lands are planted in water-intensive crops that also receive price support under the EU Common Agricultural Policy, *i.e.* cotton (364 000 ha in 2005), maize (247 000 ha) or sugar beet (41 000 ha) (Box 3.1). Around 60% of the total irrigation demand is met by surface water, whereas the rest is met by groundwater. The use of groundwater for irrigation purposes is substantially above recharge rates (OECD, 2008).

Irrigation schemes and methods

Of the total irrigated area, about *one-third are community schemes* run by Local Land Reclamation Boards (TOEV), under the Ministry of Rural Development and Food, and the *two-thirds are private irrigation schemes* (Latinopoulos, 2005). In early 2000s, 19% of the irrigated area was watered by way of surface irrigation, 50.6% by sprinkler and 30.4% by drip irrigation, a clear shift towards more efficient methods over the last decade. The relative shares of these methods are different for the private and collective irrigation networks (Table 3.3). The more efficient systems have increased their share in both collective and private networks, almost totally replacing surface systems in the case of the latter.[8] More than 65% of community schemes were served by piped pressure systems at the beginning of the review period, whereas in the remaining part less efficient gravity channel systems were used; in private schemes, gravity systems have nearly disappeared (Karamanos *et al.*, 2007). There are also examples of wastewater effluent recycling for use on irrigated areas (OECD, 2008). The jurisdiction of local and regional land reclamation boards is limited to collective schemes and there is little oversight over what happens in private irrigation schemes. *Illegal abstractions* from wells for which no abstraction licence has been obtained and *excessive pumping* from authorised wells (beyond quantities permitted in the licence) are widespread, leading to falling lake and groundwater levels, land subsidence and saltwater intrusion in coastal aquifers.

Pricing of irrigation water

In a country where irrigation accounts for 86% of total water use, water prices paid by farmers are a vital element of water management. *No resource price is being applied to irrigation water*; the water provided by the Public Power Corporation's multi-purpose reservoirs is not charged to either community or private irrigation

Box 3.1 **Irrigated agriculture on the Thessaly Plain**

Agriculture lays claim to almost 94% of *Thessaly's water resources*, whereas urban uses account for 5% and the power and industry represent less than one per cent. Agricultural water use patterns produce a seasonal shortfall in water during the irrigation period, which is causing friction between irrigators and Thessaly's two large cities of Larisa (125 000 inhabitants) and Volos (120 000 inhabitants). Although the region is mainly agricultural, industrial activity is economically significant as well. Moreover, regional authorities are promoting tourist development in coastal areas, which will boost demand from that sector (*e.g.* swimming pools, golf courses).

An extensive infrastructure (76 pumping stations, 85 small and large dams, 13 reservoirs, 1 700 public and 31 000 private wells) serves the many *communal and private irrigation systems* of the region. However, most systems were constructed in the 1960s and 70s and their efficiency is much reduced. Significant water losses are recorded in the network of irrigation canals (with a combined length of 4 700 kilometres) and pipes (3 200 kilometres) that transport the water from its sources to the fields (Mahleras *et al.*, 2007). Thessaly farmers do not pay much for their water: *irrigation fees* from surface waters in the Thessaly region range between EUR 8-10 per stremma (1 000 square metres) of agricultural land, which is the equivalent of EUR 0.07 per cubic metre on average. Illegally operating wells are a problem, as they contribute greatly to the excessive pumping that has caused water tables to dramatically fall over the past decades: during the 1970s, 35 m was a typical depth of groundwater table, but depths of up to 350 m are now not uncommon. The irrigated area expanded more than threefold during the last four decades of the 20th century. Roughly half of the Thessaly Plain's cultivated 500 000 ha are irrigated. Surface waters are the source of water for 74 900 ha, whereas 177 600 ha are irrigated by groundwater, which provide 70% of irrigation water.

Cotton is by far the most important crop, accounting for 140 000 ha or 63% of irrigated lands; the remainder is planted in maize, wheat, sugar beet and vegetables. All these crops require large quantities of water to flourish, and the fertilisers and pesticides used to grow them partly end up in the groundwater and are the main factor in the pollution of the *river Pinios*. Greece is Europe's largest cotton producer by far (Spain is the only other producer), but is responsible for just 2% of world production. Nevertheless, the crop is important nationally, representing 9.1% of Greece's overall agricultural output in 2005. Greek cotton farmers have much benefited from EU financial support that at times was up to four times world prices. Farmers get paid for the area of land planted, irrespective of whether the crop is actually harvested. The combination of this policy and weak enforcement creates perverse incentives for farmers to grow more than one crop on the same field or to claim payments for non-existent cotton plantings. The expected decline in EU cotton subsidies will mean that in future cotton will be less dominant on the Thessaly Plain. Nonetheless, water demand might not decrease, since cotton is likely to be replaced by other economically viable but water demanding crops (*e.g.* energy crops). Therefore, improving overall efficiency of water use (including the efficiency of irrigation methods) remains the most viable option to reduce water consumption in the plain.

schemes. The Island of Crete is one of the few examples of pricing of irrigation water according to metered consumption.

In community irrigation schemes operated by the TOEV, farmers pay a small fee per "stremma" (one-tenth of a hectare) of cultivated area towards the cost of administration, operation and maintenance. The capital costs are entirely borne by the state. *Fees are low*, averaging between EUR 150-200 per hectare per year, which is the equivalent of about EUR 0.02-0.08 per cubic metre of water. If a community scheme depends on the use of energy for pumping, special arrangements exist for preferential electricity tariffs (10-15% rebates) or diesel tax refunds. In private networks, the cost of construction and maintenance is wholly borne by the owners, but energy costs for pumping are eligible for the same advantages as community schemes.

Table 3.3 **Irrigation methods,** early 2000s

	Irrigation method (%)			
	Surface	Sprinkler	Drip	Total
Total, *of which*:	19	50.6	30.4	100
collective networks	37	53	10	100
private networks	7	49	44	100

Source: Karamanos *et al.* (2007).

Overall assessment

Despite the shift towards more efficient on-farm irrigation methods, irrigation water application rates per hectare rose over the past decade (from 5.5 megalitres per hectare of irrigated land in early 1990s to 5.9 in early 2000s), indicating a declining trend of irrigation water efficiency (OECD, 2008). Several factors continue to seriously *undermine the efficient use of agricultural water*: *i)* losses in off-farm supply networks still account for almost half the water withdrawn at source; *ii)* illegal abstractions have long been condoned and cause economic and environmental damage; *iii)* low water prices and non-volumetric pricing policies encourage profligate water use; and *iv)* agricultural subsidies distort farmers' choices about what crops to grow.

Water use efficiency in agriculture (in terms of water diverted from the environment that is taken up by crops) is estimated at 60% (Karamanos *et al.*, 2007). Greece has repeatedly expressed its intention to improve the efficiency of irrigation water use (*e.g.* in its 2001 National Plan to Combat Desertification), but there is *little evidence of concerted action* to date.[9] Measures to improve efficiency should not just consider technical issues related to water use efficiency, but also aim to increase the economic productivity of water (*i.e.* getting more value from less water). Additional volumes of water potentially made available by implementing efficiency measures, would come at a lower unit cost than water gained by way of interbasin transfers requiring large new infrastructure (Box 3.2).

The question of the economic productivity of water also raises the issue of *water allocation* (*i.e.* encouraging water to flow to the highest-value uses). This should be of high priority for a country like Greece with its acute water deficits in summer, and is not automatically taken care of by virtue of implementing the WFD. A national

Box 3.2 **The Acheloos water transfer project**

The 220 km long Acheloos river is Greece's largest river (in terms of water volume). It springs from the Pindos Mountains, in the centre of Greece, and flows south-westwards to the Ionian Sea. In ancient times the spirit of the *river Acheloos* was venerated as the river god Achelous. Its catchment area has many *unique natural features*. The river habitat is home to several populations of internationally protected species, including otter (Lutra lutra), trout (Salmo trutta) and dipper (Cinclus cinclus). At the river's downstream end, the Ramsar-listed wetlands of the Messolongi Lagoons Complex are of global ornithological significance. The Acheloos Valley and Delta have also been included in the national Natura 2000 list. The wider catchment includes fragile forest ecosystems housing populations of terrestrial species such as grey wolf (Canis lupus), wildcat (Felis silvestris) and roe deer (Capreolus capreolus).

The original *plan to transfer water from the Acheloos to irrigate the Thessaly plain*, east of the mountains, was proposed in the 1930s in the hope of boosting agricultural production and lifting the rural economy of Greece out of depression. The *Thessaly plain* is the largest plain in Greece; cotton is the dominant crop and one that is also highly water-intensive (Box 3.1). Lack of funding halted the plan's implementation. The first international call for the design and the construction of the Acheloos water transfer infrastructure was held in 1980. More detailed plans were formulated from 1984 onwards. The first economic analysis underlying the scheme was carried out in 1988, and concluded that the scheme's viability was marginal. The project has been repeatedly and substantially modified since then.

Box 3.2 **The Acheloos water transfer project** *(cont.)*

For the past 20 years, the Acheloos water transfer project has sparked long and lively debates, while maintaining support from the Parliament's majority. The *proponents of the scheme*, many of them Thessaly farmers, have pointed to the more secure and regular yearly agricultural yields that would result from the project. They also claim that the project is needed to: *i)* supply water to towns in Thessaly and to mitigate the high water deficit of the plain; *ii)* save the river Pinios, which often dries up during summer; *iii)* halt saline intrusion, and protect and restore groundwater reserves; *iv)* minimize land subsidence due to groundwater depletion; and *v)* change farming practices. According to some studies (*e.g.* the 2006 water management study for the Pinios and the Acheloos river basins; the 2008 water management study for Epirus, Central Greece and Thessaly) the water transfer will not have any serious adverse effect neither on the Acheloos river's ecosystem nor on the ability to meet water demand in the river basin and the Prefectures of Aetolia and Acarnania.

The *opponents of the scheme*, mainly national and international NGOs, have argued that the dams and reduced flows in the Acheloos will change the habitats of several endangered and internationally protected species irreversibly and that others will suffer serious disturbance both during and after the construction work (WWF, 2007). They also fear that the Ramsar site at Messolongi would suffer from a critical reduction in freshwater input, which would fundamentally alter its character. In addition, NGOs claim the scheme will have adverse socio-economic and cultural impacts, including the destruction of important monuments, such as the 11th century monastery of St George of Myrophyllo.

In the course of the years, the highest court in Greece, *the Council of State* (CoS), considered issues involving the project six times, and stalled it in four cases (it can do so only on points of law). In 1994, for instance, the Council issued a restraining order against the project contractors, suspending all construction works until an integrated and scientifically sound Environmental Impact Assessment had been prepared. In 2006, the government declared the project to be in the national interest, and submitted to the Water Management Plan of the Pinios and Acheloos rivers to the Parliament for approval.

In March 2008, the *Greek government* released a national water management programme that renewed its commitment to the Acheloos project. The current plan for the Acheloos diversion project includes the construction of four major dams and reservoirs, a 17.4 km long diversion channel to Thessaly and two tunnels. The system is designed to take 600 million cubic metres of water (instead of 1 100 million cubic metres of the original project) annually from the Acheloos basin to the other side of the Pindos mountains. This volume is close to 11% of the mean annual yield of the Acheloos and enough to irrigate between 240 000 ha and 380 000 ha. On the Thessaly side, the design and construction of extensive infrastructure are required, including on the irrigation network. Works on some infrastructure are in progress, including the Gyrtoni barrage dam and the Smokovo pressure pipe irrigation network. As of end 2008, construction was still underway, as were the efforts to stop it.

policy and instruments enabling the trading of water not needed for healthy aquatic ecosystems would give users an incentive to use water wisely and profit from selling any surplus. The experience of other countries shows this is not easy politically, but it would change current water use patterns often described as irrational.

2.2 Urban water use

Provision of drinking water

An estimated *98% of the population is connected to a metered water supply system* and the current infrastructure meets demand. Nevertheless, as in many countries, much of the old and decaying distribution networks need to be replaced. An additional problem on some of Greece's many islands is that the local water resources cannot meet the demand caused by the influx of tourists during summers, and tankers are used to bring in water from the mainland. Desalinisation units are operating in a number of islands.

The *quality of the raw water used for the preparation of drinking water is generally acceptable*, as for example in Lake Marathona,[10] where raw water meets A1 standards (only requiring rapid filtration and disinfection), the highest category in terms of EU Directive 75/440/EEC. Even so, in several instances drinking water sources have been compromised due to a range of causes, such as salt-water intrusion in coastal aquifers caused by overpumping, or high nitrate concentrations as a result of excessive application of nitrogenous fertilisers. A serious case of contamination with depleted chromium of both surface and groundwater in the Asopos basin required the abandonment of the groundwater source altogether.

Tap water is of generally good quality and complies with potable water standards. Nevertheless, as noted in the 2004 annual report of the Greek Ombudsman, the effectiveness of drinking water quality monitoring is prejudiced by poor quality assurance of monitoring systems, partly because many of the quality testing laboratories of the water utilities are not accredited, as required by legislation. Utilities should also ensure that their public warning procedures are adequate in cases when supply systems break down occasionally.[11]

Pricing of municipal water services

Each municipality determines its own *tariff structure for municipal water services*, but overall variations among operators are small. Tariff structures typically include a progressive volumetric rate for different consumer categories, in addition to a fixed monthly standing charge that depends on the diameter of the pipe connecting the consumer to the network. Households pay a disproportionally high price

compared to commercial users, which after 2010 will be in violation of the WFD. The water bill includes sewerage cost expressed as a standard percentage of the water consumption cost (Table 3.4).

Price levels have steadily risen in real terms during the review period on the basis of a pre-announced 5-year programme. For instance, as of 2008 the average price for domestic consumers in Attica is around EUR 0.85/m^3, with the total water bill representing an estimated 1.1% of average household income. Large families and

Table 3.4 **Water tariff structure in Attica,** 2002-07

Tariff categories	Tariff parameter	(m^3)	2002	2007
			(EUR/m^3)	
Domestic	Monthly consumption	0-5	0.3580	0.4017
		5-20	0.5458	0.6283
		20-27	1.5788	1.8025
		27-35	2.2127	2.5235
		over 35	2.7644	3.1415
Industrial	Monthly consumption	up to 1 000	0.7072	0.8137
		over 1 000	0.8305	0.9579
Government buildings	Regardless of consumption		0.8422	0.9682
Public use	Regardless of consumption		0.5898	0.6798
Harbour	Regardless of consumption		0.5898	0.6798
Charity	Regardless of consumption		0.2377	0.2781
Local authority	Regardless of consumption		0.2582	0.4738
			(EUR/month)	
Standing charge (connection pipe diameter)		up to 5/8 inches	0.4930	0.55
		up to 3/4 inches	0.7248	0.84
			(% of water consumption cost)	
Sewerage charge (type of building/economic activity)				
domestic	Apartments, houses		*48*	*65*
	Houses with gardens > 200 m^2		*34*	*45*
government buildings			*24*	*65*
charity			*34*	*65*
industrial	All enterprises[a]		*34*	*65*
	Water-intensive industries[b]		*24*	*33*

a) Except water-intensive industries.
b) *E.g.* distilleries, paper making.
Source: EYDAP.

consumers in rural isolated areas benefit from a ceiling on the total water bill. In absolute terms, Greek prices remain well below typical figures paid by consumers in many parts of Europe, albeit less so when measuring water bills as a share of household income.

Hence, *Greece has established rational pricing policies* for municipal water services, including incentives for water conservation. Progress is being made towards full cost recovery from household billing and on average amounts to about 60%. There is quite a variation among basins, with Attica and Thrace showing a cost recovery of 108% and 103%, respectively, whereas at the other end of the scale Thessaly and East Peloponnese only achieve 34% and 38%, respectively (Table 3.5). It is therefore unlikely that Greece will achieve full-cost recovery by 2010 in all its 14 basin districts, as demanded by the WFD.

Table 3.5 **Cost recovery[a] of water services,** per river basin district, mid-2000s

River basin districts	Cost recovery (%)		
	Domestic	Irrigation	Total
West Peloponnese	62.2	11.4	50.5
North Peloponnese	77.3	19.4	68.2
East Peloponnese	37.9	15.7	34.2
West Sterea Ellada	61.3	14.3	46.2
Epirus	71.0	22.4	68.1
Attica	108.1	21.3	106.1
East Sterea Ellada	75.1	16.0	57.6
Thessaly	33.7	6.4	29.8
West Macedonia	53.6	41.1	51.7
Central Macedonia	86.6	12.0	78.3
East Macedonia	79.4	27.4	70.7
Thrace	103.3	11.1	78.3
Crete	49.7	56.3	50.9
Aegean Islands	42.9	1.8	37.8
Greece	59.5	36.5	55.4

a) Costs recovered in pricing urban and agricultural water services. Includes financial, resource and environmental costs and subsidies. Resource costs are the costs of foregone opportunities which other uses suffer due to the depletion of the resource beyond its natural rate of recharge or recovery (*e.g.* linked to the over-abstraction of groundwater). Environmental costs are the costs of damage imposed by water uses on the environment and ecosystems.

Source: YPEHODE – CWA.

2.3 Droughts and floods

Greece is vulnerable to the effects of drought and the impact of climate change is likely to exacerbate this situation (Chapter 7). The country's policies for managing droughts are compiled in the 2001 National Action Plan for Combating Desertification. The plan includes a wide spectrum of measures (in agriculture, forestry, water resources, rural development, research) that are mostly part of other sectoral policies and, hence, are implemented by a range of actors. Greece's fourth national report to the UN Convention to Combat Desertification lists a number of achievements in the water resources domain, such as the establishment of the CWA, the construction of reservoirs, and the progress made with the implementation of the WFD. The CWA has recently started to develop a strategy for drought and water scarcity management, drawing on a study completed by the Agricultural University of Athens in October 2008.

The 2003 water law attributes responsibility for *flood mitigation* to the CWA and the General Secretariat for Civil Protection; the latter is responsible for the emergency response to natural and manmade disasters, including riverine and coastal flooding. Flood hazard maps have been drawn up for the areas most at risk from flooding, but the quality of compliance with such maps is not reported (Chapter 7). The EU Flood Risk Directive 2007/60/EC will push Greece (and all other EU countries) to take a more systematic and comprehensive approach to the problem of flooding according to a timetable that runs parallel to that of the WFD. The flood risk management plans, due to be developed by 2015, will provide a more detailed picture of Greece's measures to reduce vulnerability to damage by flooding.

3. Managing Water Quality

3.1 Status and trends

Freshwaters

Mountains cover about 70% of Greece's total area and the mountainous reaches of Greek rivers, in general, have good chemical status. Middle reaches typically have fair quality; the lowland stretches of many rivers can be characterised as medium to poor. Mean annual concentrations of nutrient and heavy metals are low and in most cases below maximum permissible limits for raw water for the preparation of drinking water (CWA, 2006). *Water quality is most impaired in the northern part of the country*, partly because rivers entering from neighbouring countries already carry a pollution load (Chapter 8), and partly because of the burden imposed (and not yet sufficiently mitigated by strict enforcement of pollution regulations) by intensive agricultural and

industrial activities. Many lakes in the north have been eutrophied. In some places, the level of phosphorus, nitrites, ammonium and dissolved solids exceed standards. During the period 2004-08, the Hellenic Environmental Inspectorate gave priority to the pollution in four rivers (Kifisos, Asopos, Kalamas, and Pinios) and one lake (Koronia); Lake Koronia and the Asopos River are longstanding pollution hot spots.

Water quality in Greece has for long been assessed mainly in terms of a water body's aptness as a source of irrigation or drinking water; the *biological aspects of water quality* received scant attention before the adoption of water Law 3199/2003 (as it was the case in other EU countries before the adoption of the WFD). A classification and assessment of the ecological status of surface waters was completed by the Hellenic Centre for Marine Research and the Greek Biotope and Wetland Centre only at the end of 2008.[12]

An initial characterisation of the 236 main groundwater bodies in the country suggests that 110 aquifers are at risk of failing to achieve the good chemical and quantitative status required by the WFD for 2015. *Groundwater quality*, even though generally good, is threatened by salinisation caused from over-extraction and seawater intrusion at coastal aquifers or uncontrolled wastewater disposal. High concentrations of nitrates, deriving from nitrogenous fertilisers and the use of livestock manure, as well as pesticide residues have been detected in northern and western parts of the country, but do not always exceed maximum permissible values. According to information available, 9% of water samples indicate frequent to very frequent high nitrate concentration in groundwater sources (GHK, 2006). Concentrations are most elevated in the plain of Thessaly (Central Greece) and various plains in the north of the country.

Estuaries and coastal waters

Greece's 2006 national report on coastal zone management observes that the measures taken over the past decades, including investments in wastewater treatment, have *improved the condition of coastal waters*, albeit without fully eliminating problems. Such problems are manifest in estuaries and semi-enclosed gulfs, which are more vulnerable to human pressures. Further, the waters surrounding the islands in the Aegean Sea are experiencing growing pollution as tourism development expands without adequate wastewater control. The 2007 progress report of the National Strategy for Sustainable Development (NSSD) singles out seven sites suffering from land-based pollution sources. These are mostly but not always close to large population centres,[13] such as in the case of Amvrakikos Gulf in southern Epirus, where fish farming is the major cause of pollution. Although these problems are mostly of a local character, they are serious (Chapter 8).

Bathing waters

Greece's record in keeping its *coastal bathing waters* clean is *among the best in Europe*. Greece monitored a total of about 2 050 coastal bathing areas during 2006 and 2007, the greatest number of any EU country. There are just six freshwater bathing sites. The number of areas monitored has increased steadily since 1992; for example, in 2006 alone, 44 new sampling points were added, whereas three sampling points were withdrawn. Average bathing water quality in coastal and freshwater areas remained excellent. Virtually all sites comply with mandatory values and 96-98% also comply with the more stringent guide values. The European Commission reports a high "stability index for the coastal zones", *i.e.* the performance is consistent from one bathing season to the next, even with the large number of bathing areas concerned. The results of fortnightly quality tests and information on the current situation of bathing areas are made available via the internet.

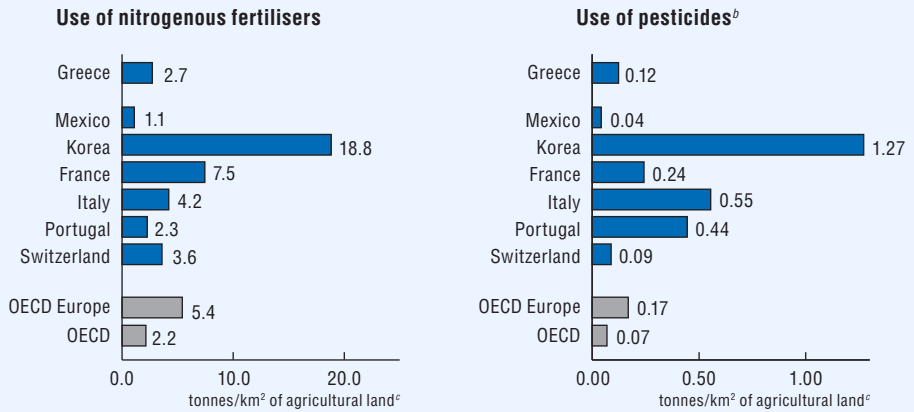
3.2 Impact of agriculture and industry

Nitrates and pesticides

Monitoring of farm pollutants discharges in water bodies is not adequate in terms of regularity and territorial coverage. The *use of pesticide* has decreased during the review period, and intensity of pesticide use is lower than OECD-Europe and many other countries (Figure 3.3). However, pesticides have been increasingly used since 1990 and continue to be detected in waters, especially in areas of intensive agriculture (OECD, 2008).

Greece is applying a mix of voluntary and mandatory instruments to reduce the risk of nitrate pollution from agriculture. During the review period, the country *substantially reduced the intensity of use of nitrogenous fertilisers* from 3.7 to 2.7 tonnes per square kilometre of agricultural land (Figure 3.3). This reduction was achieved through the Ministry of Rural Development's (partly EU-funded) programme of agri-environmental measures, which started in 1995. In 2005, the agri-environmental measures funded by the Rural Development Programme 2000-06 involved almost 13 000 farmers (contracts) and a total area of around 261 700 hectares (EC, 2007b). Participating farmers committed themselves to permanent set-aside, fallowing, crop rotation, and fertilisation practices taking account of both crop nitrogen demand and the need to prevent nitrogen losses to the environment (Karyotis *et al.*, 2006). The programme is to be continued and further expanded. Similar voluntary agri-environmental measures, also by way of providing financial incentives to farmers to participate, are aimed at preserving and enhancing wetland areas such as Lake Pamvotis in the Epirus region (north-western Greece) and the lakes and lagoons of Thrace. Moreover, the mechanism of "cross-compliance" applies to all farmers benefitting from EU financial support (Chapter 4).[14]

Figure 3.3 **Agricultural inputs,** 2006[a]



a) Or latest available year.
b) For many countries, sales are used as a proxy for pesticide use.
c) Arable and permanent crop land and permanent grassland.
Source: IFA; OECD, Environment Directorate.

Greece has declared 7 *vulnerable zones*[15] (the main country's fertile plains under intensive agriculture) under the EU Nitrates Directive 91/676/EEC, and has formally adopted the action programmes required for each area. The programmes require farmers to, among other things, respect maximum rates and timing of fertiliser application, depending on local conditions (such as crop type, soil type, ground slope, and irrigation system). There are also rules about the management of farm waste, erosion prevention, winter soil cover, and the transport and storage of fertilisers. Also, farmers in vulnerable zones must follow the official Code of Good Farming Practice, which is voluntary for farmers in other areas. It is not clear how well these rules are enforced.

Dangerous substances

Public concern in 2007 and 2008 about the presence of high levels of dangerous substances in the drinking water of Oinofyta town, 60 km north of Athens, drew attention to the *poor control of industrial liquid and solid waste disposal*. Until 2008 Oinofyta supplied some 10 000 local residents with drinking water drawn from the Asopos River, which was found to have from medium to high levels of depleted chromium and lead, as was the water in boreholes in the area (EC, 2008). Oinofyta

inhabitants are now connected to the Athens water supply system (EYDAP). The Asopos basin is the home of as much as one-fifth of Greece's industrial production and some hundred enterprises discharge their waste into the river, many of them illegally. In the last two years, the Hellenic Environmental Inspectorate has stepped up inspections at large installations in the river neighbourhoods, leading to legal proceedings against manufacturers for dumping unprocessed wastewater into the river; massive fines have been imposed on some 40 factories.

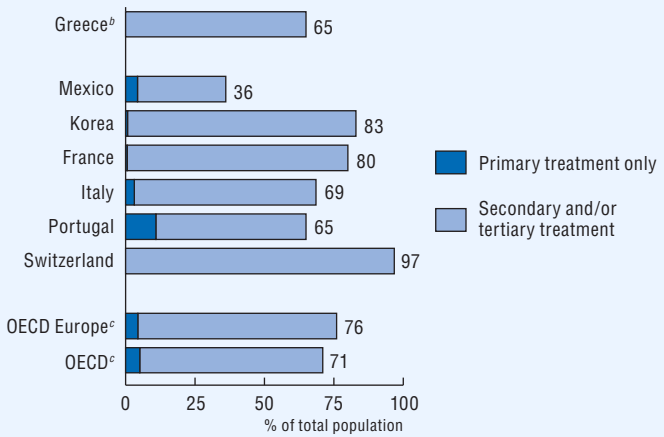
The 2004 annual report of the Greek Ombudsman noted the negligent operation of industrial waste treatment operations and the failure to construct the required infrastructure. *Lack of enforcement over a long period* appears to be at the root of the problem, although the creation of the Hellenic Environmental Inspectorate in 2003 has contributed to gradually improve compliance. The control of pollution by dangerous substances discharged into the aquatic environment has been subject to EU rules since 1976,[16] but a comprehensive national pollution-reduction programme for the substances concerned was only completed in 2003, with implementation starting as late as 2007. Even though some local pollution-reduction plans were adopted early in the review period (Gulf of Pagasitikos in southern Thessaly, Lake Vegoritida-Petron near the border with FYROM, Lake Koronia east of Thessaloniki), a more vigorous approach to the problem of discharge of dangerous substances is required.

3.3 Urban wastewater treatment

Much progress was made during the review period in equipping Greece with *sewerage and treatment systems* satisfying the objectives of the EU Urban Waste Water Directive (UWWD), although the directive's final 2005 deadline was not met (it is expected to be met by 2013). According to Greek authorities, 90% of the about 8 million inhabitants living in settlements greater than 2 000 population equivalents (agglomerations requiring a collection system under the UWWD) were connected to a sewerage network at the end of 2008, and 91% had a wastewater treatment plant in their area.[17] This latter figure translates to about 65% of the total population connected to public wastewater treatment plants (with secondary treatment), up from the 45% in the late 1990s (Figure 3.4). However, as of November 2008, 12 agglomerations greater than 15 000 population equivalents did not have the necessary collection and treatment systems.[18] The wastewater load generate by smaller settlements, where about 2.9 million population lives, is collected by individual systems (*e.g.* septic tanks) and transferred to the nearest treatment plant. In some small settlements cesspools are still used.

Greek water and wastewater enterprises are responsible for the *operational performance of treatment systems*, but not all facilities are functioning optimally, either to save on running costs or because of poor management. There have also been

Figure 3.4 **Population connected to public wastewater treatment plant,** 2006[a]



a) Or latest available year.
b) As of end 2008.
c) Secretariat estimates.
Source: OECD, Environment Directorate.

reports of illegal connections to the sewerage network by small industrial units that may own biological treatment units, but do not systematically operate them to avoid operational costs.[19] In rural areas, evidence exists of waste from small livestock farms, illegal slaughterhouses, and improper washing of pesticide containers finding its way into treatment systems not designed to deal with such loads (GHK, 2006). The large number of small utilities under the direct control of municipalities raises questions about the expertise available to keep systems running in accordance with design specifications; it would certainly be advisable to put effective surveillance mechanisms in place. Furthermore, cooperation among several small operations to bundle or hire in expertise, as is already happening, deserves further encouragement; another option would be to consolidate small utilities into larger management units.

The *sewage sludge* produced daily at the Athens Metropolitan Area wastewater treatment plant (on the island of Psyttalia off Piraeus) is turned into almost dry matter in a state-of-the-art drying facility completed in September 2007. A nearby cement factory uses the resulting product, which has a calorific value similar to lignite, as a fuel for its cement kilns. While the use of sludge for fertiliser and soil improvement in agriculture is a common solution in many countries, it has limited scope in Greece

due to the prevalence of shallow or rocky soils and the often steep terrain.[20] In the meantime, the growing amounts of sewage sludge from the expanding number of sewage treatment plants throughout Greece still end up in sanitary landfills or even uncontrolled disposal areas.

4. The WFD Economic Analysis

The Water Framework Directive (WFD) requires EU countries to take account of the principle of *cost recovery* of the costs of all urban and agricultural water services in the pricing of water services, including financial, resource and environmental costs and subsidies. Consequently, Greece has carried out calculations of the degree of cost recovery in each basin district, on the basis of guidance issued by the European Commission; the methodology adopted is very similar to that of some other EU countries.

The calculations carried out by the CWA show *considerable variation in the degree of cost recovery among basins* in terms of both domestic water services and irrigation (Table 3.5).[21] The national average rate of cost recovery amounts to 55%; the rate for domestic water supply and wastewater treatment services is 59.5% and that for irrigation water supply amounts to 36.5%. For domestic water services, the calculations according to this methodology show that, compared to the financial costs (for capital, operation and maintenance), the resource and environmental costs are almost negligible on a national scale. For irrigation, on the other hand, resource and environmental cost account for 19.6% and 6.6%, respectively. Financial costs represent 16% of total costs, and agricultural subsidies, at 59%, account for the largest part.

Notes

1. The CWA, the National Water Council and the 13 Regional Water Directorates were not actually established until some two years after Law 3199 had been passed.
2. Greece counts 228 municipal water and wastewater enterprises (DEYA).
3. For example, a nationwide review of water quality published in 2006 did not contain any data pertaining to the period after 1999 (CWA, 2006).
4. Greece comprises 14 basin districts in terms of the WFD, and counts 13 Regional Water Directorates.
5. These programmes form part of, respectively, the Community Support Framework for Greece 2000-06 and the National Strategic Reference Framework 2007-13 (Chapter 5).
6. Water stress is defined as the ratio between total annual abstraction and overall average yearly renewable resources.
7. Dryness is defined as the ratio between annual precipitation and potential evapotranspiration. A ratio of between 0.20 and 0.49 makes a region semi-arid, and one of between 0.50 and 0.74 sub-humid.
8. Some community systems have rice as their main crop and therefore will always require flood irrigation.
9. For example, some plans within the Rural Development Programming Framework 2007-13 intend to improve the efficiency of irrigation systems but do not provide any funding figures, making the statement not easily credible. Furthermore, some plans foresee the maintenance of highly water consuming crops (such as beetroots, converted to energy crops), raising questions of sustainability (EC, 2007a).
10. Lake Marathona is the only reservoir in the Athens-Piraeus water supply system located in Attica; it is protected by law and all wastewater discharges are prohibited, irrespective of treatment.
11. An example is the incident in the municipality of Zaharo (western Peloponnese). When its supply system was damaged by the 2007 fires, microbiological contaminants found their way into town reservoirs, and residents complained they were not warned that their water had become unfit for consumption.
12. Before that, the only national assessment of the ecological status of surface waters available in Greece dated from the late 1990s; the reported biological indicators pointed to a declining trend during that period (Tsouni *et al.*, 2002).
13. Thermaikos near Thessaloniki, Pagasitikos in Thessaly, Elefsis Bay and the Inner Saronikos Gulf near Athens.
14. "Cross-compliance" requires farmers to implement the good agricultural and environmental conditions and the environmental statutory management requirements, which are prescribed by the EU legislation and detailed in the National Rural Development Programme 2007-13. Concerning water protection, these requirements mainly correspond to those set by EU Directives 80/68/EEC and 91/676/EEC.

15. Located in northern Greece (Salonica-Pella-Imathia plain area and the Strimonas River basin), central Greece (Thessaly and Kopaida plains), and the West (Arta-Preveza plain and the Pinios S. Ilia area).
16. Directive 76/464/EEC on pollution caused by certain dangerous substances discharged into the aquatic environment, transposed into Greek law by way of Joint Ministerial Decision 144/1987. This EU directive has since been superseded by the WFD and Directive 2006/11/EC.
17. In some areas the treatment station was completed before the sewerage network.
18. The UWWD deadline for this infrastructure to be operational was 31 December 2000.
19. Illegal connections of septic tanks to stormwater networks also contribute to pollution problems.
20. The sludge can be used in agriculture if it is clean enough in terms of EU Directive 86/278/EEC, which prohibits the sludge from sewage treatment plants from being used in agriculture unless specified requirements are fulfilled, including the testing of the sludge and the soil. Parameters subject to the provisions of the directive include the following: dry matter, organic matter, copper, nickel, pH, nitrogen, total and ammoniacal, total phosphorus, zinc, cadmium, lead, mercury, chromium.
21. These calculations are based on a simplified appraisal method; a comprehensive economic analysis will follow to guide the introduction of water pricing, as required by the WFD by 2010.

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4

BIODIVERSITY AND NATURE CONSERVATION*

Features

- Biodiversity richness
- Management of protected areas
- Integration of biodiversity issues in agriculture, forestry, fisheries and tourism policies
- International cooperation
- Protecting the Pindos Mountains

* This chapter reviews progress in the last ten years, and particularly since the 2000 OECD Environmental Performance Review. It also reviews progress with respect to the objectives of the 2001 OECD Environmental Strategy.

Recommendations

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Greece:

- adopt and implement the *National Biodiversity Strategy and Action Plan*, as a comprehensive action-oriented framework for ecosystem and species conservation at both national and local levels; set time-bound objectives and periodically evaluate progress;
- continue to extend *protected areas*, particularly including coastal areas and marine ecosystems; complete the implementation of the *Natura 2000 network*; ensure that all protected areas are provided with management plans and adequate conservation measures;
- further improve the *human and financial capacity* for nature conservation and the management of protected areas; review the future evolution of the funding system of biodiversity management, with substitutes to EU contributions (*e.g.* increased use of economic instruments; contribution of national and local public and private funding);
- increase and disseminate *knowledge on the conservation status of species*; carry out systematic monitoring of endangered and threatened species, and evaluate the effectiveness of protection projects.

Conclusions

Greece has an exceptionally *rich biodiversity*; an almost untouched natural environment characterises wide areas of the country. Greek policy documents (including the 2002 National Strategy for Sustainable Development) explicitly refer to the *international and EU commitment* of reducing the current rate of biodiversity loss. During the review period, a number of *new protected areas* were designated, including ten national parks; the list of Sites of Community Importance and Special Protection Areas was extended; the *Natura 2000 network* was designated to cover 21% of the land surface and 5.5% of the territorial waters. Greece improved and updated the *legislative framework* for nature conservation, moving from a strict protection approach to a more integrated and participatory management. Twenty-seven independent and multi-stakeholder *Management Bodies* were given management responsibilities over some 1.7 million hectares of protected areas. Information on the status of habitats and species is improving, for instance through the *Biodiversity Clearing House Mechanism* Website. The number of *threatened species* covered through protection projects considerably increased, with significant

involvement of environmental NGOs and research institutes (*e.g.* loggerhead sea turtle, Mediterranean monk seal). Stricter measures were implemented to control international trade of species. *Organic farming* has developed rapidly. There is no GMO cultivation in Greece. The renewed *forest legislation* adopts the principles of biodiversity conservation and multiple uses of forest lands. Further steps have been taken to promote more eco-friendly *tourism*, and the Specific Framework Plan for Tourism sets restrictions on construction of tourist facilities. Greece participates actively in *international activities* to preserve the biodiversity of the Mediterranean area and to control marine pollution.

Despite this progress, additional actions are needed to mitigate the *growing pressures* on natural assets from economic activities. Greece is among the four OECD countries that have not yet submitted the *National Biodiversity Strategy and Action Plan*, thereby lacking a comprehensive framework for the protection of species and ecosystems. The National Biodiversity Strategy is currently under consultation. The *actual management of the Natura 2000 network* needs improvement: less than one fifth of the Natura 2000 surface is included in legally designated protected areas, and nearly half lacks the environmental study required to define conservation measures. Only a few marine areas are included in the network. Most protected areas still require management plans. Management responsibilities rest with many authorities at central and local levels, with consequent *overlapping and coordination problems* and weak enforcement. *Budgetary and human resources* should be reinforced. Management Bodies of protected areas have mostly relied on EU funds. Greece needs to ensure adequate long term financing, including funds to substitute for EU contributions. Many of the *mammal and freshwater fish species* living in Greece are threatened, and an increase in invasive alien species has been observed, especially concerning marine ecosystems. Inventories of species need to be extended and improved, and Red Lists of fauna and flora to be regularly updated. Conservation policy has yet to achieve an effective *mainstreaming of biodiversity* issues into other sectors. *Poor farming practices* and excessive use of water for irrigation have contributed to degrade semi-natural habitats and wetlands. The number of farmers participating in agri-environmental schemes has grown steadily, but still accounts for a small share of farmland. While forests appear relatively healthy, they are threatened by frequent and devastating summer *fires*; more resolute prevention and restoration measures need to be undertaken. *Tourism development* exerts growing pressure on ecosystems, especially in coastal zones and islands, where protective provisions have been often infringed. Further efforts are needed to build *consensus* around nature conservation, informing local communities of related ecosystems services and economic benefits.

♦ ♦ ♦

1. Policy Objectives

Greek *objectives on nature conservation* encompass the international commitments to 2010 set by the Convention of Biological Diversity (CBD) and the EU Biodiversity Action Plan. Protecting biodiversity and ecosystems is one of the main objectives of the 2002 National Strategy for Sustainable Development (NSSD). The strategy calls for reducing the current rate of biodiversity loss and protecting and restoring the natural ecosystems, by: *i)* putting in place a national system for the management, monitoring and wardening of protected areas; *ii)* implementing specific projects to restore and protect natural areas (including Natura 2000 sites) and species of fauna and flora; *iii)* managing forest ecosystems in a sustainable way; *iv)* increasing the knowledge on species; *v)* raising public awareness and participation; *vi)* integrating biodiversity concerns into land use planning and sectoral policies.

These objectives and action lines have been integrated into the *national and regional investment programmes financed by the EU Funds*, including the Environment Operational Programme 2000-06, the Operational Programme for Environment and Sustainable Development 2007-13, the National Rural Development Plans 2000-06 and 2007-13. Moreover, broad objectives related to biodiversity and landscape conservation have been included in the *National Framework for Spatial Planning and Sustainable Development*, and in the specific framework plans for mountainous areas, coastal areas and islands; measures to prevent desertification are defined in the National Action Plan to Combat Desertification (Chapter 7). In 1999, YPEHODE approved the National Strategy for Wetland Resources, which specifies actions for the conservation and rehabilitation of all functions and values of Greek wetlands.

Greece developed its first National Biodiversity Strategy in 2008; the approval of the Strategy by YPEHODE (ministerial decision) is envisaged in 2009, following public consultation. Implementation priorities and quantitative objectives will need to be included in the Action Plan to follow. The recommendations of the *2000 OECD Environmental Performance Review* of Greece provide a framework for assessing performance on nature and biodiversity management:

- speed up the process of putting in place a National Biodiversity Conservation Strategy and Action Plan, thereby providing a coherent framework for nature conservation and for the identification of ecosystems, species, landscapes and landscape features that should receive special management and protection;
- increase the total surface of protected area, including marine ecosystems and coastal areas, and ensure that they are effectively protected, particularly through management plans;
- establish a national ecological network, including existing protected areas and Natura 2000 sites;

– strengthen co-operation and partnership among ministries and agencies responsible for nature conservation at the planning and implementation stages; strengthen the administrative capacity of the central, regional and local authorities to implement conservation programmes;

– increase public awareness and reinforce information and education programmes on nature conservation problems;

– prepare a comprehensive assessment of the impact of urban, housing and tourism development on coastal and island natural ecosystems, and implement measures to protect species and habitats in these areas.

2. State of Biodiversity

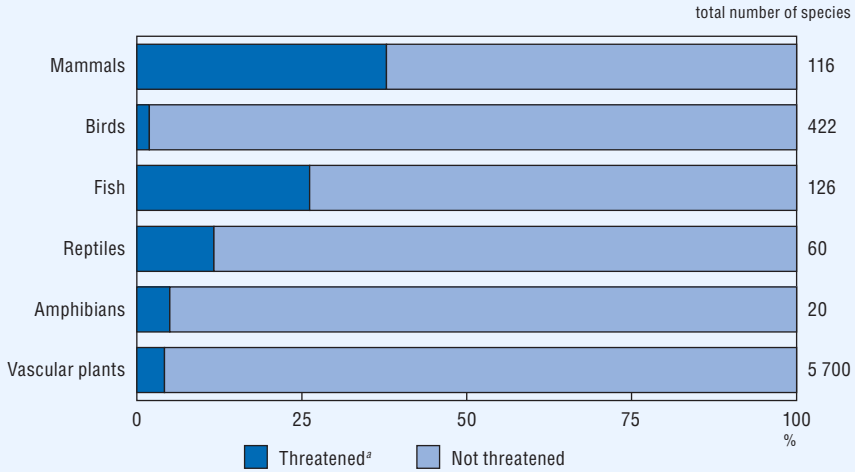
About two-thirds of the Greek territory are covered by a *hilly or mountainous terrain*, with the typical landscape being rugged and steep. Greece has a very *extensive coastline* of about 15 000 kilometres and about 3 000 islands, which represent 20% of the land area. The coastline is mainly rocky (70%) and sandy (25%), with about 5% of wetlands. Ten of the 15 largest urban centres are coastal, and most of them have important harbours (Chapter 7). The Hellenides Mountains, extending from north to south, divide the country into two parts. Greece has a Mediterranean climate, with mild and wet winters, and hot and dry summers.

Species and ecosystems diversity is high due to the great range of climatic and geomorphologic conditions. Greece entirely lies in the Mediterranean bio-geographical region, with ecosystems ranging from semi-desert and maquis, to cold climate mountain forests of birch, scots pine, and spruce. Wetlands (rivers, estuaries, deltas, lagoons, shallow lakes, shallow marine formations, and marshes) cover a relatively wide area (210 000 hectares), despite their large degradation over the past decades. Forests cover nearly 30% of Greek territory (although tree cover has decreased as a result of the 2007 fires); 29% of the land is cultivated, and 36% is grassland (much of it upland and sparse) (Chapter 7).

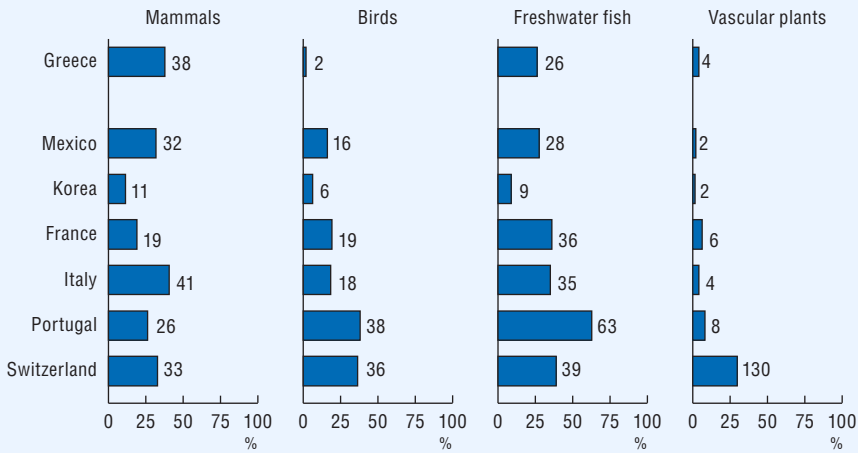
Greek *flora and fauna* are among the richest in Europe: more than 5 500 plant species have been recorded, with a large number of endemic species, due to the isolation of mountains and islands. The fauna includes a large number of indigenous species (Figure 4.1). Nearly all mammal species recorded in Greece (116) are indigenous, as well as 85% of freshwater fish species. The herpetofauna consists of 20 species of amphibians and 60 species of reptiles. Over 400 bird species have been recorded, of which 240 nest in Greece.[1] Invertebrate species have been estimated at around 25 000, many of which populate the country's thousands caves.

Figure 4.1 **Fauna and flora**

State in Greece, early 2000s



Threatened species[a]



a) IUCN categories "critically endangered", "endangered" and "vulnerable" in % of known species.
Source: OECD, Environment Directorate.

The update and revisions of the Red Data Books for rare and threatened vertebrate and plant species are currently under preparation. The share of threatened species of birds, reptiles, amphibians, and vascular plants is relatively low, whereas that of *threatened species* of mammals (38%) is high compared to other OECD countries (Figure 4.1). The proportion of threatened species of freshwater fishes (26%) is high, but lower than that of other Mediterranean countries. An increase in *alien species* has been observed, especially concerning the marine ecosystems: the Hellenic Centre for Marine Research estimates that the number of invasive alien marine species increased from 78 in 2000 to 155 in 2007, mostly introduced through shipping (*e.g.* via the Suez Canal).

3. Ecosystems and Species Conservation Measures

3.1 Legal and institutional frameworks

Greece has a long-standing conservation policy: the *legislation on nature conservation* dates back to the 1930s, with the laws providing for protection of mainland national parks and forests. During the review period, Greece made important strides in improving and updating the legislative framework, to incorporate relevant EU directives and international commitments (Table 4.1). In particular, the 1999 Law on Spatial Planning and Sustainable Development defines a comprehensive framework for the management of protected areas, amending and supplementing the 1986 Framework Environmental Protection Law (Chapter 7).

The *responsibilities for the protection and management of habitats and species* rest with a number of authorities at central and local level, generating some overlapping and coordination problems. The Ministry for the Environment Physical Planning and Public Works (YPEHODE) is in charge of planning activities related to habitat and species conservation, establishment of protected areas and oversight of their Management Bodies (MBs), and environmental impact assessment. The Ministry of Rural Development and Food (YAAT) and the Regional Forest Services are competent for forest management, protection of the rural landscape, fisheries, hunting, agriculture, genetic resources, and conservation of species (including plants and farm animals). The Ministry of Culture (YP) shares with YPEHODE responsibilities for landscape protection. The regional, prefectural and local authorities are involved in land use planning and environmental impact assessment, and are consulted prior to the designation of protected areas. Several research institutes (*e.g.* the Greek Biotope and Wetland Centre, the Hellenic Centre for Marine Research and the National Foundation for Agricultural Research) provide scientific and technical support to central and local authorities, and take awareness raising initiatives.

Table 4.1 **Legislative framework for nature conservation**, 1998-2007

Act number and year	Act title/subject
Law 2637/1998	Establishment of the Certification Account Organisation and of wildlife refuges
JMD[a] 33318/3028/1998	EU Habitats Directive (92/43/EC)
Law 2719/1999	International convention of the conservation of migratory species of wild fauna and other regulations
Law 2742/1999	Spatial planning and sustainable development and other regulations (including management bodies)
Law 2902/2001	Memorandum of understanding between the Hellenic Republic and the Republic of Turkey concerning the cooperation for the protection of the environment
Law 2971/2001	Sea shore legislation and other regulations
Law 3010/2002	Harmonisation of the Law No 1650/86 according to EU Directives 97/11/EC and 96/61/EC, and other regulations (including Environmental Impact Assessment for natural areas)
Law 3022/2002	Amendments to the 1970 Barcelona Convention for the protection of the Mediterranean Sea against pollution and to its 1980 protocol on pollution from land-based sources
Law 3026/2002	Modification of the Article XXI of the Convention for the International Trade of species of flora and fauna that are threatened by extinction (CITES)
Law 3044/2002	Establishment of 25 management bodies of protected areas
Law 3071/2002	Implementation of the 1982 United Nations Convention on the Law of the Sea provisions concerning the conservation and management of straddling fish stocks and highly migrating fish stocks
JMD[a] 11642/1943/2002	EU Directive 2001/18/EC on the release of genetically modified organisms into the environment
Law 3165/2003	International Convention on phytogenetic resources for food and agriculture
Law 3208/2003	Protection of the forests ecosystems and compilation of forest cadastre, regulation of holding rights on forests and forest areas
Law 3233/2004	Cartagena Protocol on Biosafety in the Convention on Biological Diversity
JMD[a] 38639/2017/2005	EU Directive 1998/81/EC on the use of genetically modified micro-organisms
Law 3495/2006	International plant protection convention – new revised text
Law 3568/2007	International Convention on the regulation of whaling and its protocol
Law 3585/2007	Environmental protection, agricultural security and other regulations
Law 3598/2007	Agreement on the privileges and immunities of the International Tribunal for the Law of the Sea
Law 3497/2007	Protocol concerning cooperation in preventing pollution from ships and, in cases of emergency, combating pollution of the Mediterranean Sea
JMD 14849/853/E103/2008[a]	Update of the transposition of the Habitats Directive

a) Joint Ministerial Decision.
Source: YPEHODE.

3.2 Protected areas

A *wide and representative number of biodiversity areas are under protection* in Greece. Taking into account national parks, natural reserve areas, controlled hunting areas and areas protected under international agreements, the Government reports that some 13% of the land area and 2.4% of territorial sea have some kind of protection, although a part of it does not have formal legal status. The vast majority of protected areas are located on state-owned land, since the State is the major landowner in Greece.

During the review period, overall protected surface increased, and some *new protected areas* were designated (Table 4.2), including ten national parks,[2] one eco-development area, a protected forest and one nature reserve. The boundaries of the two national marine parks of Alonissos and Zakynthos were redefined in 2003. Moreover, wildlife refuges cover more than 1 million ha, protecting areas of wintering, breeding and rescuing of wild fauna.[3] Research related and nature conservation projects only are allowed in strict nature reserves, whereas nature reserves can also host traditional activities. National parks usually include a core area of absolute protection and a peripheral zone (Box 4.1). Several activities (*e.g.* grazing, logging, hunting, collecting plants and lighting fires) are strictly forbidden in the core area; other activities are allowed in the protected peripheral zone of national parks subject to specific restrictions, as well as in eco-development areas and wildlife refuges. Specific requirement in spatial planning and environmental impact assessment procedures are in place to protect habitats in legally designated protected areas, as well as outside their borders.

The *legislative act designating a protected area* specifies the level of its protection, including restrictions on activities (*e.g.* agriculture, husbandry and fishing) and land use. The protection level is determined on the basis of a Specific Environmental Study (SES), illustrating the biodiversity features of the area, and identifying conservation measures and compatible activities. The SES is approved by the Environment Minister; both the SES and the draft designation act are subject to public consultation prior to final approval.

The Natura 2000 network

Greece hosts a large variety of Mediterranean habitats included in the reference list of the Natura 2000 initiative (EU Birds Directive 79/409/EEC and Habitats Directive 92/43/EEC): from open sea, tidal areas and sea dunes, to several types of shrubs and grasslands and Mediterranean mountainous forests of coniferous. Since 1999, additional areas of 105 000 hectares (ha) and 1 075 000 ha have been designated as *Sites of Community Importance* (SCI) and *Special Protection Areas*

(SPA), respectively. As of 2008, the Greek list includes 239 SCIs and 163 SPAs. When overlapping is excluded, the Natura 2000 network covers 21% of the Greek land surface and 5.5% of the territorial waters.

The Greek *Natura 2000 sites* are mostly wide areas (on average 5 000 ha), and are scattered throughout the country, in several cases along rivers. The numerous wildlife refuges serve as stepping stones and contribute to improve the connectivity between the Natura 2000 sites. Forests and woodlands cover 58% of the Natura 2000 area; 14% are grassland and agricultural land with natural vegetation, 10% is pasture

Table 4.2 **Protected areas,** 1998-2008

	Year[a]	Competent Authority	1998			2008		
			Sites	Surface area		Sites	Surface area	
				(ha)	(%)[b]		(ha)	(%)[b]
National forest parks (inland)	1938	YAAT	10	68 900[c]	*0.6*	10	68 900[c]	*0.6*
Aesthetic forests	1973	YAAT	19	32 500	*0.2*	19	32 500	*0.2*
Protected forests	2006	Regional Authorities	–	–	–	1	41 742	*0.4*
Natural monuments	1975	YAAT	51[d]	16 700	*0.1*	51[d]	16 700	*0.1*
Landscapes of natural beauty	1950	YPEHODE and YP	264	. .	. .	507	. .	. .
Controlled hunting areas	1975	YAAT	7	107 090	*0.9*	7	102 812	*0.8*
Game reserves[e]	1979	YAAT	584	964 400	*7.4*	–	–	–
Game breeding stations	1976	YAAT	20	3 160	. .	21	3 603	. .
Zones of urban control[f]	1989	YPEHODE	10	14 700	*0.1*	12	6 382	. .
Nature reserves[g]	2006	YPEHODE	–	–	–	1	163	–
National marine parks[g]	1992	YPEHODE	2	254 100	*0.1*	2	225 946[h]	*0.1*
National parks[i]	2004	YPEHODE	–	–	–	10	836 095	*6.2*
Eco-development areas[g]	2003	YPEHODE	–	–	–	1	41 829	*0.3*
Wildlife refuges	1998	Regional Authorities	–	–	–	606	1 028 057	*7.79*

a) Year of establishment of the first area in the category.
b) % of total land area; some protected areas overlap.
c) Including 34 300 hectares of peripheral zones.
d) 15 areas and 36 historic trees or coppices.
e) The category "game reserves" has been replaced by the category "wildlife refuges".
f) Including areas designated as Strict Nature Reserves and Nature Reserves.
g) Including peripheral zones.
h) The boundaries of the marine parks were redefined in 2003.
i) Including the Tzoumerka National Park established in February 2009.
Source: YPEHODE.

Box 4.1 **Protecting the richness of the Pindos Mountains**

In 2005, the two state Parks of Vikos-Aoos and Pindos (Valia-Kalda), created in 1972 and 1996 respectively, were included in the *Northern Pindos National Park*. The Northern Pindos is the largest protected area in Greece; it covers around 240 000 ha with 6 700 ha in the core zone of the park. The entire regions of Zagori, Konitsa and Metsovo and the western part of the Grevena district are in the national park. The protected area lies within the boundaries of the Prefectures of Ioannina and Grevena, and includes 97 settlements, 8 municipalities and 11 communities.

The Pindos Mountains are the largest mountain range in Greece (230 km of length and 70 km of width), going from the Albanian border in the north to the Gulf of Corinth in the south. The natural environment is highly diversified and hosts a *great number of flora and fauna species*. More than 1 700 flora species grow in the National Park, including several rare and endemic species (*e.g.* Centaurea tymphaea, Silene pindicola and Soldanella pindicola). The Pindos Mountains host one of the largest populations of brown bears in southern Europe (about 150 to 200 individuals), as well as nearly 60 other mammals species, including the wild cat, the chamois and the wolf; 167 birds, 30 reptiles, 14 amphibians and 20 fish species have been recorded in the area.

A number of restrictions are applied to the *core zone* of the Park to preserve its precious biodiversity. There, constructions of new roads, houses and other buildings, quarrying, tree felling, collecting plant and animal specimens, waste disposal, hunting and fishing are banned. While hiking is permitted, remaining in the core zone of the Park after sunset is strictly prohibited (Kati *et al.*, 2007).

The standard environmental legislation and regulation apply to the *peripheral zone* of the Park; special cautions are taken in infrastructure works, as for the construction of the new Egnatia Motorway. The *Egnatia Motorway* is the backbone of Northern Greece transport system; it stretches from the Greek-Turkish border to Igoumenitsa (crossing the Pindos Mountains) and brings areas in Epirus, western Macedonia and Thrace out of their isolation. Special tunnels and green bridges have been built to reduce habitat fragmentation and minimise the impacts on the population of brown bears and other large mammals. A special monitoring programme has been implemented to assess the impacts on wild fauna during both the construction phase and the operational phase.

The Government has established (February 2009) a *new national park in the wide area of Tzoumerka*, to include the southern part of the Pindos range. Owing to its almost untouched natural environment, cultural richness (Byzantine and post Byzantine monuments, archaeological sites, old stones bridges) and traditional settlements (like the beautiful villages of Kalarites and Sirrako). The area of Tzoumerka presents an important tourism development potential. The national park is expected to preserve the fragile mountain ecosystems and biodiversity, while positively contributing to the regional economy, providing for additional means of livelihood for the local communities.

land, and 19% are marine areas. Many sites are included in or close to intensively farmed land, urban areas or tourist development locations, leading to potential pressures on biodiversity, especially on wetlands.

Greece has made significant progress in the identification of SCIs and SPAs, but the *network appears to be incomplete* (EC, 2008a), and conservation and compensatory measures are not adequately implemented. The connectivity aspects (including biological corridors) have not been satisfactorily integrated (WWF, 2006). The marine environment has been judged by international conservation groups as being underrepresented. In 2007, the EU Court of Justice urged to close the gap between the 196 Important Bird Areas in Greece listed by Birdlife International and the number of designated SPAs.[4] As of 2008, only 18% of the area within SCIs and SPAs was included in legally designated protected areas.

During the review period, 87 SESs were drafted or under preparation, covering 53% of the Natura 2000 area (Table 4.3). The Government plans to designate 24 *new protected areas* in the 2007-13 period, representing an additional 20% of Natura 2000 area, and to implement conservation measures in all SPAs.[5] Accelerating the elaboration of SESs for all sites is crucial to provide these areas with a legal protection status and to define adequate conservation measures.

Table 4.3 **Natura 2000 sites included in protected areas**, 2008

Designation stage[a]	Area of sites (ha)	Share of total Natura 2000 (%)
Designated area	598 800	*17.6*
Legislative text at the stage of final signatures	183 500	*5.4*
Areas with approved Specific Environmental Study	197 700	*5.8*
Areas with specific Environmental Study under preparation/evaluation	820 000	*24.1*
Total	1 800 000	*53*

a) According to Law 1650/86.
Source: YPEHODE.

Management of protected areas

During the past decades, protected areas were mainly forested areas and game reserves under the responsibility of the Ministry of Rural Development and Food

(Table 4.2); nature conservation was practically left to the Regional Forest Services (RFSs).The 1999 Law on Spatial Planning and Sustainable Development marked a turning point in the management of protected areas, providing for the establishment of independent and multi-stakeholder *Management Bodies* (MBs). Management Bodies have an overall responsibility for the conservation of nature, and Regional Forest Services are responsible for the management of forests (according to the forest legislation). This is a shift from a forest-oriented approach to nature conservation at large, emphasising a more integrated and participatory management (Papageorgiou and Vogiatzakis, 2006).[6] MBs are responsible of a wide range of activities, and primarily of drafting and implementing five-year management plans (prioritising activities and specifying conservation measures);[7] they contribute to wardening and executive control, although RFSs remain the primary enforcement authorities. MBs boards consist of seven to eleven members representing a range of actors (central, regional and local authorities, RSFs, local stakeholders groups, scientific community and NGOs) and are accountable to YPEHODE. Twenty-seven MBs were established, covering about 1.7 million ha of protected areas.

The *Natura 2000 Committee* (established in 2002) is an inter-ministerial advisory body to coordinate and evaluate activities of MBs. With a chair appointed by YPEHODE, the Committee also includes representatives of university, research centres and environmental NGOs. However, the Committee operated from 2002 to 2005 only; a reform of the Committee is being considered.

Some MBs have faced *financial difficulties* and a shortage of adequately trained staff. The management plans of a number of protected areas are still under preparation. The management of protected areas and the implementation of the Natura 2000 network have been generally financed on a project-basis. MBs have rarely adopted self-financing instruments (*e.g.* entrance fees and merchandising); they have mainly relied on EU funds, also to cover their operational costs (which are excluded from the State budget). The Operational Programme for Environment and Sustainable Development 2007-13 and the Regional Operational Programmes allocate EUR 225 million (EU funds and national co-financing) to support the existing MBs, as well as the ones that will be established. Expenditure for about EUR 50 million were financed through the Environment Programme 2000-06; since 2000, the EU financial instrument LIFE has co-financed 19 projects totalling EUR 28 million.[8] Limited national funding (EUR 7.5 million in 2000-06) was granted through the YPEHODE Special Fund for the Implementation of City Master Plans and Town Plans (ETERPS or "Green Fund") (Chapter 5). The available resources appear inadequate when compared to the Government's estimated financial requirement of EUR 238 million per year (EC, 2004a).

The enlargement of the protected area network generates further land use conflicts and *major management challenges*. The designation of Natura 2000 and other protected areas has often been a top-down and centralised process, as well as the establishment of MBs (Andreou, 2004). In some cases, local authorities and residents are unaware of the protection status of their neighbourhoods. Certain local authorities have been reluctant to acknowledge the MBs as competent authorities and have claimed a larger representation in them. Further efforts are needed to build social consensus around protected areas, informing local communities of related benefits and involving relevant stakeholders in decision-making. The coexistence of parallel protection regimes, overlapping management responsibilities, and the lack of protection status and MBs for certain natural ecosystems (including Natura 2000 sites), hinder implementation of conservation measures and effective monitoring. The Greek Ombudsman has pointed out repeated elusion of protective provisions and environmental assessment procedures, as well as delays in preventing or demolishing illegal building (*e.g.* the tourist resort in the Aliki wetland in Kos).[9] Greece needs to ensure that its new plans and management capabilities are well used and financed to meet the EU ambitious target of halting biodiversity loss by 2010.

3.3 Protection of species

Greek legislation provides for *protection of a large number of native flora and wildlife species* (916 plants, 139 vertebrates and 82 invertebrates), and for strict controls over international trade of species (Chapter 8). During the review period, the number of species involved in protection projects considerably increased, including the grey wolf, the brown bear, the monk seal, and the loggerhead sea turtle, as well as several vascular plants (Table 4.4). Major projects have been financed by the EU financial instrument LIFE-Nature and national funding sources (*e.g.* ETERPS Fund). Financial support has mostly been allocated to research institutes, development companies and NGOs.

Protected areas represent an instrument for species conservation: the National Marine Park of Alonissos contributes to the protection of the monk seal, and the National Marine Park of Zakynthos is the natural habitat of the rare and threatened loggerhead sea turtle; protected forests contribute to the protection of tree-nesting birds of prey (*e.g.* the black vulture). *Outside protected areas*, measures for species protection include regulation on the hunting period, a binding fishing code, access restrictions, limited user rights, and compensations for income loss. Building on EU legislations, measures are in place to track the introduction of *alien species*, including control at national borders.

Table 4.4 **Main protected species,**[a] 2007

Group	Species (latin name)	Species (common name)	Group	Species (latin name)	Species (common name)
BIRDS	Aegypius monachus	Black vulture	MAMMALS	Canis lupus	Grey wolf
	Anser erythropus	White-fronted goose		Lynx lynx	Lynx
	Aquila clanga	Spotted Eagle		Monachus monachus	Monk seal
	Aquila pomarina	Lesser spotted Eagle		Ursus arctos	Brown bear
	Aythya nyroca	Ferruginous Duck	REPTILES	Caretta caretta	Loggerhead sea turtle
	Botaurus stellaris	Great Bittern	FRESHWATER FISHES	Ladigesocypris ghigii	Gizani
	Branta ruficollis	Red breasted goose			
	Falco eleonorae	Eleonora's Falcon	PLANTS	Anthemis glaberrima	–
	Gypaetus barbatus	Bearded vulture		Bupleurum kakiskalae	–
	Hieraaetus fasciatus	Bonelli's Eagle		Cephalantera cucullata	–
	Larus auduinii	Audouin's gull		Hypericum aciferum	–
	Numenius tenuisrostris	Slender-billed curlew		Nepeta sphaciotica	–
	Oxyura leucocephala	White-headed Duck		Phoenix theophrastii	Cretan Date Palm
	Pelecanus crispus	Dalmatian pelican		Pinus halepensis	Aleppo Pine
	Pelicanus onocrotalus	Pelican		Pinus nigra	European Black Pine
	Phalacrocorax aristotelis desmarestii	Shag		Pinus pinea	Stone pine
	Phalacrocorax pygmaeus	Pygmy cormorant		Zelkova abelicea	–

a) Species for which projects were carried out during the review period.
Source: YPEHODE.

However, 22% of habitats and species of community interest are reported as having inadequate *conservation status*, and 6.8% as having bad conservation status (Table 4.5). On several occasions the European Court of Justice has recommended Greece to improve the level of protection. For example, in 2002, the EU Court declared that Greece had failed to protect the most important breeding sites of the loggerhead sea turtle in the Zakynthos Island (the largest nesting population in the Mediterranean area). The development pressures associated to tourism were the principal threats. Since then, important steps have been taken (Box 4.2).

The *data bases on flora and fauna species* are maintained by universities, research institutes and NGOs. The Red Data Books of threatened vertebrate and plant species are being updated by the Hellenic Zoological Society and the Hellenic Botanical Society. The brown bear, the monk seal and the loggerhead sea turtle are constantly monitored by NGOs. Cetacean strandings are monitored by the Ministry of Merchant Marine and NGOs. Data on avifauna are widely collected by the Hellenic Ornithological Society with some support from YAAT. The database of invasive alien marine species is maintained by the network of research institutes led by the Hellenic Centre for Marine Research. Information is made widely available, especially through the Biodiversity Clearing House Mechanism Website set out by YPEHODE, pursuant to the Convention on Biological Diversity. The data on vascular plants and vertebrates animals is satisfactory, but more information is needed for other plant species and invertebrate animals, as well as for alien terrestrial species. The conservation status of 55% of flora

Table 4.5 **Conservation status of habitats and species of Community interest,**[a] 2008

Conservation status	Habitats	Flora species	Fauna species	Total	Share
	(number)				(%)
Favourable	49	5	25	79	*24.4*
Inadequate	26	19	26	71	*22.0*
Bad	7	2	13	22	*6.8*
Unknown	3	32	117	152	*47.0*
Total	85	58	181	324	*100.0*

a) EU Habitats Directive.
Source: YPEHODE.

Box 4.2 **Tourism pressure on sea turtle nesting sites on Zakynthos Island**

Laganas Bay on Zakynthos Island (Ionian islands) is the *European most important breeding site of the endangered loggerhead sea turtle* (Caretta caretta). These turtles only nest every two or three years, and in Zakynthos the breeding season runs from May to August. Eggs hatch two months later, and the very vulnerable baby turtles run to the sea during the early morning hours. Studies suggest that the turtles show a remarkable fidelity to the beach where they were hatched, implying that changes in the beaches can disorient returning turtles and produce irreversible loss of specimens.

Zakynthos's most important economic activity is *tourism*, and its sandy beaches are the primary attractions. Hotel and other accommodation capacity continued to increase (+17% between 2003 and 2007), reaching nearly 23 500 beds. About 800 000 tourists per year visit Zakynthos, whose resident population is less than 39 000; the vast majority of tourists arrive from abroad in summer periods (*i.e.* during the turtle nesting season). The concentration of tourism activities on the coast creates *intense pressures on turtle nesting sites* (*e.g.* compaction of the sand by sunbathers and all-terrain vehicles, coastal construction of tourist shops and refreshment kiosks, waste disposal) and some kilometres of beach have been rendered unsuitable for breeding. Associated noise and light disorient the turtles, and each year a number of turtles are killed in coastal waters by boats and fishing nets.

To preserve this important area, the *National Marine Park of Zakynthos* (NMPZ) was created in 1999 and its Management Body was established in 2000. Some coastal lands were purchased with aid from the World Wild Fund for Nature (WWF) and the EU. Motor boats and water sports are banned and strict regulations are in place concerning building of tourism facilities, access to beaches (opening hours and maximum number of tourist allowed), placing of sunbeds and umbrellas, and fishing. However, in 2000 the *European Court of Justice* considered these measures insufficient, and declared that Greece had failed to implement an effective system of protection, thereby violating its obligations under the EU Habitats Directive.

Since then, several efforts have been made to comply with the Court's ruling and implement the protection measures prescribed by the legislation. Between 2001 and 2004, the NMPZ Management Body implemented a *comprehensive coastal zone management project*, funded by YPEHODE, the Prefecture of Zakynthos, and the Municipalities of Laganas and Zakynthos, with the contribution of the EU LIFE-Environment programme. The project helped to build (a partial) consensus around the protected marine area, owing to a participatory and co-management process involving stakeholders, NGOs, local businesses, farmers and fishermen, as well as dissemination and training activities (NMPZ, 2004). A systematic patrolling programme was launched; the marine areas were demarcated using innovative techniques to respect Posidonia beds. These measures resulted in a reduction of disturbances to the turtles from visitors on beaches and at sea (*e.g.* lower trespassing rate).

Box 4.2 **Tourism pressure on sea turtle nesting sites on Zakynthos Island** *(cont.)*

However, in 2003-04 the NMPZ Management Body faced *severe financial problems*. During the 2004 summer there was no staff to run the park: the public was not provided with information, the area was not sufficiently patrolled and there were repeated violations of the bans and limits set to protect the turtles (*e.g.* illegal anchoring of boats, motor vehicle use and opening up of bars on the sand dunes) (EC, 2004b). The breeding sites were badly affected, leading the European Commission to send a written warning (reasoned opinion), urging Greece to comply with the 2000 Court's ruling.

The *situation has improved* significantly since then. A new Advisory Board of the NMPZ Management Body was appointed, and substantial financial resources were granted to the Park (some EUR 10 million for the period 2005-09) from both national (YPEHODE) and EU funds. The case was put in archive by the European Court of Justice in 2007. With the contribution of NGOs (*e.g.* the Sea Turtle Protection Society of Greece and WWF) and the assistance of volunteers, the nests have been monitored and protected every season. The establishment of the NMPZ has prevented the construction of large tourist resorts. However, some illegal buildings on beaches have not been removed yet and landownership-related problems remain. Actions have been undertaken to facilitate the settlement of disputes among the involved stakeholders. The co-operation amongst responsible authorities (local authorities, Coast Guard and NMPZ Management Body) needs to be further enhanced to ensure more effective patrolling and enforcement Some local people are still hostile towards conservation efforts, because of the limits imposed on tourism development.

and 65% of fauna species of Community interests present in Greece remains unknown (Table 4.5). Further efforts are needed in monitoring and assessing wildlife status to prevent extinction and irreversible decrease of rare and threatened species.

4. Integration of Biodiversity Concerns into Sectoral Policies

4.1 Agriculture

More than half of utilised agricultural area in Greece is considered of high nature value, the highest share in EU15 (EEA, 2004). A quarter is part of the Natura 2000 network. However, the *impacts of farming on biodiversity* have been poorly monitored (OECD, 2008). The abandonment of traditional farming activities leads to

loss of valuable landscapes and cultural features, particularly in rural mountainous areas,[10] while the intensification of agriculture in fertile plains exerts increasing pressure on natural ecosystems and water resources (Chapter 3). Poor farm management practices (including overgrazing and deforestation), farming on steep slopes and excessive use of water for irrigation, have contributed to soil erosion, loss of semi-natural habitats and wetland degradation. The population of nearly half of farmland bird species monitored by Birdlife International is declining.

Greece has *no stand-alone sustainable agriculture strategy*; the integration of nature conservation objectives follows the rules and instruments set under the EU Common Agricultural Policy. Under the "cross-compliance" mechanism, farmers benefitting from direct payments are required to keep their lands in Good Agricultural and Environmental Condition (GAEC) and to meet the environmental Statutory Management Requirements (SMRs) stemming from the EU legislation. GEAC and SMRs are adapted to national and local specificities, as detailed in the National Rural Development Programme (NRDP) 2007-13; Greece has defined few and rather general SMRs pursuant to the Birds and Habitats Directives, reflecting a weak level of protection (Farmer *et al.*, 2007). Soil management is a priority of Greek agricultural policy, as reflected in the Code of Good Farming Practice defined in the NRDP 2007-13.[11]

In the 2000-06 period, the NRDP allocated about 6.5% of overall public funds (EUR 400 million, 75% of which funded by the EU) to *Agri-Environmental Measures* (AEM).[12] These measures are contract-based compensation payments for the voluntary application of environment-friendly methods (beyond those set out in the Code of Good Farming Practice) for a minimum of five years. More than half of the funding of agri-environmental measures was allocated to promote organic farming and 40% to the reduction of water pollution of agricultural origin, including in the wetlands (*e.g.* the lakes Pamvotis, Doirani, Volvi and Koronia) (Chapter 3). The remaining 10% was almost completely earmarked for biodiversity conservation, including conservation of native crop varieties and livestock breeds,[13] farmland habitats important for wildlife (*e.g.* hedgerows) and Natura 2000 areas (OECD, 2008). For the period 2007-13, more than one third of NRDP 2007-13 public funds (EUR 1.7 billion, including EU support from 50% to 85% depending on the region) is earmarked for improving the environment and the countryside (second thematic axis), with the following objectives: *i)* conservation of biodiversity and soil quality; *ii)* development of agricultural and forestry sustainable practices; *iii)* protection of traditional rural landscapes; *iv)* rational management of water.[14] Greece is *lagging behind other EU countries in implementing AEMs*. Despite the growing number of contracts, these cover only 8.7% of the utilised agricultural areas, compared with an EU average of 23%. The main characteristics of Greek agriculture (the small size of holdings, land parcelling, vulnerable marketing structures, low skill and education

levels and an ageing population) slow down the implementation of innovative programmes, such as those related to nature and landscape conservation. Many farmers remain largely uninformed about the environmental impacts of their agricultural practices and valuable natural features of their farmlands. On the contrary, partly owing to the 2000-06 NRDP financial support, *organically cultivated crop areas* increased markedly (at a 7.3% annual average rate between 2003 and 2006), reaching 7.6% of utilised agricultural area (about 300 000 ha), the third highest share in OECD-Europe (EC, 2008b). The monitoring and evaluation of agricultural support need to be strengthened, to understand better the effectiveness of AEMs and the agriculture impacts on biodiversity.

4.2 Forestry

Forests cover about 30% of Greek territory, two thirds of which are in public ownership. Nearly 58% of the Natura 2000 area is covered by forests. Greek forests are almost entirely considered as semi-natural (*i.e.* influenced by human intervention) and appear relatively healthy: the share of trees affected by severe *defoliation* has been decreasing and is now 20% (compared to an EU average of 23%). Forest biodiversity has not been highly affected by *invasive alien species*, despite the presence of some tree species that displace the native vegetation (*e.g.* the Tree-of-heaven) and some fungi (*e.g.* the Dutch elm disease) (EEA, 2008). *Fires*, grazing, illegal cutting and insects represent the main pressures on forest ecosystems; fires also amplify the problem of desertification: the burnt areas continued to increase during the review period, but remained low compared to the last decade, with the exception of the 2007 ravaging fires (Box 7.4). In 2007, more than 30 000 ha of forests in Natura 2000 sites were seriously damaged,[15] with harsh consequences on mammal species (*e.g.* the golden jackal and the wild cat) and endemic plants. In 2008, more than 18 000 ha burnt, mainly in the island of Rhodi (JRC-IES, 2008).

The main piece of forest legislation is the 2003 *Forest Law*, which adopts the principles of sustainable forest management, biodiversity conservation and multiple uses of forest lands. A Forest Functional Plan is in place, including measures for burnt land restoration, fire protection, improvement of degraded forests, designation of protected forests, and completion of the *National Forest Registry* (Greek National Committee for Combating Desertification, 2006). Programmes for the protection and restoration of burned forest areas are in place (*e.g.* Parnitha Mountain, Olympia, Kaiafas). However, the reforestation rate of burnt and degraded forestlands almost halved during the review period, and the Government expects to complete the National Forest Registry not earlier than 2012 (Chapter 7). A Thematic Strategy for Forests and Mountainous Ecosystems will be developed to improve the integration of biodiversity issues in forest management.

Regional Forest Services are in charge of *managing forested areas*, including ranger services, and of developing *ad hoc* management plans. These plans regulate tree cutting, grazing, hunting (on the basis of annual ministerial decisions), use of chemicals, collection of herbs and other plant species. Forest management plans do not always fully integrate biodiversity conservation objectives. Only 4% of forested land (about 160 000 ha) is managed for biodiversity protection, 20% of which for *in situ* conservation of genetic resources. Only one productive forest is eco-certified (by the Forest Stewardship Council), covering about 31 500 ha (less than 1% of forest area), but there are plans to implement a national certification system. *Total expenditure* for long-term sustainable services from forests has decreased in the period 2000-05 (MCPFE, UNECE and FAO, 2007).

4.3 Fisheries

Greece has a *long-standing tradition in fisheries and aquaculture*, owing to its geographical features and rich biodiversity of its surrounding marine areas (nearly 450 marine fish species). Greek fisheries policy is based on *sustainable management objectives* (including rational exploitation of fisheries resources and protection of vulnerable areas and species), and is heavily influenced by the EU Common Fisheries Policy. Greek national measures aim at regulating the fishing effort, by setting minimum landing size of commercial species, mesh size regulations, closed areas and seasons, minimum depths and distances from shore for fishing and penalties for infringements (Chapter 8).

Fisheries in Greek waters target mainly small pelagic fish stocks, but also demersal species, bluefin tuna, swordfish and albacore. To minimise the *impacts of fishing activities on the protected aquatic fauna* (random capture of sea mammals and water birds), the usage of drift nets and pelagic trawling have been banned. For the conservation of the habitats of endangered aquatic organisms, protection zones restricted to fishing have been defined.[16] The licensing procedure for aquaculture farms controls for the introduction of alien species. There are plans to establish Areas of Organized Aquaculture Development, to increase efficiency of aquaculture activities and to better integrate them in coastal zone management (OECD, 2005). Greek fishermen are becoming gradually aware that fisheries are highly dependent on healthy ecosystems. Some associations have favoured the designation of fisheries-restricted reserves as a way to restore natural habitats and increase abundance and diversity of fishstock (IUCN, 2007).

Fisheries represent a major threat to the population of the endangered *Mediterranean monk seal and the loggerhead sea turtle*, which live along the Greek coastline: overfishing causes the reduction of available food; accidental entrapment in

fishing gear and deliberate killing by fishermen are among the major causes of injuries to these animals.[17] At the same time, fishermen bear income losses due to damage in the gear and reduced fish catches. The Hellenic Society for the Study and Protection of the Monk Seal promoted a 2005-09 project (co-funded under the EU LIFE-Nature programme) to draft and implement an action plan to mitigate the seal-fisheries conflict, with the active participation of fishermen. The project also aims at evaluating and revising the National Conservation Strategy for the Mediterranean Monk Seal. Similar programmes of cooperation with fishermen have been undertaken by the Sea Turtle Protection Society of Greece (ARCHELON) in several parts of the country.

4.4 Tourism

The *tourism sector* plays a major and growing role in the Greek economy (Box 5.1). Greece is one of the most popular European destinations, especially for beach tourism: in 2006, the country accounted for 4.5% of total international overnights in the European Union. Tourism activity is sharply seasonal and concentrated in islands and coastal areas. More than 70% of international tourists arrive between May and September, and 80% of overnights take place in southern Aegean Islands, Crete, Ionian Islands, Attica and central Macedonia.

Tourism development exerts considerable *pressure on biodiversity, nature and landscape*, in particular in coastal zones. Cases of uncontrolled construction, including building of vacation houses were reported during the review period, leading in some cases to severe disturbance or loss of ecosystems (*e.g.* sand-dunes and wetlands). Tourist activities and water sports often disturb wildlife and pollute marine waters and shores. For example, the intense summer tourist flow in the Zakynthos Island damaged many nesting grounds of the loggerhead sea turtle, and many specimens were injured by speedboats (Box 4.2). The population increases two to ten-fold during summer periods in many islands, where basic environmental and sanitation services (*e.g.* wastewater treatment, waste collection) appear inadequate and undersized. The environmentally careless behaviour of tourists is also an issue.

The main objectives of the *Greek tourism policy* are to diversify and to enrich the quality of the tourist product, by developing special types of tourisms (*e.g.* thermal, rural, ecological and business tourism) and increasing the supply of hotel, resorts and other tourist facilities (*e.g.* golf courses and yacht harbours). There is growing awareness of the need to preserve the country's natural environment and cultural heritage, as assets for tourism development. Investments have been promoted to develop traditional settlements, recreational activities in National Parks and mountainous areas, as well as more eco-friendly lodgings and environmental education programmes. Eco-tourism infrastructures have been developed in some regions, such as Epirus and

Crete; some hotel operators have voluntarily adopted environmental management systems. The Development Law and the Operational Programme "Competitiveness" provide for financial support to implement environmental investment programmes in tourist facilities (*e.g.* energy efficiency, solar energy, wastewater treatment).

The integration of nature conservation issues in tourism development is strictly linked to *coastal zone management and land use planning*. The Specific Framework Plan for Coastal Zones and Islands and the Specific Framework Plan for Tourism (in preparation) set specific restrictions on construction of tourist facilities, especially along the coastline. Tourism infrastructure development may be limited or subject to stricter control in specifically identified areas, the "Areas of Controlled Tourism Development". The "Areas of Integrated Tourism Development" (*e.g.* those in Messinia) aim to control tourism development and improve the whole range of tourism services (Chapter 7). The mandatory environmental impact assessment (EIA) for new tourism facilities and special tourism infrastructure have contributed to the integration of environmental concerns into tourism development projects. However, the challenge is to effectively implement the zoning plans and to systematically enforce regulations, including EIA. Appropriate participation mechanisms are needed to involve local communities and ensure sustainable and equitable tourism development.

5. International Issues

Greek policy on biodiversity conservation has largely benefitted from the impulse of *international agreements*, including the United Nations Conventions on Biological Diversity (CBD), on International Trade in Endangered and Threatened Species of Wild Flora and Fauna (CITES), and to Combat Desertification (CCD), as well as the Barcelona, Ramsar, Bonn and Bern Conventions.[18] During the review period, Greece ratified the Cartagena Protocol on Biosafety to the CBD, the Prevention and Emergency Protocol to the Barcelona Convention, the International Convention on the Regulation of Whaling and its protocol (Table 4.1). YPEHODE is the main national focal point for nature related international agreements; YAAT is the national focal point for CITES and for the FAO International Treaty on Plant Genetic Resources for Food and Agriculture.

Greek policy documents explicitly refer to the *CBD* and its target of reducing the current rate of biodiversity loss by 2010. However, Greece has often been late in complying with reporting obligations under the Convention and, more importantly, is among the four OECD countries that have not yet submitted the National Biodiversity Strategy and Action Plan. Greece is strongly committed to the CBD *Cartagena Protocol's objective* of ensuring the safe handling of genetically-modified organisms (GMOs) to protect biodiversity and human health (Box 4.3).

Box 4.3 **Biosafety policy**

Greece has traditionally placed high *political attention to biosafety*. The Greek public has been generally opposed to imported and domestic foodstuffs containing genetically-modified organisms (GMOs), as well as to agricultural research and experimentation involving biotechnologies. No biotech products have been developed or field-tested in Greece. By 2005, all 54 Prefectures had voted to declare themselves GMO-free. Some GMO-produced soybeans and soybean meal are imported, although many Greek food producers demand that the importers and soybean processors provide certificates indicating that the product is GMO-free. A Ministerial Decision requires a "non presence" of GMOs in imported seeds.

In early 2005, Greece started implementing the *EU Regulation on Traceability and Labelling*, administered by the Hellenic Food Control Agency (of the Ministry of Development, Industry and Trade). The Agency is charged with enforcing biotech food controls and food labelling, and with tracking the movement of genetically-modified products through the production and distribution chains. The Greek Ministry of Rural Development and Food (YAAT) is responsible for controlling imports of agricultural products and food at customs, and for checking that biotech labelling on feed and seed imports is in conformance with EU norms. The National Chemical Laboratory, under the Ministry of Economy and Finance, conducts all laboratory testing on food products.

The *National Biotechnology Committee* reviews, on a case-by-case basis, dossiers prepared by the European Commission on requests for GMO applications within the EU. The Committee includes eminent academics and representatives from seven ministries (YAAT, Health, YPEHODE, Development, Economy and Finance, Foreign Affairs and Culture). A *National Bioethics Committee* (established in 2002) operates separately from the National Biotechnology Committee, and submits reports to YPEHODE. It includes representatives from the Greek Orthodox Church, universities, NGOs and consumer organisations. The National Agricultural Research Foundation (under the YAAT), has established a Biotechnology Research Section, and several universities conduct biotechnology research and training programmes (*e.g.* Aristotelian University of Thessaloniki; University of Crete).

Pursuant to *CCD* obligations, in 2001 Greece adopted the National Action Plan to combat desertification (Chapter 7). The Plan provides the framework for integrating anti-desertification measures into land use planning, coastal zone management, and sectoral policies (especially agriculture and forestry). During the review period, Greece introduced additional implementing provisions for *CITES*, including a licensing scheme to control international movements of threatened and endangered species (Chapter 8).

Greece has always been deeply involved in activities to preserve the biodiversity of the *Mediterranean area* and control for marine pollution, including participating in activities under the Barcelona Convention and its protocols. The Coordinating Unit of the UNEP Mediterranean Action Programme is based in Athens, and the Greek government provides for financial and logistic support (Chapter 8). Greece has engaged in several bilateral cooperation projects for the conservation and sustainable use of biodiversity (*e.g.* the management of the transboundary Park of Prespa Lakes, shared with Albania and FYROM), often within the framework of the Official Development Assistance (YPEHODE, 2008).

Greece has established *protected areas under international conventions and programmes* (Table 4.6). There have been no significant changes in number and surface of these protected areas since 1998. As Party to the Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and contiguous Atlantic Area (ACCOBAMS), Greece was recommended in 2007 to establish eight *marine protected areas for cetaceans* in its territorial seas.[19] *Ramsar wetlands* are managed jointly by the Management Bodies for nature conservation (MBs) and the water authorities (Regional Water Directorates); MBs are in charge of elaborating the management plans. Greece actively participates in the Mediterranean Wetland Initiative (MedWet), a regional initiative of the Ramsar Convention, and hosts one of the five MedWet Centres. During the review period, major conservation and restoration projects were implemented with the support of the EU LIFE-Nature

Table 4.6 **Protected areas under international agreements,**[a] 2007

	Sites (number)	Area of sites (ha)	International agreement
SPAs[b]	9	260 176	Barcelona Convention
Biogenetic reserves	16	22 260	Council of Europe
World heritage	2[c]	34 075	Paris Convention
Biosphere reserves	2	9 000	UNESCO
European diploma	1	5 100	Council of Europe
Wetlands	10	168 700	Ramsar Convention

a) Excludes SPAs and SCIs under EU Directives.
b) Specially Protected Areas as defined by the Protocol to the Barcelona Convention concerning Specially Protected Areas and Biological Diversity in the Mediterranean.
c) Including Mount Athos.
Source: YPEHODE.

programme (*e.g.* the restoration of the Drana Lagoon of the Evros Delta). Other projects are foreseen within the EU Operational Programme for the Environment and Sustainable Development 2007-13, including the restoration of Lake Koronia. Nonetheless, protection of wetlands needs to be reinforced. Only three out of ten Ramsar wetlands in Greece have been removed from the Montreux Record of sites whose ecological character has been changed or is threatened by human activities.[20]

Notes

1. Some bird species (*e.g.* Pelecanus crispus) nest only in Greece.
2. National parks of: Shinias-Marathonas (2000), Lakes Volvi-Koronia (2004), Northern Pindos (2005), Messolonghi Lagoons (2006), Dadia-Lefkimi-Soufli (2006), Kerkini Lake (2006), Evros Delta (2007), Amvrakikos wetlands (2008), Nestos Delta and Lakes Vistonis-Ismaris (2008). The Tzoumerka National Park was formally established in early 2009, four others will follow; in 2009, 4 new protected areas will be designated: Prespa, Acheron-Kalamas estuary, Kotychi wetland-Strofylia forest and Parnon mountain.
3. All game reserves were changed into wildlife refuges, which provide for a higher level of protection of game wealth and of wild flora and fauna.
4. Birdlife International maintains a reference list of Important Bird Areas (IBAs) in support of an array of regional agreements, including the Emerald Network under the Bern Convention, the Barcelona Convention and EU Birds Directive. YPEHODE has recently undertaken an analysis of Greek IBAs, aiming at their future designation as SPAs.
5. In 2005, the European Commission pointed out that conservation measures were not implemented in the large majority of SPAs. As of end 2008, additional conservation measures were under consideration.
6. The RFS are decentralised government bodies that are entirely under the control of the Ministry of Rural Development and Food. The RFSs have traditionally implemented a restricitve management regime, often leading to conflicts with rural communities and visitors. The forest-oriented approach is believed to have hindered integration of nature conservation into local development (Papageorgiou and Vogiatzakis, 2006).
7. Management Bodies are responsible for: elaborating regulations and management plans; monitoring and assessment; delivery of opinions on building permits and other projects; public information; organisation of recreational activities and management of visitors.
8. EU contibution accounts for about 80% of the 2000-06 and 2007-13 Programmes and for 60% of LIFE funded projects.
9. The Greek Ombudsman reports that about 25-30% of complains handled by the Department for Quality of Life are related to the natural environment (nearly 500 cases per year), indicating that there are considerable pressures due to illegal constructions, pollution and degradation of sites.
10. Nearly 83% of the total agricultural land is classified as less-favoured area (*i.e.* land of poor productivity), mainly located in the mountains.
11. Many GFP recommendations address soil cover, crop rotation, cultivation practices (*e.g.* ploughing on slopes), management of crop residues (*e.g.* the elimination of crop residues after harvest by burning is strictly forbidden and controlled), and lifestock density to avoid overgrazing (EEA, 2005).
12. Between 2000 and 2006, actual expenditure on agri-environmental measures was EUR 122 million (including EU funds and national co-financing).

13. These measures have supported the population growth of many farm breeds. The sheep breeds of Chios and Anogia were removed from the endangered species catalogue. However, 12 breeds are now extinct.
14. Under the NRDP 2007-13, the Ministry of Rural Development and Food will implement actions for the maintenance of plant resources under threat of genetic erosion, and for promoting farming practices compatible with the protection of wildlife (such as bear, jackal and birds).
15. In particular, the sites of community interest: Kaiafa forest and lake, Olympia, Foloi plateau, Mount Taygetos, Mount Parnonas, Mounts Barbas and Klokos, Selinountas Gorge, Vouraikos Gorge (WWF Greece, 2007).
16. Five feasibility studies were launched for the building of artificial reefs nearby Kalymnos Island, Ierissos Gulf, Messolonghi Lagoon, and the estuaries of Alfios and Preveza (YPEHODE, 2006).
17. It is estimated that 35% of young seal deaths are due to accidental entrapment in fishing gear; deliberate killing accounts for more than 50% of adult seal deaths (MOM, 2007).
18. Barcelona Convention on the Protection of the Mediterranean Sea Against Pollution (1970), Ramsar Convention on Wetlands of International Importance (1971), Bonn Convention on Conserving Migratory Species of Wild Animals (1979), Bern Convention on the Conservation of European Wildlife and Natural Habitats (1979).
19. Kalamos; Eastern Ionian Sea and Gulf of Corinth; Gulf of Saronikos and adjacent waters; waters surrounding the northern Sporades; northern Aegean Sea; waters surrounding the Dodecanese; Amvrakikos Gulf; south-west Crete and Hellenic Trench.
20. The artificial Lake Kerkini, the Evros Delta and the Lake Mikri Prespa were removed from the list in 1999.

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5 ENVIRONMENTAL-ECONOMIC INTERFACE*

Features

- Decoupling environmental pressures from economic growth
- Resource intensity
- Sustainable development
- Environment-related taxes and subsidies
- Implementation of environmental policies
- Environmental expenditure

* This chapter reviews progress in the last ten years, and particularly since the 2000 OECD Environmental Performance Review. It also reviews progress with respect to the objectives of the 2001 OECD Environmental Strategy.

Recommendations

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Greece:

- include appropriate *targets and objectives* in the revised National Strategy for Sustainable Development;
- utilise fully the *institutions on sustainable development* now in place to ensure the implementation of the revised National Strategy for Sustainable Development; continue focusing sector integration and sound long-term planning with a view to achieve a low-carbon, energy and material efficient economy;
- expand the use of economic instruments as part of a green *fiscal reform* (*e.g.* energy taxation, progressive car taxation in relation to pollution);
- progressively eliminate *environmentally harmful subsidies* (*e.g.* agriculture water tariffs); consider replacing tax exemptions (*e.g.* on heating oil) with more targeted social compensation schemes;
- review the economic efficiency of *environmental subsidies* (*e.g.* to renewable energy sources) and revise them accordingly;
- further strengthen the visibility, human and financial resources, and influence of the *environmental administration* at all levels;
- strengthen overall *environmental financial efforts*, moving progressively towards full implementation of the polluter-pays and user-pays principles;
- implement plans to strengthen the financial and human resources devoted to the new environmental inspectorate; continue to promote *compliance with and enforcement of environmental and land use regulations*;
- review and revise prices, taxes and subsidies, with the aim of internalising environmental externalities; expand the use of *economic instruments* to serve environmental objectives;
- strengthen the analytical basis for decision-making, including *environmental data*, and *economic information* on the environment (*e.g.* environmental expenditure, environment-related taxes, resource prices, employment).

Conclusions

Integrating environmental concerns into economic decisions

In the context of rapid economic growth and structural changes, key accomplishments include the elaboration of a national sustainable development strategy, strengthening of the environmental impact assessment process, and the

establishment of a strategic environmental assessment process. *Environmental impact assessments* have been in place since 1990; they have now become an operational tool most important in a period dominated by *infrastructure building* (*e.g.* transport, energy, water). *Strategic environmental assessments* (SEA) are now embedded in law; the 2004 Olympic Games went through an SEA. Environmental objectives have been largely integrated into *EU funded programmes*. In the 2000-06 programming period, about 25% of EU support (excluding agriculture-related support) was allocated to environment-related investments at large (averaging 0.8% of GDP). Progress has been made in reducing *some emission and resource intensities* (*e.g.* NO_x and nitrogen fertilisers), showing a relative (although still limited) decoupling of environmental pressures from economic growth. The *energy intensity* of the economy has been considerably reduced, and steps have been taken to promote reliance on natural gas.

However, the *2002 National Strategy for Sustainable Development* has not been fully used to its potential as an integrative tool. The strategy has not been really influential over the past years and it has not been thoroughly monitored. It does not include targets, and focuses on the environmental dimension. The revised strategy should be more influential as an integrative policy tool with measurable targets and more operational monitoring and evaluation mechanisms. Overall *material intensity* in Greece is well above the OECD average, especially for fossil fuels (reflecting the country's large use of domestic lignite). Revenues from *environment-related taxes* as a share of GDP decreased during the review period, reaching 1.9% of GDP, among the lowest shares in OECD. *Energy and fuel taxes* are relatively low in Greece, and there is scope and need to apply economic instruments to encourage a shift to less polluting energy production. Electricity from lignite is exempted from the excise duty, and several *discounts and tax breaks on energy prices* are used for social purposes. Greece should consider revising taxes or charges to influence demand, and introducing targeted compensation schemes to address social issues. *Vehicle taxes* take account of fuel efficiency and environmental performance only to a limited extent.

Strengthening the implementation of environmental policies

The Greek environmental policy is largely based on environmental regulations, and on EU directives. During the review period, Greece passed important *environmental legislation* and transposed recent EU directives. Positive developments in the review period include the creation of the *ombudsman* with, *inter alia*, environmental responsibilities and of an operational *environmental inspectorate*, as well as positive results of surveillance and enforcement concerning marine pollution. Greece also made significant progress in constructing *urban wastewater treatment* infrastructure (with large financial transfers from the EU funds); all major wastewater infrastructure projects are

scheduled to be completed by 2013. Considerable progress was achieved in *water pricing*, with recovery rates reaching 95% in large cities like Athens. This positive development is largely driven by the EU Water Framework Directive, which requires the implementation of water-pricing policies towards the recovery of water service costs by 2010. Greece made important strides in closing down many illegal landfills by the end of 2008. *Waste management* and recycling improved during the review period.

Lack of *enforcement* remains the Achilles heel of *environmental and land use* policy implementation, weakening the effectiveness of regulations and permitting. Despite the establishment of the new environmental inspectorate and its good start, further efforts are needed to provide it with the capacity and instruments that it requires to fulfil its mandate. Greece needs to persist in its efforts to close the remaining illegal *landfills*. In many parts of the country, local authorities have experienced difficulties in opening legal/sanitary landfills due to opposition by local communities. Overall, better understanding and implementation of the polluter-pays-principle (PPP) and user-pays-principle (UPP) should be fostered, and environmental awareness further promoted. The use of economic analysis and instruments should be expanded. Although Greece has progressively stepped up its pollution abatement and control (PAC) expenditure to 0.7% of GDP, its *environmental expenditure* represents less than 1% of GDP. This is a limited effort compared to OECD countries in a comparable development stage despite considerable EU support. The road to environmental convergence in the EU remains challenging for some issues (*e.g.* air pollution abatement from fixed and mobile sources, waste infrastructure and management). It is suggested that Greece increases significantly its *environmental financial efforts*: *i)* looking beyond 2013 and possible decreases in EU support; and *ii)* moving towards the full implementation of the PPP and UPP, thereby decreasing public support from national and EU sources. The *environmental administration*, which is significant part of the Ministry for the Environment, Spatial Planning and Public Works (YPEHODE), needs to be further strengthened.

♦ ♦ ♦

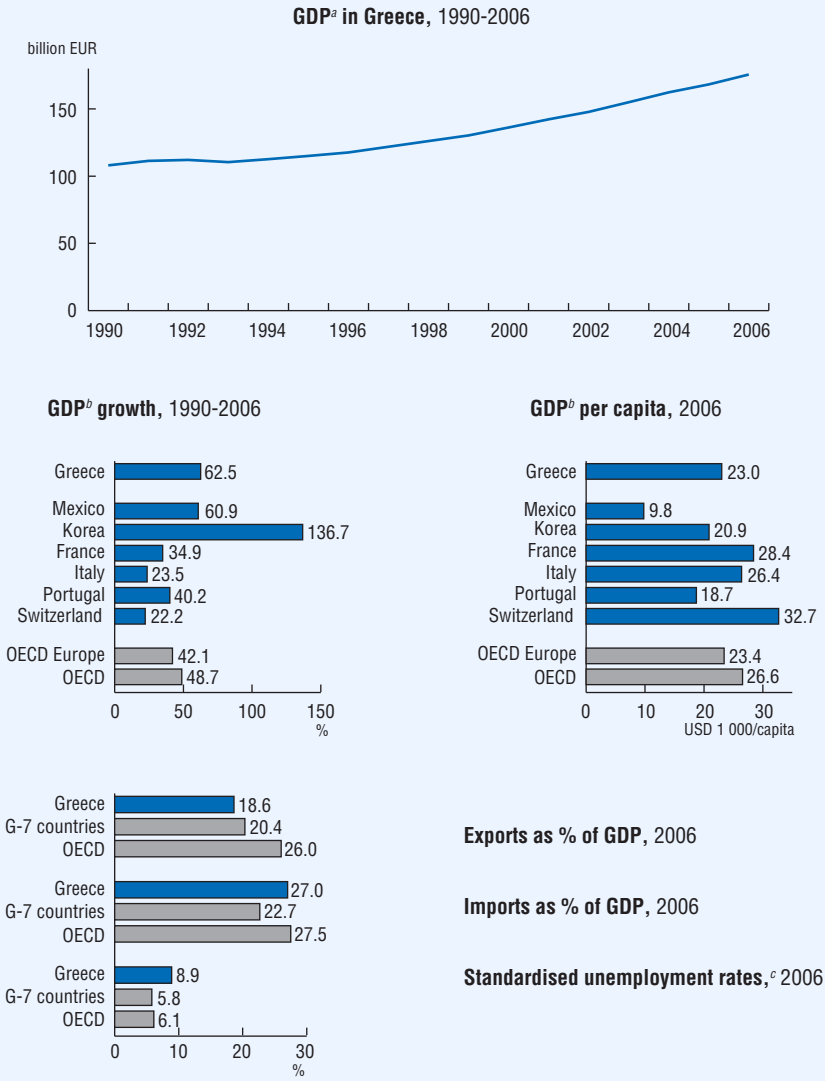
1. Progress Towards Sustainable Development

1.1 Decoupling environmental pressures from economic growth

Economic development

Over the past ten years, the *Greek economy has grown rapidly*, on average by more than 4% per year (Figure 5.1). Explanations include: financial market

Figure 5.1 **Economic structure and trends**



a) GDP at 2000 prices.
b) GDP at 2000 prices and purchasing power parities.
c) % of civilian labour force.
Source: OECD (2007), *OECD Economic Outlook No. 82.*

liberalisation coupled with membership in the European monetary union, which led to a substantial reduction in borrowing costs; European net transfers of the order of 2% of GDP per year; buoyant activity in export markets in South-Eastern Europe; fiscal consolidation, and infrastructure building (*e.g.* transport, energy, 2004 Olympic Games) (Box 5.1).

During the period 2000-06, Greece's both *GDP and international tourism* receipts grew by 29%, while the population increased by 2%. Total primary energy supply and road freight transport increased by 12% and 15%. Industrial production did not grow and agricultural production decreased by 9% (Table 5.1).

Table 5.1 **Economic trends and environmental pressures**

(% change)

	1990-06	1998-06	2000-06
Selected economic trends			
GDP[a]	63	39	29
Population	11	3	2
Agricultural production	14	–1	–9
Industrial production[b]	20	9	0
International tourism receipts	92	82	29
Road freight transport[c]	32	25	15
Passenger car transport[d]	157	70	43
Selected environmental pressures			
Pollution			
CO_2 emissions from energy use[e]	35	13	8
SO_x emissions	14	1	7
NO_x emissions	13	–2	4
Energy			
Total primary energy supply	40	18	12
Total final consumption of energy	46	18	16
Resources			
Municipal waste	64	21	11
Nitrogenous fertiliser use	–47[f]	–22[f]	–20[f]
Pesticide use	31	–10	–7

a) At 2000 prices and PPPs.
b) Includes mining and quarrying, manufacturing, and production of electricity, gas and water.
c) Based on values expressed in tonne-kilometres.
d) Based on values expressed in passenger-kilometres.
e) Sectoral approach; excluding marine and aviation bunkers.
f) To 2005.
Source: OECD, Environment Directorate; IEA-OECD.

Box 5.1 **Economic context**

Greece has *a small open economy*, with a relatively small industrial base. The public sector (government and public enterprises) still plays a major role despite privatisation programmes. Greece joined the European Union in 1981 and has been a major beneficiary of the EU budget ever since. In 2007, *EU net transfers* accounted for 2.5% of GDP. In the programming period 1994-99, about EUR 18 billion in EU structural funds and Greek national financing were spent on projects to modernise and develop Greece's transportation network (*e.g.* new international airport near Athens, new Athens metro system). EU transfers to Greece continued with approximately EUR 27 billion in structural and cohesion funds planned for the programming period 2000-06; but with Greece not fully absorbing these funds. EU funding for EUR 24 billion has been planned in the National Strategic Reference Framework for the programming period 2007-13. EU funds will continue to finance major public works (*e.g.* transport and water infrastructure), upgrade competitiveness and human resources (*e.g.* agriculture and rural areas) and address disparities between poorer and more developed regions.

In 2006, *Greece's GDP* was EUR 214 billion. The data incorporate an upward revision to the level of GDP by about 10%, as agreed to by Eurostat in October 2007. The Greek economy is one of the fastest growing in Europe; its annual GDP growth has exceeded 4% in the recent years. Although this growth rate is set to weaken in 2008, it is still expected to be around 3.4% in 2009 (OECD, 2008a). Greece's per capita GDP in 2006 was just below the OECD Europe average. Inflation has remained fairly stable in recent years; it is currently about 3% per year.

Adoption of the Euro in 2001 provided Greece (which had been a high inflation risk country under the drachma) with access to competitive loan rates. This contributed to a dramatic increase in consumer spending which gave a significant boost to economic growth. Combined with the expenditure increase caused by the preparation of the Athens 2004 Olympics, this resulted in excessive deficits and debt in 2003 and 2004, with the government deficit reaching 7.3% of GDP in 2004. Due to lower post-Olympic spending and tight public spending, the government deficit was 3.1% of GDP* in 2007. The Greek administration has pledged to the European Commission to achieve a balanced budget by 2010.

Greece is a service-based economy. The service sector accounts for 72% of GDP. In particular, *tourism* contributes directly and indirectly to 18% of GDP. About 850 000 people are employed in tourism related activities or one in every 5 jobs. Export earnings from international visitors and tourism goods generate more than 20% of total exports. Between 2000 and 2006, international tourism receipts increased by 29% (to reach EUR 11 billion) and international tourist arrivals by 22% (to reach 17 million). The *industrial sector* is relatively small and accounts for 24% of GDP, one of the smallest shares in OECD-Europe. The manufacturing industry (mainly food and beverages) represents about 13% of GDP, whereas energy-intensive sectors (*e.g.* chemicals, paper products, cement and minerals) have a minor role. The low-energy intensive construction sector accounts for 8.5% of GDP.

Box 5.1 **Economic context** *(cont.)*

Maritime transport also underpins the national economy. Net revenue from sea transportation accounts for 4.2% of GDP, and foreign exchange inflows from the shipping industry amounted to some EUR 11 billion in 2006, an increase of 75% since 2000. The industry also provides direct employment for 30 000 Greek seafarers, with some 150 000 land-based workers serving the maritime enterprises and associated industries.

Although the *unemployment rate* has come down from its record level of 12% in 1999 to about 9% in 2006, it remains high by OECD standards. In its latest stability and growth programme, the government foresees the unemployment rate falling to 7.4% in 2008. However, this masks structural problems. The unemployment rate for women is nearly two-and-half times that for men; and youth unemployment (ages 15-29) is about twice that of people in older age brackets. Long-term unemployed (out of work for more than one year) account for more than half of the total unemployed people. Businesses claim that strict redundancy provisions make them reluctant to hire new workers during periods of growth.

Greece has a sizable *trade deficit*, with imports of goods and services exceeding exports by EUR 26.9 billion in 2006. In merchandise trade exports amount to just one-third of the value of imports. This deficit is largely offset by tourism, shipping and net transfers from the EU, and, decreasingly, by remittances from emigrant workers. Germany, Italy, France, the United States and the United Kingdom form the main market for Greece's exports consisting of manufactured goods, food and beverages, petroleum products, cement and chemicals. Greece imports basic manufactures, food and animals, crude oil, chemicals, machinery and transport equipment mainly from Germany, Italy, France, Japan, Netherlands and the United States. Greek exports to EU countries are increasingly facing competition.

* Unrevised GDP data (European fiscal commitments have been agreed prior to this revision).

Pollution intensities

Emissions of SO_x, NO_x and CO_2 from energy use increased during the review period by 7%, 4% and 8%, at a lower rate than GDP. SO_x emissions have continued to increase in Greece, whereas in many other OECD countries these emissions have decreased significantly and have been strongly decoupled from the use of fossil fuel.

Greece's *SO_x emissions per unit of GDP* are among the highest in the OECD; they are three times the OECD-Europe average. NO_x and CO_2 emissions per unit of GDP are slightly above the OECD-Europe average (Figure 2.1).

Energy intensity and energy efficiency

Greece's *energy intensity* (*i.e.* total primary energy supply per unit of GDP) has been steadily decreasing, reflecting a weak decoupling of TPES from GDP. It decreased by 13.4% between 2000 and 2006 to reach 0.12 tonne of oil equivalent (toe) per USD 1000 of GDP. This is well below the OECD-Europe average, and in the top ten of OECD countries. The relatively low energy intensity reflects rapid GDP growth, the structure of the Greek economy (*e.g.* small industrial base, large international shipping sector) (Box 5.1) and the results of EU funded investments to improve energy efficiency in industry (IEA, 2006).

Greek power production still relies significantly *on lignite* (despite a decreasing share from 36% to 27% of TPES between 1990 and 2006). The role of natural gas increased (since it became available in 1997) to 9% of TPES. Oil accounts for 57%, renewables for 6% and electricity imports for about 1% (Table 2.3). *Fossil fuels* thus represent 93% of energy supply.

Resource intensities

Water withdrawals grew moderately during the review period, mainly due to the increase in irrigation water application rates per hectare (OECD, 2008b). Agriculture accounts for about 85% of total water abstraction. The increasing quantity and intensity of irrigation water use is a concern because the water is extracted largely from aquifers.

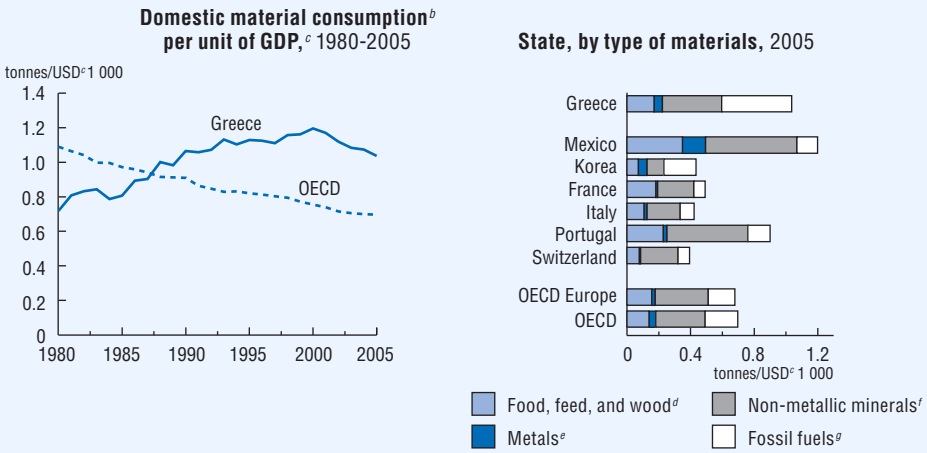
The use of *nitrogen fertilisers and pesticides* decreased during the review period (by about 20% and 7%, respectively). Although the generation of *waste* per capita continues to increase with consumption, it remains below the OECD-Europe average.

In 2005, overall *material intensity* measured as domestic material consumption (DMC) per unit of GDP in Greece was about 50% above the OECD average. While the material intensity of the OECD has been constantly decreasing since 1980, that of Greece increased until 2000 and has then declined (Figure 5.2). Whereas the intensity of use of all broad types of materials (*i.e.* food, feed and wood; metals; non-metallic minerals) is about 50% higher in Greece than in the OECD, it is 100% higher for fossil fuels.[1]

Assessment

Greece has achieved some success in *relative decoupling* of environmental pressures from economic growth: *e.g.* NO_x and CO_2 emissions have been growing slower than GDP. Greece's SO_x emissions per unit of GDP are among the highest in the OECD and SO_x emissions have continued to increase in Greece while many other OECD countries have achieved a strong decoupling. Existing regulations (*e.g.* the use

Figure 5.2 **Material intensity**[a]



a) The material intensity of an economy can be measured as unit of domestic material consumption (DMC) per unit of GDP. A decline in material intensity is equivalent to a rise in material productivity (*i.e.* GDP/DMC).
b) Domestic material consumption is the sum of domestic (raw materials) extraction used by an economy and its physical trade balance (imports minus exports of raw materials and manufactured products).
c) GDP at 2000 prices and purchasing power parities.
d) Domestic production from agriculture, forestry and fisheries, plus trade of raw and processed products from these sectors (*e.g.* cereals, live animals foodstuff, feedstuff, pulp and paper, processed wood, fuel wood, biofuel).
e) Domestic extraction of metal ores, plus trade of metal ores (*e.g.* bauxite) metal concentrates (*e.g.* nickel matte), refined metals (*e.g.* steel, aluminium, copper), products mainly made of metals (*e.g.* vehicles, machinery, electronics and electrical equipments), and scrap.
f) Domestic extraction and trade of minerals used in industry (*e.g.* salts, potash, phosphate rocks) and construction (*e.g.* sand, gravel, stones), plus trade of derived processed products (*e.g.* cement, glass).
g) Coal, crude oil, natural gas, peat and traded derived products (*e.g.* plastic and rubber).
Source: OECD (2008), OECD Pilot MF Database.

of low sulphur oil) and the measures taken by energy operators are expected to bring about a substantial decrease in national SO_x emissions in the near future (Chapter 2). Strong decoupling has been achieved in the use of nitrates and pesticides. The intensity of *water use for irrigation* has continued to increase.

While the agriculture and industry sectors are declining or stable in production, international *tourism* and both passenger and freight *transport* have grown and are likely to continue to grow rapidly. *Energy intensity* has improved and Greece is among the OECD countries performing well for this indicator. Nonetheless, the reduction of lignite consumption should be seen as a priority as it could bring economic and environmental benefits. For instance, lignite combustion is more intensive in air emissions (including greenhouse gases) and coal extraction is land disruptive.

Despite recent progress, there is still room to decrease *material intensity* and increase *resource productivity*. It is recommended that Greece gives more consideration to resource efficiency, as today's investment choices (*e.g.* transport infrastructure, energy production facilities and the building stock) may determine future environmental pressures for decades, and may increase the economy's *resource dependency*. In this respect, Greece may wish to reinforce its integrated product policy and green public procurement, to stimulate the development and wider application of resource efficient technologies and of the 3 Rs (Reduce, Reuse, Recycle waste) principle. This would bring both economic and environmental benefits.

1.2 Sustainable development: framework

Institutional arrangements

"Sustainable development" is *enshrined in Greek law* as a national policy objective by virtue of a 1998 decision by the Council of State. The *National Coordination Committee of the Government Policy for Spatial Planning and Sustainable Development* was established in 2002 with representation from the Secretary-Generals from all relevant Ministries. An advisory council, the National Council for Spatial Planning and Sustainable Development (NCSPSD) was also created with participation from ministries, local authorities, employers and labour unions, research institutions and NGOs.

Overall, the *"sustainable development" concept* is well institutionalised within the Greek Government, and a central theme of numerous strategies and programmes of specialised ministries and institutes.[2] Further, inter-ministerial support and co-ordination, rather weak at the outset, have been strengthened by the preparation of the 2007-13 National Strategic Reference Framework associated to the programming of *EU funding* for Greece. Concerning *strategic sectoral plans and programmes*, the 2006 Joint Ministerial Decision on Strategic Environmental Assessment transposed the EU Directive (2001/42). Concerning *projects*, the 2002 Law on Environmental Impact Assessment amended the previous 1986 Law on Environmental Protection and integrated the EU Directive (97/11/EC) on the same matter.

National Strategy for Sustainable Development

In 2002, the *first Greek National Strategy for Sustainable Development (NSSD)* was approved by the Council of Ministers, following its preparation by the Ministry for the Environment, Physical Planning and Public Works (YPEHODE) and the National Centre for the Environment and Sustainable Development (NCESD). The Strategy benefited from collaboration within an Inter-ministerial Coordination Committee composed of representatives of several ministries and serving as the

National Preparatory Committee for the 2002 Johannesburg World Summit on Sustainable Development (WSSD). The NSSD was responding to the requirement of the WSSD.

The *goal of the 2002 NSSD* was to promote economic growth in Greece while safeguarding social cohesion and environmental quality. It articulates a set of *principles* for the formulation of an action plan in line with international challenges and commitments, including EU policy and legislation. The NSSD sets three basic principles for environmental policy: the precautionary principle; the polluter-pays-principle; and the equity and shared responsibility principle. It includes as *priorities*: addressing climate change, reducing air pollution, managing solid waste, managing water, combating desertification, protecting biodiversity and natural ecosystems, and managing sustainability of forests.

The NSSD was a first attempt to prioritise key issues, including *environmental issues*. It identifies the main sector for action for each environmental issue. In the case of climate change, the national strategy was integrated in the relevant sectoral policies, energy and transport. The *social issues* are less explicit in the NSSD. The social dimension consists of broad principles and orientations that can be drawn on to determine actions and measures for an integrated intervention programme to promote social solidarity policies. Five issues are considered: exclusion from employment opportunities; enhancement of equal opportunities between men and women; exclusion from other public goods; prevention from exclusion risk; and action to protect vulnerable population groups. The NSSD further addresses the integration of sustainable development into *sectoral policies*, such as spatial planning (regional development, physical planning and urban planning), energy, transport, agriculture, fisheries, industry, tourism and employment policies. The strategy does not specify targets for the sectoral policies. Instead, it sets overall objectives, such as promoting alternative energy, improving transport systems, and promoting alternative forms of tourism. Finally, the NSSD includes a section on horizontal actions in three areas: the use of economic instruments; information collection and management; and institutional and administrative reform.

The *NSSD was to be implemented by 2010*, with progress monitored through appropriate indicators drawn from the EU's work on sustainable development indicators. The National Council for Spatial Planning and Sustainable Development was established to coordinate and implement the NSSD with representatives from YPEHODE, local authorities, employer and trade unions, research institutes and NGOs. The close *linkage between the Greek NSSD and the EU Sustainable Development Strategy*, with the requirement for periodic reporting by member States to the European Commission on national implementation efforts, should ensure Greece's continuing commitment, focus and progress.

In 2007, the National Strategy was revised, based on proposals from ministries and extensive consultations with regional and local officials, and with a broad range of private stakeholders. The revision encompasses the *priorities of the 2006 Renewed EU Sustainable Development Strategy*, plus four additional chapters on matters of national priority: culture, tourism, agriculture and physical planning. Responsibility for review and monitoring of NSSD implementation is vested in a reconstituted National Council for Spatial Planning and Sustainable Development, supported by the NCESD. Biennial progress reports are to be produced by the Council, along with contributions to Greece's reports to the European Commission on progress with implementation. This revised National Strategy is set to be adopted by the Council of Ministers in 2009.

Box 5.2 **Sustainable development: international aspects**

Greece has been very supportive of sustainable development initiatives and programmes at the regional and global levels. In 1996 it agreed with the other contracting parties to the Barcelona Convention to establish a Mediterranean Commission on Sustainable Development; in 2001 Greece joined the other Mediterranean countries in calling for preparation by the EU Commission of a *Mediterranean Strategy for Sustainable Development (MSSD)*. In 2002, Greece hosted the 2nd Euro-Mediterranean Ministerial Conference on the Environment in Athens which endorsed the Strategy initiative and agreed to announce jointly at the 2002 Johannesburg World Summit on Sustainable Development (WSSD) the intention to produce the MSSD. This regional Strategy, completed in 2005, draws together a variety of global sustainable development-related initiatives and links them to national policies and actions, and also to the EU Sustainable Development Strategy.

At the WSSD, the Greek government *played a central role in the launching of three* "*Type II Partnership*" initiatives focusing on water resources management: *i)* the Mediterranean Education Initiative for Environment and Sustainability (MEDIES), with emphasis on water and waste; *ii)* the Euro-Mediterranean Water-Poverty Facility; and *iii)* Sustainable Water Management in the Balkan and south-east Mediterranean Area. Further, Greece has also contributed to the "Water for Life" programme which the EU launched at the World Summit. This is consistent with Greece's role as the lead country for the Mediterranean Component of the EU Water Initiative (MED EUWI), involving countries from South-Eastern Europe, the Middle East and Africa, and to which Greece has contributed EUR 100 000 annually since 2003. The promotion of common approaches to sustainable development is an important element of discussions and co-operation in numerous "Joint Ministerial Committees for Economic and Technical Cooperation" involving Greece and third countries.

Future monitoring and performance evaluation of the NSSD should be aided by an updated list of *sustainable development indicators*, currently under development. These are based on "Environmental Signals – A Report on Sustainability Indicators", prepared by the NCESD in 2003. YPEHODE has been collaborating with the Universities of Athens and the Aegean on the development of indicators in the framework of a UNEP/MAP initiative on "Indicators for Sustainable Development for the Mediterranean". Greece has been very supportive of sustainable development initiatives in this region (Box 5.2).

Overall, the Greek government made a significant effort to develop the 2002 NSSD in a comprehensive manner. However, this strategy lacked clear measurable targets, indicators and timelines and did not involve participation by the public. No strong monitoring system was put in place and the governance structure to ensure the implementation of the strategy was weak. The currently ongoing *revision of the NSSD seems to address these weaknesses*. The revised NSSD should include appropriate measurable and time-bound objectives and targets, and related indicators. An appropriate governance structure should be established to ensure the implementation of the strategy; this includes defining clear roles and responsibilities for better accountability among all levels of government. In the future, the NSSD should be regarded as an integrative tool to address horizontal issues and to translate sustainable development in sectoral policies.

1.3 Sustainable development in practice: institutional integration

Investment programming: environmental concerns in regional and rural development programmes

Greece has been a major beneficiary of *EU funding* (Box 5.1). In the *programming period 2000-06*, net EU transfers represented annually 2.4% of GDP on average (Table 5.2); transfers from Structural and Cohesion Funds amounted to about 48% of total public capital expenditure in Greece (EC, 2007).[3] Nevertheless EU transfers have led the public administration to focus on investment programming, and the Greek economy to benefit from large investments in public infrastructure. This applies particularly to environmental investments, for which Greece has benefited from Cohesion and Structural Funds, rural development aid, and the LIFE programme. Environmental objectives have been largely integrated into development programmes promoting economic and social cohesion. Indeed, EU funds represent the main financial source for public investment expenditure in environmental sectors in all Greek regions (GHK, 2006).

In 2000-06, EU funds of about EUR 2.7 billion (EUR 1.6 billion from Cohesion Fund and EUR 1.1 billion from Structural Funds) were allocated to *environmental infrastructure and nature protection* (EUR 3.6 billion including national co-financing).[4] This financial allocation corresponded to about 10% of the total EU support available for Greece and averaged 0.23% of GDP (or 0.3% of GDP if national co-financing is included) (Table 5.3). The water sector received over 65% of these funds, followed by waste management (25%); nature conservation received a minor share (6%). When considering an extended definition of environment-related expenditure,[5] the overall planned budget for *environment-related investments* increases to EUR 9.9 billion (including 30% co-financing from Greece), representing 25% of the overall planned budget for all types of investments supported by the EU and an annual average of 0.8% of GDP.

Table 5.2 **EU transfers**

	Agricultural aid[a]	Structural and Cohesion Funds	Other expenditure[b]	Gross EU transfers (A + B + C)			Contribution to EU budget	Net EU transfers (A + B + C – D)		
				Total	Per capita	Per GDP		Total	Per capita	Per GDP
	(A)	(B)	(C)				(D)			
	(EUR million)	(EUR million)	(EUR million)	(EUR million)	(EUR)	(%)	(EUR million)	(EUR million)	(EUR)	(%)
					2004					
Spain	6 345	9 627	384	16 357	383	*1.9*	7 429	8 928	209	*1.1*
Greece	2 780	2 843	185	5 808	525	*3.1*	1 546	4 262	385	*2.3*
Portugal	828	3 472	115	4 414	420	*3.1*	1 211	3 204	305	*2.2*
Ireland	1 846	839	130	2 815	696	*1.9*	1 122	1 693	418	*1.1*
					2007					
Spain	6 973	5 430	393	12 796	285	*1.2*	8 548	4 248	95	*0.4*
Greece	3 644	4 591	194	8 429	755	*3.7*	2 790	5 639	505	*2.5*
Portugal	1 300	2 456	149	3 904	368	*2.4*	1 323	2 581	243	*1.6*
Ireland	1 763	264	140	2 167	499	*1.2*	1 368	798	184	*0.4*

a) 2007: "Preservation and management of natural resources" in the 2007-13 financial framework.
b) 2004: internal policies, administration; 2007: competitiveness for growth and employment, citizenship, freedom, security and justice, administration.
Source: European Commission.

Table 5.3 **EU funds for regional and rural development in Greece,**[a] 2000-06 and 2007-13

Intervention categories[d]	2000-06[b]			2007-13[c]		
	Planned EU contribution	Annual average	Share	Planned EU contribution	Annual average	Share
	(EUR million)	(EUR million)	(%)	(EUR million)	(EUR million)	(%)
Environmental protection and risk prevention[e], including:	2 752	393.2	*10.0*	2 663	380.4	*11.0*
Air quality	12	1.6		24	3.4	
Household and industrial waste	683	97.5		432	61.7	
Drinking water[e]	997	142.5		456	65.1	
Wastewater treatment	820	117.2		942	134.6	
Rehabilitation of contaminated land	55	7.8		26	3.8	
Nature protection	160	22.8		180	25.7	
Risk prevention (natural and technological risks)				479	68.4	
Agriculture, forestry and rural development, including:	3 868	552.6	*14.1*	3 707	529.6	*15.4*
Agricultural water resources management	436	62.3		1 297	185.2	
Agri-environmental measures and others	449	64.1				
Fisheries	312	44.6	*1.1*	208	29.7	*0.9*
Energy infrastructures, including:	182	26.0	*0.7*	625	89.3	*2.6*
Renewable sources of energy	14	2.0		293	41.8	
Energy efficiency, cogeneration, management	43	6.1		71	10.2	
Transport infrastructure, including:	8 317	1 188.2	*30.3*	6 058	865.4	*25.1*
Railways	2 136	305.1		811	115.8	
Urban transport	608	86.9		921	131.6	
Telecommunications infrastructure and information society	1 437	205.2	*5.2*	1 608	229.7	*6.7*
Urban and rural regeneration	466	66.5	*1.7*	479	68.4	*2.0*
Cultural heritage	789	112.7	*2.9*	483	69.1	*2.0*
Tourism, including:	601	85.9	*2.2*	172	24.6	*0.7*
Natural assets and heritage				53	7.6	
Research and development, innovation and entrepreneurship, including:	1 938	276.9	*7.1*	1 872	267.4	*7.8*
Environment-friendly technologies and products	287	41.0		41	5.9	

Table 5.3 **EU funds for regional and rural development in Greece,**[a] 2000-06 and 2007-13 *(cont.)*

Intervention categories[d]	2000-06[b]			2007-13[c]		
	Planned EU contribution	Annual average	Share	Planned EU contribution	Annual average	Share
	(EUR million)	(EUR million)	(%)	(EUR million)	(EUR million)	(%)
Human resources, social inclusion, labour market policy	4 690	670.0	*17.1*	4 236	605.2	*17.6*
Social infrastructure	1 282	183.1	*4.7*	1 405	200.7	*5.8*
Technical assistance, institutional capacity building and other	819	117.0	*3.0*	610	87.2	*2.5*
Total	27 454	3 922.1	*100.0*	24 125	3 446.5	*100.0*

a) Current prices (based on EU indexing rules for Structural Funds); excluding national contribution.
b) Community Support Framework (EUR 23 billion from European Regional Development Fund (ERDF), European Social Fund (ESF), European Agricultural Guidance and Guarantee Fund (EAGGF), Financial Instrument for Fisheries Guidance); Rural Development Plans (EUR 1.2 billion from EAGGF), excluding agricultural direct aid; Cohesion Fund (CF) for infrastructure projects on transport and environment (EUR 3.3 billion); LIFE-programme for environment and nature projects (EUR 37.4 million).
c) National Strategic Reference Framework (EUR 20.4 billion from ERDF, ESF, and CF); National Rural Development Plan (EUR 3.7 billion from the European Agriculture Rural Development Fund); National Fishery Programme (EUR 208 million from the European Fishery Fund).
d) Based on Structural Funds classification.
e) It differs from the official Classification of Environmental Protection Activities (CEPA).
f) Including some mixed water supply and wastewater treatment projects.
Source: OECD, Environment Directorate's calculations based on European Commission data.

In 2000-06, nearly two-thirds of the Structural Funds earmarked for environmental infrastructure and nature protection (EUR 1.1 billion of EU contribution) were allocated at regional level, through the 13 Regional Operational Programmes. One third was allocated to the *National Operational Programme Environment*, managed by YPEHODE, to implement environmental projects of national or interregional importance (Table 5.4). In the same period, through the *LIFE programme*, EU spent about EUR 37.5 million to finance 50 projects in Greece (total project cost of about EUR 71 million, including Greek co-financing), nearly half of which for nature and biodiversity conservation projects.

Implementation of environmental projects receiving EU assistance has been relatively slow, especially in the water sector, as shown by a *low absorption capacity rate*: by end 2005, less than 50% of Structural Funds for 2000-06 had been spent or

Table 5.4 **National Operational Environment Programme,**[a] 2000-06

(EUR million)

	Planned total budget	Actual expenditure[b]	(%) spent[c]
	522.6	353.6	*68*
Priority 1: Aquatic environment	17.0	11.2	*66*
1.1 Water quality monitoring	7.8	3.6	*47*
1.2 Actions and interventions on water provision and wastewater	9.1	7.5	*83*
Priority 2: Solid waste	18.4	7.0	*38*
2.1 Non hazardous solid waste management	10.9	5.3	*49*
2.2 Hazardous solid waste management	7.4	1.6	*22*
Priority 3: Civil protection, protection of landscapes and marine environment	16.5	16.2	*99*
3.1 Civil protection	5.6	5.8	*104*
3.2 Landscape protection and restoration	6.8	6.5	*96*
3.3 Abatement of marine pollution	4.0	3.8	*96*
Priority 4: Atmospheric environment	15.3	11.0	*72*
4.1 Reduction of air pollution	12.5	8.7	*70*
4.2 Reduction of noise pollution	2.7	2.2	*83*
Priority 5: Environmental institutions and public awareness	14.8	6.4	*44*
5.1 Environmental Institutions	8.3	5.4	*65*
5.2 Environmental Public awareness	6.4	1.0	*16*
Priority 6: Infrastructure on water resources management, soil protection and implementation of european legislation – protection of natural disasters	190.1	107.2	*56*
6.1 Protection and improvement of soil and water resources	24.0	9.6	*40*
6.2 Infrastructure on water resources management, implementation of European legislation – natural disasters	166.1	97.6	*59*
Priority 7: Physical and town planning – restoration of sites	75.2	60.9	*81*
7.1 Physical and town planning	15.1	10.3	*68*
7.2 Innovative and strategic restorations on urban environment	60.1	50.6	*84*
Priority 8: Biotopes – ecotopes	165.0	130.0	*79*
8.1 Protection and management of biotopes/ecotopes, species protection, protected areas	49.9	26.1	*52*
8.2 Karla lake re-creation	115.1	103.9	*90*
Priority 9: Environmental actions with the participation of the private sector	0	0	*0*
Priority 10: Technical assistance	10.0	3.1	*31*

a) Part of structural funds for the environment *per se*, managed directly by YPEHODE. Another part of structural funds are managed by regional administration.
b) At end 2007, the 2000-06 planned budget can be spent until end 2008.
c) Actual expenditure as % of planned total budget.
Source: YPEHODE.

legally committed. Funds are expected to be fully spent by the first trimester of 2009.[6] Nonetheless, environmental investments have contributed significantly to improving the quality of life and in developing infrastructure in Greek regions.

For the *programming period 2007-13*, estimates indicate investment needs for the water and waste sectors of EUR 1.8 billion and EUR 1 billion, respectively (GHK, 2006). The planned allocations are broadly in line with these financial requirements (Table 5.3). Compared to the previous programming period, the 2007-13 share of total EU transfers for environmental infrastructure and nature protection slightly increases (11%). The water sector (especially wastewater treatment) remains the highest investment priority, and absorbs 53% of the EU contribution to environmental infrastructure expenditure (EUR 2.6 billion). Compared to the previous period, more attention is given to prevention of natural and industrial risks, whereas a lower share of funds is earmarked for waste management (16%). The *overall planned budget for environment-related investments* (in broad terms including those in the agriculture, energy and transport sectors) exceeds EUR 6 billion, representing 26% of the total available EU contribution.

YPEHODE is managing the implementation of the *National Operational Programme* "*Environment and Sustainable Development*", with a total public budget of EUR 2.25 billion (of which 80% from Structural and Cohesion Funds) for the period 2007-13. The programme focuses on: integrated solid waste management, rational use of water resources, modern wastewater facilities, protection of natural resources and the efficient tackling of environmental risks (*e.g.* desertification, droughts, fires, floods, and marine pollution). It will contribute to economic growth through a more efficient use of resources, such as re-use, recycling and recovery of waste. The programme will also support interventions which, in addition to investments in energy and transport, will contribute to combating climate change.

Strategic Environmental Assessment (SEA)

Greece has numerous national programmes (including investment programmes), plans and strategies (Table 5.5). In line with EU Directive 2001/42/EC, the government has introduced in 2006 the necessary provisions for the environmental assessment of the effects of *certain sectoral plans and programmes*, on a national, regional and local level. Sectors concerned are: agriculture, forestry, fisheries, energy, industry, transport, tourism, water and waste management, urban or physical planning or land use.

The SEA procedures for *national and regional plans and programmes* are managed and coordinated at the central level: all the relevant sectoral ministerial services are involved in these procedures. YPEHODE retains general supervision

responsibilities. The SEA procedures for *prefectural and local plans, policies and programmes* are managed and coordinated by regional environmental services. Public participation is part of the process. Although SEA is recent, there are currently an increasing number of applications for SEA.

Even before SEA became mandatory, it was carried out in some form for the Athens Olympic Games Master Plan, and for Specific Framework Plans (*e.g.* coastal zones and islands; mountain areas). It is now required specifically for Areas for Integrated Tourism Development and for 2007-13 EU funded investment programmes. The SEA procedure requires a qualitative and quantitative assessment of the environmental impacts of plans and programmes, including cumulative impacts, as well as the examination of the alternatives. Clarity and information are needed to better understand and *effectively implement* this recent SEA process.

Table 5.5 **Selected national programmes, plans and strategies**

Energy 2001 – National Action Plan for Energy Conservation in the Built Environment	YPEHODE
National Climate Change Programme (1995, 2002, 2007)	YPEHODE
Establishment of Emissions Trading Scheme in Greece (2004)	YPEHODE
National Allocation Plan for Emissions Trading (2004-06, 2008)	YPEHODE
National Plan for Spatial Planning and Sustainable Development 2008	YPEHODE
National Action Plan for Cities and Housing (1996-2000)	YPEHODE
National Operational Programme Environment 2000-06	YPEHODE
Regional Operational Programme 1994-99 and 2000-06	Ministry of Interior
National Plan for Solid Waste Management (2000-06)	YPEHODE
National Operational Programme for Environment and Sustainable Development (2007-13)	YPEHODE
National Biodiversity Conservation Strategy and Action Plan[a]	YPEHODE
National Action Plan to Combat Desertification 2001	Ministry of Rural Development and Food
National Strategy for Sustainable Development 2002	YPEHODE
National Energy Efficiency Action Plan 2007	YPEHODE
National Hazardous Waste Management Plan 2007	YPEHODE
National Rural Development Plan 2000-06	Ministry of Rural Development and Food
National Rural Development Programme 2007-13	Ministry of Rural Development and Food
National Operational Programme “Competitiveness” 2000-06	Ministry of Development

a) Under preparation.
Source: OECD, Environment Directorate.

Environmental impact assessment (EIA)

Environmental impact assessment is a major tool for preventive action and is required for most categories of projects, including small projects. The EIA procedure and the environmental permitting system are fully integrated: the former is the basis for issuing an environmental licence. The framework for EIA procedures is provided in the Environmental Protection Law (1650/86) and has been updated by transposed EU directives [Law 3010/2002, Joint Ministerial Decision (JMD 15393/2002, JMD 11014/2003, JMD 37111/2003)]. The most recent legislative and regulatory upgrades specify: the array of *public and private projects or activities* that are subject to an EIA (environmental permitting), which is broader than EU requirements, and the framework of the environmental permitting system (preliminary environmental impact assessment, approval of environmental terms, procedure for public information and participation).

Procedures have been well implemented following to the transposition of EU directives into national law. The EIA procedure is carried out at national, regional and local level for large, medium and small scale projects respectively. At the national level, EIAs are co-ordinated by three services of YPEHODE: the Special Environmental Service, the Directorate for Air and Noise Pollution Control, and the Directorate of Environmental Planning. In nearly one-third of the cases, EIAs have led to changes in project design. In practice, EIAs have contributed to the integration of environmental concerns into projects, for instance, into tourism development projects. Tourism establishments have to submit EIAs to the competent authority. Each tourism project must acquire an environmental permit regarding the suitability of the land and appropriateness of the investment. The environmental permit (acquired through the EIA procedure) is a pre-requisite for submitting any investment proposal.

However, on the one hand, some industry representatives consider the *process too long and too bureaucratic*, in both the administrative and decision-making phases. It can take up to 2-3 years, and several approvals to obtain a permit. On the other hand, the public and NGOs consider that the EIA process lacks context and overarching direction. Cases of public resistance to implementing projects have been reported.[7]

According to *assessment reports*, there is a risk for EIAs to be "discredited either because environmental approval of projects or activities are by-passed, or because, in some cases, such studies are only commissioned after the final project plans have been drawn up, with the sole purpose of confirming the site already selected". EIAs can be "vague and inconclusive, lacking a qualitative or quantitative assessment of environmental impacts, a cumulative assessment of a project in conjunction with other ones, or an examination of alternatives" (Greek Ombudsman, 2006).

A large *number of EIAs* are carried out each year: at national level, YPEHODE deals with about 1 100 cases per year; at regional level (environmental permitting), there are about 2 000 cases per year; and at prefectural level, around 3 000-4 000 cases per year. EIA staff at national level amounts to 80 employees, of which 60 are scientists; at regional level, staff varies between 6 and 15 employees per region.

Overall, EIAs are an important instrument for integrating environmental concerns in project design, construction and operation, particularly in a period when Greece is undergoing massive *infrastructure investment* (*e.g.* transport, energy, water infrastructure). EIAs are conducted within a framework of solid legislation and institutional arrangements. Greece should strengthen implementation by: *i)* drawing on the successful EIA experiences and appropriate guidelines; *ii)* enhancing the quality and influence of EIAs in reasonable time frames; and *iii)* ensuring appropriate public and stakeholders participation.

1.4 Sustainable development in practice: market-based integration

The use of *economic instruments* (*e.g.* taxes, charges, trading mechanisms), both for direct environment purpose and for the integration of environmental concerns into sectoral policies, is often perceived as not realistic in Greece, because of national economic and social circumstances. Nevertheless, a number of economic instruments have been used over the years in Greece (OECD, 2000), and the polluter-pays-principle (PPP) and the potential of economic instruments are well recognised in official documents. Greece has adopted related OECD Council recommendations and EU orientations. The 2002 NSSD states that "one of the main reasons for environmental degradation is *unsuccessful pricing*, which, in many cases, sends wrong signals to the market and does not incorporate the environmental cost". The NSSD aims at "getting the prices right" and at achieving a "long-term change in consumption and production patterns, by introducing adequate economic instruments". The Operational Programme "Competitiveness" 2000-06 of the Ministry of Development (part of the 3rd Community Support Framework) calls for "the identification of environmental costs and their internalisation in products market prices", and "the pilot introduction of new economic instruments (*e.g.* green taxation, voluntary agreements, systems for pollution cost accounting and emission trading)". Overall, there is a need to better align measures in use with such statements.

Environment-related taxes

In 2006, *environment-related taxes* amounted to 1.9% of GDP, a figure among the lowest in OECD-Europe, and which recently has decreased significantly (3.6% in 1995); the share of total tax revenue has also decreased (to 6.1% from 12.7%, Table 5.6). This decrease was driven by shrinking revenues from *energy taxation*, while *transport taxation* has been slightly increasing. Taxes on pollution are used to a limited extent.

Table 5.6 **Environment-related taxes,** 1995-2006

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total (EUR million)	3 202	3 580	3 796	3 766	3 506	3 694	3 576	3 532	3 715	3 870	3 917	4 065
Share of GDP (%)	*4.7*	*5.0*	*4.7*	*3.6*	*3.1*	*3.0*	*2.4*	*2.3*	*2.2*	*2.1*	*2.0*	*1.9*
Share of tax revenue (%)	*12.7*	*12.8*	*11.7*	*10.0*	*8.4*	*8.0*	*7.5*	*6.7*	*6.6*	*6.7*	*6.3*	*6.1*

Source: OECD/EEA database on economic instruments for environment, 2009.

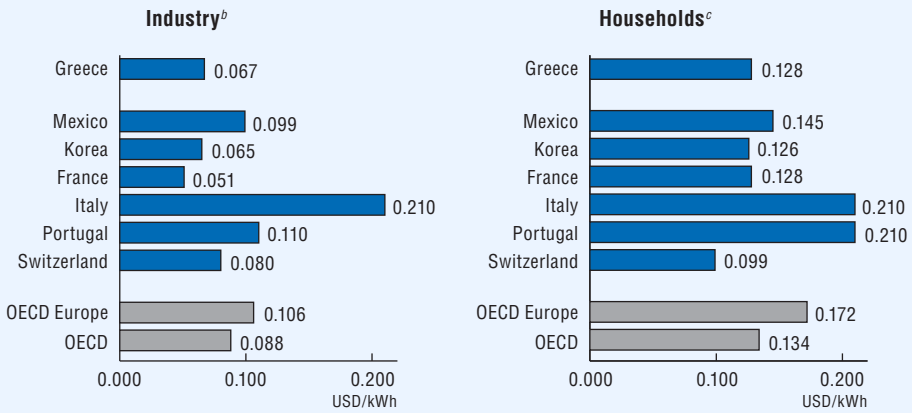
Energy taxes

The EC Directive on the *taxation of energy products and electricity* has been transposed. The National Customs Code uses *exemption* options provided in this directive: electricity and natural gas are exempt from excise tax until 2010 and 2014 respectively, and benefit from a lower VAT rate (9% instead of 19%); biodiesel tax exemptions have recently been reduced;[8] diesel used for space heating benefits from a tax reduction during the heating season (October to April).

Hard coal, lignite and coke were subject to an *excise duty* rate of EUR 0.3/ gigajoule from January 2007; these products are relieved from excise duty for: *i)* use for mineralogical processing; *ii)* generation of electric power; and *iii)* for chemical reduction, electrolytic and metallurgical processing: electricity from lignite, the major domestic energy source and one of the major sources of pollution, is therefore exempted. According to the 2006 renewables law, local authorities collect a 3% duty on renewable energy pre-tax revenues (Table 5.7); revenues are earmarked for local development works. Household *electricity prices* (in terms of purchasing power parities) are significantly lower (26%) than the OECD-Europe average, but close to the OECD average; industry prices (at current exchange rates) are also significantly lower than the OECD-Europe average (37%) (Figure 5.3).

Energy pricing and taxation are often used to contribute to *social objectives*, such as rural development and reduction of social exclusion. For example: a tax relief on heating fuels applies during the heating season.[9] The cost for the "public service obligation" in electricity delivered to users is about EUR 200 million per year (or EUR 4 per MWh of electricity delivered) (IEA, 2006). These practices may discourage energy efficiency efforts and contribute to distort the energy market. Other instruments could be considered for achieving social objectives, while the price signal can focus on economic and environmental objectives (OECD, 2006).

Figure 5.3 **Electricity prices,** 2006[a]



a) Greece: 2005 data.
b) In USD at current exchange rates.
c) In USD at current purchasing power parities.
Source: IEA-OECD (2007), database of end-use prices.

Table 5.7 **Energy taxes,** 2008 and 2009

Sector/fuel	Excise tax (EUR/unit)		VAT (%)[a]
	2008	2009	
Household electricity	0	0	*9*
Household natural gas	0	0	*9*
Household heating oil (01 May-14 October)	0.293/litre	0.302/litre	*19*
Household heating oil (15 October-30 April)	0.021/litre	0.021/litre	*19*
Household coal	0.3/gigajoule	0.3/gigajoule	*19*
Non-commercial lead replacement gasoline	0.352/litre	0.359/litre	*19*
Non-commercial unleaded gasoline (95 RON)	0.350/litre	0.359/litre	*19*
Non-commercial diesel	0.293/litre	0.302/litre	*19*
Biodiesel	0.293/litre	0.302/litre	*19*
Industry electricity	0	0	
Industry natural gas	0	0	
Industry fuel oil	19/tonne	19/tonne	
Industry coal	0.3/gigajoule	0.3/gigajoule	
Industry and commercial diesel	0.293/litre	0.302/litre	
Municipal renewable duty[b]	3%	3%	

a) As regards the islands in the prefectures of Lesvos, Khios, Samos, the Dodecanese, the Cyclades and the Aegean Islands of Thasos, Samothraki, the northern Sporades and Skiros, the VAT rates are reduced by 30%.
b) On the pre-VAT sale price to the Operators of the Electricity Systems. Electricity from photovoltaics exempted.
Source: European Commission.

Diesel fuel tax concession to farmers was about EUR 11 million in 2006 (OECD, 2007). Greece is supporting the production and use of bioenergy: support of 40% for the capital costs for bio-diesel plants, exemption from excise duties for biodiesel production quotas in 2005 (51 million litres), 2006 (91 million litres) and 2007 (114 million litres). In line with European Union objectives, Greece has set a target of 5.75% of automotive fuels to be produced by biofuels by 2010.

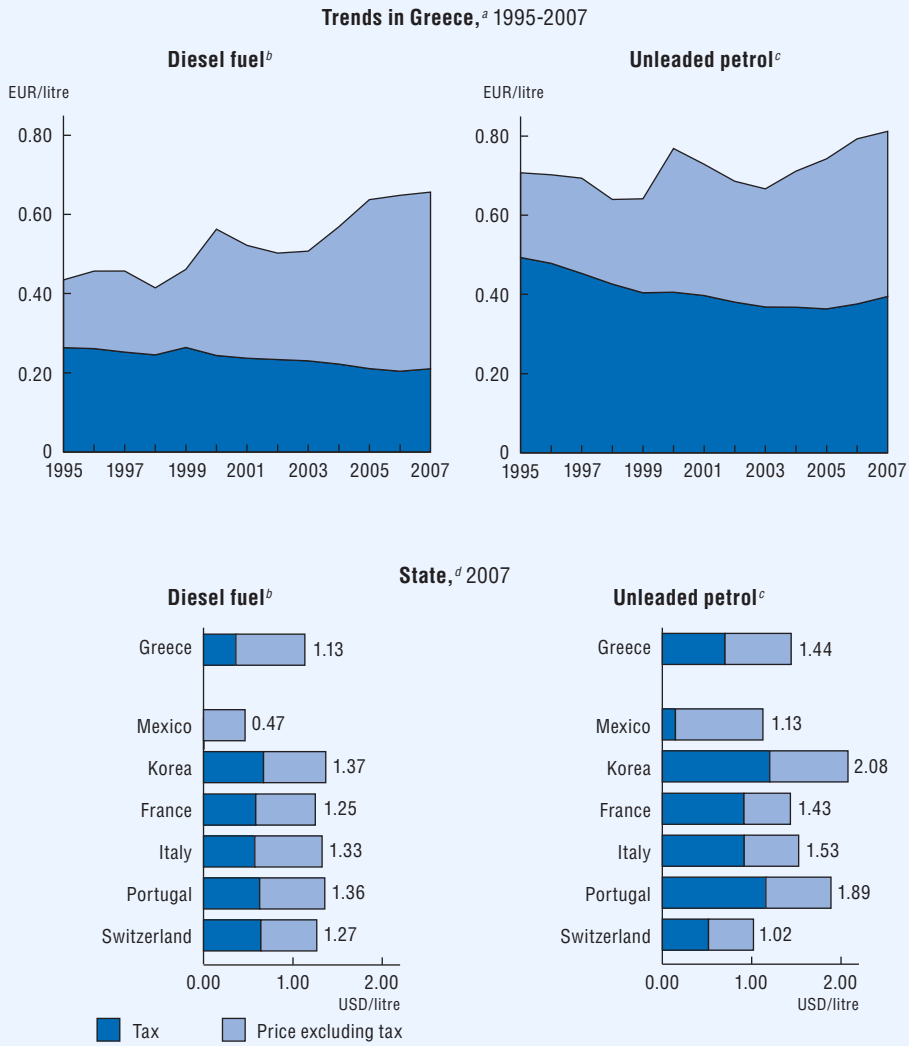
Transport taxes

In 2007, *road fuel prices* were lower in Greece than in a number of other OECD-Europe countries. However, expressed in purchasing power parities, these prices were just below the OECD-Europe average. The share of taxes in total price has steadily decreased over the review period. VAT and excise duties together represent 49% of the gasoline price and 32% of the diesel price, the lowest rates in OECD Europe (Figure 5.4).

According to Law 2960/2001, motor vehicles for private use imported to Greece (*i.e.* to be registered and to circulate with Greek plates) are subject to a *registration tax*, to be paid on the wholesale price (net of deductions for second-hand cars) and the insurance and transportation costs. The tax rate depends on anti-pollution technology (according to EU Directive 98/69/EC) and increases with cylinder capacity. Tax rates range from 5% to 50% (for Euro 4 vehicles and later standards), from 14% to 142% (for Euro 3 vehicles) and from 24% to 334% (for vehicles under older directives). Motor vehicles of conventional technology are subject to rates from 37% to 346%. Hybrid cars complying with provisions for anti-pollution technology, and electric cars are not subject to the registration tax. Motorcycles and heavy good vehicles are also subject to the registration tax depending on cylinder capacity. A 30% surcharge applies to heavy good vehicles without anti-pollution devices. The structure of the registration tax has been changed several times over the past decades to encourage environmentally sustainable consumption, leading to successful results in the renewal of the vehicle fleet.[10]

Owners of motor vehicles and motorcycles using public roads are subject to an *annual road tax*, paid in November and December for the following year. A vignette is posted on cars. Tax rates, tax bases and reliefs are determined by the Ministry of Finance. Motor vehicles are categorised into vehicles for private and for public use, and within each category into passenger cars, lorries, buses, trailers and other vehicles. The tax base is cylinder capacity for private cars (Table 5.8), gross weight for lorries and number of passenger seats for buses. The annual road tax for 2008 applicable to lorries for private use ranges from EUR 51 to 1 027 and for buses for private use from EUR 146 to 352; whereas in the category for public use the tax for lorries ranges from EUR 88 to 1 000, for buses from EUR 146 to 410, and for taxis is EUR 197. Starting from 2009, all rates were increased by 20%. Electric and hybrid

Figure 5.4 **Road fuel prices and taxes**



a) At constant 2000 prices.
b) Automotive diesel for commercial use.
c) Unleaded premium (RON 95); Korea: unleaded regular.
d) Diesel: at current prices and exchange rates; unleaded premium: at current prices and purchasing power parities.
Source: IEA-OECD (2009), database of end-use prices.

Table 5.8 **Annual road tax for passenger cars and motorcycles,** 2008 and 2009

Category	Cylinder capacity (cc)	Tax (EUR)	
		2008	2009
A	Up to 300	15	18
B	301-785	38	46
C	786-1 357	93	112
D	1 358-1 928	168	202
E	1 929-2 357	372	446
F	More than 2 358	483	580

Source: European Commission; Ministry of Finance.

Table 5.9 **Revenues from car taxes,** 1999-2008

(EUR million)

	Registration tax	Annual road tax
1999	717	372
2000	619	329[a]
2001	599	753[a]
2002	647	631[b]
2003	713	555
2004	839	694
2005	821	706
2006	826	794
2007	922	820
2008	–	1 020[c]

a) The difference in revenues between 2000 and 2001 for the road tax reflects the fact that the collection for 2001 took place in January of 2001 (instead of November-December 2000).
b) High revenues in 2002 are due to the consolidation of charges and the application of the road tax to all vehicles, as well as to a major increase in vehicle registrations
c) Estimates.
Source: Ministry of Finance.

vehicles are exempt from the road tax, as well as new motorcycles which are registered in replacement of those of old technology.

Revenues from the registration tax and the road tax are generating each year comparable and sizable amounts (close to EUR 1 billion each in 2007 and 2008) (Table 5.9). As from 2008, the revenues of the road tax are allocated to municipalities (90%) and prefectures (10%), whereas 40% was previously allocated to the State budget. A "*Green Fund*" has been established within YPEHODE, called ETERPS (Special Fund for the Implementation of City Master Plans and Town Plans). It benefits by EUR 0.01 per litre from the petroleum product tax.

Strengthening the link of transport taxes to environmental performance of vehicles should be considered, with a revenue neutral restructuring and a *more explicit environmental fiscal base*. As proposed by the European Commission,[11] CO_2 emissions would be a simple base, more efficient than the cubic capacity or power of the engine. The balance between the taxation of the vehicle (which is relatively high) and the taxation of the use of the vehicle (which is relatively low) should also be reconsidered.

2. Implementing Environmental Policies

2.1 Institutional framework

National level

The *Ministry for the Environment, Physical Planning and Public Works (YPEHODE)* is primarily responsible for developing and implementing environmental policy in Greece. It works together with the regions, prefectures and local authorities and supervises several legal entities created for the implementation of special environmental programmes, including: Public Corporation of Urban Planning and Housing (DEPOS); Organisation for Planning and Environmental Protection of Athens; Organisation for Planning and Environmental Protection of Thessaloniki; National Mapping and Cadastre Organisation (OKHE); Hellenic Environmental Inspectorate (EYEP); National Centre for the Environment and Sustainable Development; Ktimatologio S.A. (Public registry/national cadastre); Central Water Agency (CWA).

Other ministries and national organisations also have responsibilities for implementing environmental policies: the Ministries of Interior, Development, Health, and Rural Development and Food deal with water resource management; the Ministry of Transport and Communications regulates motor vehicles and fuels; the Ministry of Mercantile Marine deals with the protection of the marine environment; The Ministry of Economy and Finance administers many EU funds. Significant national funds are allocated for the environment through the new development

programme of the local administrations (Thisseas Programme) managed by the Ministry of Interior, in particular through the sub-programme "Local Development and Environmental Protection".

Regional, prefectural and municipal levels

The *13 regions* are decentralised units of the central government. Their governors are appointed by the government. Their primary function is planning and coordination (Chapter 7). The regions are responsible for vetting the General Town Plans of the municipalities, drafting and approving Regional Waste Management Plans, approving development proposals (with associated EIA), and the supervision of municipal and prefectural planning authorities. Regional Water Directorates are responsible for the formulation and implementation of river basin plans.

At the *prefectural level* (54 prefectures), environmental responsibilities relate to the regulation and protection (via Prefectoral Decisions or Joint Prefectoral Decisions) of the regional natural environment and to implementation of land use plans made and approved by YPEHODE. They include planning and programming, economic development, social development, culture and quality of life. Some decisions of the High Court attributed some of the prefectures' responsibilities to the regions or the central government.

Primary environmental responsibilities of *municipalities* (914) and *communities* (120) (first level local authorities) include waste and wastewater management, drinking water supply and protection of the local environment. Prefectural and local authority overlap in certain areas; YPEHODE has the authority to resolve any resulting conflicts. *Intermunicipal associations* of municipalities and communities are sometimes formed to address environmental issues jointly. For example, the Association of Communities and Municipalities of the Attica Region, is responsible for solid waste management for the greater Athens area. A similar association exists in Thessaloniki.

Other authorities

The *Ombudsman* (established by Law 2477/1997) aims at resolving conflicts between citizens and the public administration. Among its four thematic departments, the Department of Quality of Life investigates on environmental issues and focuses on town-planning and environmental violations (Box 6.2). The body of inspectors for public administration deals with infringements, lack of transparency and failures of public sector organisation with environmental competences.

The *Council of State* (High Court) has played a positive role in implementing environmental legislation and providing a practical interpretation of the term sustainable development in its case law.

2.2 Environmental legislation

The Greek Constitution affirms that the State has the overall responsibility for protecting the natural and cultural environment, and that the State should adopt the necessary preventive and repressive measures. The 1986 *Framework Environmental Protection Law (1650/86)*, together with its subsequent amendments, is the foundation for national environmental policy in Greece. Overall, Greek environmental policy is strongly influenced by *EU environmental policy*, especially for management of water resources, air quality, toxic chemicals and waste (Table 5.10).

Greece updated its water management framework during the review period by adopting a *new water law* (Law 3199/2003) in December 2003 and the measures for integrated water resource management in 2007 (Presidential Decree 51/2007). YPEHODE has overall policy, regulatory, monitoring and control responsibilities of water utilities. The new legislation is based on the EU Water Framework Directive (WFD), with its emphasis on ecological functions of water, river basin management approach, economic evaluation and full-cost pricing of water services, and can be expected to supplant the supply management paradigm that has long prevailed (Chapter 3).

EU directives form the basis for *air management regulation* in Greece. Numerous Council of Ministers Decisions have established limits for substances[12] in ambient air and have defined technical standards, transposing all air quality related EU directives in the national legislation. The legislative framework includes national emission ceilings, fuel standards, performance standards for vehicles, licensing requirements for large combustion plants and industrial installations (Chapter 2).

Further to the review process of the first National Plan, the measures, terms and restrictions on solid *waste management* were issued in 2003 (JMD 50910/2727/2003) aiming to achieve conformity with the Waste Framework Directive. Its main features included: the establishment of a national network for waste disposal, the closure of illegal landfills and the competence of the regions for local planning. The Hazardous Waste National Management Plan, approved in 2007 (JMD 8668/2007) was considered by the European Commission not sufficiently precise regarding the identification of suitable disposal sites and the inventory of hazardous waste. In Greece, waste management continues to be a complex environmental, political, legal and social problem. Enforcement of waste legislation has proven to be difficult and authorities

Table 5.10 **Selected national legislation relating to the environment**[a]

1950	Law 1469	Preservation of Landscapes of Outstanding Beauty
1965	MD[b] E1b/221	Wastewater Disposal
1971	Law 996	Natural Parks, Aesthetic Forests and Natural Monuments
1972	Law 947	Management of Residential Areas
1975	Law 177	Controlled Hunting Areas
1975	National Constitution	Article 24.1
1976	Law 360	Regional and Environmental Planning
1977	Law 743	Protection of the Marine Environment
1978	Law 855	Ratification of the Barcelona Convention for the Protection of the Mediterranean Sea Against Pollution, and of the Dumping and Emergency Protocols
1979	Law 998	Protection of Forests and Forestry Lands
1980	Law 1032	Creation of the Ministry of Physical Planning, Housing and Environment
1981	PD[c] 1180	Establishment and Function of Industries
1982	Law 1269	Prevention of Marine Pollution from Ships – MARPOL Convention
1983	Law 1337	Land Development
1983	Law 1327	Measures for Exceptional Conditions of Pollution of the Environment
1985	Law 1515	Master Plan and Program for the Protection of the Environment in Athens
1985	Law 1558	Creation of the Ministry of Environment, Physical Planning and Public Works
1986	Law 1634	Ratification of the LBS and SPA Protocols to the Barcelona Convention for the Protection of the Mediterranean Sea Against Pollution
1986	Law 1650	Environmental Protection
1986	JMD[d] 46399/1352 JMD[d] A5/288	Harmonisation of Greek Legislation with EU Directives 75/440, 76/659, 76/160, 78/659, 79/869, 80/778
1987	Law 1739	Water Resources Management
1987	CMD[e] 144	Protection of the Aquatic Environment from Pollution Caused by Dangerous Substances
1988	JMD[d] 18186/271	Measures and Restrictions for the Protection of the Aquatic Environment; Determination of Limit Values for Dangerous Substances in Waste Water
1990	Law 1892	Development Law
1990	JMD[d] 69269/5387	Environmental Impact Assessment
1991	JMD[d] 80568/4225	Use of Sewerage Sludge Produced by Municipal Wastewater Treatment Plants in Agriculture
1993	JMD[d] 58751/2370	Air Pollution Control from Large Combustion Plants
1994	Law 2234	Development Law
1994	Law 2242	Inspectorate for Environmental Protection
1994	Law 2205	Ratification of the UN Framework Convention on Climate Change
1995	Law 2364	Gas Law
1997	Law 2508	Sustainable Development of Towns
1997	JMD[d] 113944	National Plan for Solid Waste Management – General Guidelines
1997	JMD[d] 114218	Specifications and General Plan for Solid Waste Management
1997	CMD[e] 11	Control of Air Pollution Due to Ozone
1998	Law 2637	Establishment of the Certification Account Organisation (incl. the establishment of wildlife refugees)
1998	Law 2601	Economic Development Incentives
1999	Law 2742	Spatial Planning and Sustainable Development
2000	JMD[d] 7589/731	Measures and Terms on PCBs/PCTs Management
2001	Law 2939	Alternative Management of Packaging Wastes and Other Products.
2001	Law 2947	Environmental Inspectorate (EYEP)
2002	JMD[d] 29407/3508	Measures and Terms for the Landfill of Waste
2002	Law 3010	Amendment of Law 1650/1986 / Environmental Impact Assessment

Table 5.10 **Selected national legislation relating to the environment**[a] *(cont.)*

2003	JMD[d] 50910/2727	Solid Waste Management
2003	JMD[d] 37591/2031	Measures and Terms on Medical Waste Management Produced by Health Services
2003	Law 3199	Protection and Sustainable Management of the Water Resources (transposition of EU WFD 2000/60)
2003	Law 3208	Protection of the Forests Ecosystems, Forest Cadastre, Holding Right on Forests and Forest Areas
2003	JMD[d] 11014/703	Procedures of preliminary EIA and Approval of environmental terms
2003	JMD[d] 37111/2021	Public information and Participation (EIA procedures)
2004	CMDFN[e] 5	Adoption of the second National Climate Change Programme
2004	PD[c] 116	Alternative Management of ELVs
2004	PD[c] 82	Alternative Management of Used Oils
2004	PD[c] 115	Alternative Management of Batteries and Accumulators
2004	PD[c] 109	Alternative Management of Used Tires
2004	JMD[d] 54409/2632	Establishment of Emissions Trading Scheme
2004	JMD[d] 9238	Limit values for benzene and carbon monoxide in ambient air
2005	JMD[d] 22912/1117	Measures and Terms on the Pollution Prevention and Reduction from Waste Incineration
2005	JMD[d] 29457	Emissions from large combustion plants
2005	JMD[d] 29459	National Emissions Ceilings
2005	JMD[d] 38638	Ozone in ambient air
2005	JMD[d] 38639	Deliberate release into the environment of genetically modified organisms
2006	JMD[d] 13588/725	Hazardous Waste Management
2006	JMD[d] 24944/1159	General Technical Specifications for Hazardous Waste Management
2006	PD[c] 117 and 15	Alternative management of WEEE
2006	JMD[d] 11764	Public access to environmental information and repealing Council Directive 90/313/EEC
2006	JMD[d] 13586	Assessment and management of environmental noise
2006	JMD[d] 107017	Strategic Environmental Assessment (transposition of EU directive 2001/42)
2007	JMD[d] 8668,	National Hazardous Waste Management Plan
2007	JMD[d] D13/0/121	Emissions of pollutants from non-road mobile machinery
2007	JMD[d]9267	Scheme for greenhouse gas emissions allowance trading within the European Community (transposition)
2007	JMD[d]9268	Packaging and packaging waste
2007	JMD[d] 9269	Public participation and access to justice
2007	JMD[d] 12044	Control of major-accident hazards involving dangerous substances
2007	PD[c] 51	Implementation of the EU Water Framework Directive
2008	JMD[d] 33437	Approval of the National Plan on reducing specific emissions from existing large combustion plants
2008	JMD[d] 38030	Approval of the National Plan on reducing specific emissions into the atmosphere

a) See on air and nature Tables 2.4 and 4.1.
b) Ministerial Decision.
c) Presidential Decree.
d) Joint Ministerial Decision.
e) Council of Ministers Decision.
Source: YPEHODE.

have been slow to take action against polluters. Greece has been criticised by the European Court of Justice for failing to comply with the European Waste Management Law and the Court has ordered Greece to close its illegal landfills by the end of 2008. Greece closed the majority of the illegal landfills (1102) identified in the Court's decision; the remaining seven landfills are planned to be closed by mid-2009.

The Law on *Spatial Planning and Sustainable Development* (Law 2742/99), together with the Law on the Sustainable Development of Towns (Law 2508/97) defined the legal framework for spatial planning at national, regional, prefectural and local level. The completion of the cadastre (governed by Laws 2308/1995, 2664/1998 and 3481/2006), started in 1994, will be crucial to the implementation of the planning regime (Chapter 7).

The legislative framework for *nature conservation* dates from 1930s, with laws concerning the protection of mainland national parks and forests. During the review period, Greece transposed all EU directives and international commitments into national legislation (Table 4.1). The Law 2742/99 on land-use planning and sustainable development defined a comprehensive framework for the management of protected areas.

Efficiency in energy and resource use was encouraged by the Operational Programme "Competitiveness" 2000-06 and the Development Law (3299/2004 amended by Law 3522/2006), which provided financial support for the development of renewable energy sources, energy efficiency and energy savings. Several major pieces of legislation have been passed to encourage the uptake of natural gas and renewable energy sources, as well as energy efficient technologies (Table 2.4).

2.3 Regulatory instruments

Licensing and compliance

The Law 3010/2002 amends the Environmental Protection Law and establishes the framework for a *new environmental permitting system* (EIA system). Three Joint Ministerial Decisions specify further its provisions: JMD 15393/2002 on the categorisation of public and private projects; JMD 11014/2003 on the procedures of preliminary environmental impact assessment (EIA) and approval of environmental terms; JMD 37111/2003 on public information and participation in the environmental licensing procedure.

Activities, installations and projects subject to *license* are classified into four categories (A1, A2, B3, B4), on the basis of their potential environmental impacts, their size and capacity. Each subgroup is licensed by a different authority: ministerial,

central, regional and prefectural respectively. Until now, about 12 500 installations or activities have been classified.

The Law 1650/1986 gives the responsibility of *compliance control and enforcement* of environmental requirements to the authorities in charge of granting permits: YPEHODE for large scale installations and activities operated in the Greek territory; the Directorates for Environment and Spatial Planning of administrative Regions for medium scale projects; the Directorates for Environmental Protection of Prefecture for smaller projects (via the establishment, on a case-by-case basis by decision of the prefect, of Environmental Quality Control teams). Other ministries with environmental responsibilities also have monitoring and enforcement functions under separate legislation.

The Hellenic Environmental Inspectorate

The *Hellenic Environmental Inspectorate* (EYEP) was established under YPEHODE by Law 2947/2001. It reports directly to the Minister. Its administrative organisation, structure, staffing conditions and terms were set in the Presidential Decree 165/2003. Its main responsibilities are: control and monitoring of implementation of environmental conditions laid down for projects and activities in the public and the private sectors, and recommendation of penalties in case of non-compliance; collection and evaluation of environmental enforcement data; national representation at European and international levels on environmental compliance.

The EYEP consists of a *General Inspectorate and two divisions*: southern Greece (covering Attica, Peloponnesus, Sterea Ellada, Ionian Islands, western Greece, Crete, southern Aegean Islands), located in Athens, and northern Greece (covering east Macedonia- Thrace, central Macedonia, western Macedonia, Epirus, Thessaly, northern Aegean Islands), located in Thessaloniki. Each Division has *four departments*, focusing on: public works, landfills, infrastructure, tourist installations; industrial and mining installations, poultry and rearing activities, aquaculture installations; natural environment, designated and protected areas; administration, logistical, IT and legal matters.

Inspections are carried out on the basis of an annual plan and following complaints. Inspections are carried out according to pre-established rules, which follow the provisions of the EU Recommendation (2001/331/EC) for the minimum criteria for environmental inspections. Procedures include: on-site visit and examination of all relevant factors and effluents; compilation of the inspection report; post-inspection. If violation of environmental legislation is established, the inspection report is sent to the operator, giving him reasonable time for response; if the violation

persists, and taking into account the operator's response, an official certification of environmental law violation is issued.

This official certification is the basis for proposing an *administrative sanction*, usually a fine. This proposal is addressed to: the Prefect (fine less than EUR 58 694), the General Secretary of the Region (EUR 58 694 to EUR 146 735), the Minister for the Environment (over EUR 146 735). The maximum fine was recently increased to EUR 2 million, four times higher than in the past and amongst the highest in OECD Europe. The operator has the right to appeal to the Administrative Court of Law, which decides on the final fine. Moreover, the official certification of environmental law violation can be sent to the district attorney office to start a *juridical procedure*, possibly leading to a penal sanction. Both procedures (administrative or penal) last for more than two years.

During its first years of operation, *EYEP focused on*: establishing collaboration with other licensing and inspecting authorities; carrying out selective inspections of specific cases with significant environmental impacts (*e.g.* major thermal power plants); and responding to requests or complaints by NGOs, groups of people, institutions, and parliamentarian and juridical orders. Between 2004 and 2008, EYEP performed about 970 inspections and proposed fines for nearly EUR 20 million for private and public sector activities; more than 550 case files were sent to local attorney offices for possible penal actions. EYEP has also been actively involved in international cooperation activities, mainly within the European Union Network for the Implementation and Enforcement of Environmental Law (IMPEL). In this context, EYEP coordinated a project on comparison of methodologies used for the calculation of environmental fines among EU member states.

The establishment and operation of EYEP during the review period is *a major step forward*, since Greece previously lacked an operational environmental inspection service. EYEP is also an oversight authority covering the gaps and shortcomings of other inspecting authorities at central, regional or local level. However, during its first years of operation EYEP faced a shortage of staff. The full staffing of the inspectorate, which is expected to be achieved in early 2009 with the recruitment of 32 personnel units, is an important condition: *i)* to increase environmental inspections; and *ii)* to better coordinate with other inspection authorities.

2.4 Economic instruments

Water

Households and industries pay an increasing share of the costs of the treatment and distribution of water, and cost recovery is achieved in Greater Athens (Chapter 2

and Table 3.5). Concerning agriculture, which represents about 85% of water abstraction, highly subsidised *water prices and irrigation infrastructure investments* do not induce farmers to conserve water and do not value this scarce resource appropriately. Some regions (*e.g.* Crete) experience major water losses from irrigation systems and increasing competition for scarce water resources between farming and tourism. Despite the use of more efficient water application technologies (*e.g.* drip irrigation), irrigation water application rates per hectare have been rising. This might be explained not only by water losses from irrigation infrastructure, but also by technical inefficiency in the use of drip irrigation (Karagiannis *et al.*, 2003).

The 2000 OECD Environmental Performance Review of Greece recommend to "*raise tariffs for water services* to better cover their costs, with appropriate attention to income disparities"; this recommendation has been progressively implemented for households and industries, but not for agriculture (Table 3.1). Greece should take steps to progressively increase water prices to cover costs by 2010, as required by the EU Water Framework Directive. There is scope for moving away from a water policy based on public financing (including European transfers) to a policy based on the polluter-pays-principle and the user-pays-principle.

Implementing these principles requires recognition of the economic, social and environmental dimensions of water. *Social measures* are needed to address individual, territorial and sectoral disparities, and to ensure that low-income households have sufficient access to water. Such measures could include direct income benefits or cross-subsidies within the tariff structure to support the poorest citizens. Agri-environmental measures are needed that recognise the ecological services supplied by *water ecosystems* (OECD, 2006).

Air and climate

While several economic instruments apply to the energy and transport sectors, with significant effects on air quality, no specific economic instruments are devoted directly to air management (*e.g.* pollution charges, emissions trading with the exception of GHG emissions). Licensing regulations and financial support remain the main drivers for improving air emissions from stationary sources (*e.g.* thermal power plants, refineries, industrial plants). The Greek authorities should consider *introducing economic instruments*, as other countries have done, *e.g.* for SO_2 or NO_x emissions from power plants, or for lignite extraction and combustion.

Greece participates in the *EU emission trading scheme (ETS) for CO_2*, which has been operational since 2005. The National Allocation Plans 2005-07 and 2008-12 cover about 140 installations (including power plants); overall, about 165 operators have participated in the market. Despite the relatively low CO_2 allowance price, the

EU ETS has stimulated some Greek operators (*e.g.* the Public Power Corporation) to undertake investment programmes to reduce emissions (Chapters 2 and 8).

Nature and natural resources

Access fees to national parks and protected areas are not widely used in the country. They might be seen as a natural extension to access fees to historical and archaeological sites, a tradition widespread in Greece (*e.g.* Acropolis, Delos, Olympia). While the introduction of access fees may find some social opposition (locally and nationally), it may be justified by its environmental benefits, particularly when resources are earmarked for nature protection, green jobs and economic development.

At local level, a special duty regarding extraction of materials from *quarries* has been introduced in 1993 (Law 2115). It is levied by municipalities on quarry operators, and amounts to 5% of the value of the material produced in the quarries, weighted when loaded on lorries. Revenues are used to finance environmental measures or activities that serve social and environmental purposes (Karageorgou, 2003; 2008). A performance bond for quarry operators has also been established to guarantee the reclamation of the land at the end of the quarry exploitation. Such levy on the extraction of materials from quarries, possibly extended to riverbeds and mines, and accompanied by appropriate monitoring, should induce a wiser use of natural resources and encourage the recycling of construction materials.[13]

Tourism-related economic instruments

Due to the *concentration of tourism demand over time* (mainly summer) *and space* (mainly islands and coastal areas), population can increase two to ten times in such periods and places. The provision of basic environmental services (*e.g.* water supply, wastewater treatment, waste collection) and energy supply is a particular challenge.

Based on marginal cost pricing and related peak load pricing, higher prices for water, waste and energy services in *major touristic areas* (*e.g.* islands) during summer periods, would be environmentally and economically justifiable. In practice, the pricing mechanism could take the form of a multi-hour/multi-seasonal charging system, or of an access fees (*e.g.* to an island for non-residents, *ad valorem* tax for nights in tourism facilities). In areas of intense touristic activity and high natural value, the joint use of regulatory instruments (*e.g.* building eco-design, building permits) and economic instruments (*e.g.* construction licensing taxes varying with the distance from the island shores) may lead to both improved environmental protection and increased funding to reduce environmental damage from tourism.

Environmental subsidies

Already in the 1980s, 50% of the purchase price of solar heaters was tax deductible. This incentive had led Greece to rank among the top three countries in the use of solar heaters in Europe. While this measure was abolished in the late 1980s, during the review period, *tax rebates* for the installation of energy efficient equipment in buildings and factories have been provided. For example, since January 2005 20% of the cost for households to convert heating facilities from oil to natural gas or to install natural gas, solar and photovoltaic systems, is deducted from the taxpayer's total income (up to an amount of EUR 700). Based on cost-benefit analysis and internalisation of environmental damages, these incentive measures might be made more cost effective. Economic analysis should also be used to compare such actions on the energy mix with actions concerning energy efficiency gains.

To promote *renewable energy sources (RES)*, a wide range of instruments have been adopted (Table 2.4). Direct subsidies for RES plants, feed-in tariffs and tariff incentives have contributed to the acceleration of investments (Box 2.1). The feed-in tariff scheme was modified in 2006, introducing a differentiated tariff depending on energy source and location of the plant, to better support underexploited sources (*e.g.* photovoltaic and off-shore wind farms) and installation of RES plants in islands (Chapter 2). These support schemes may lead to over-subsidisation and cost-benefit analyses would help to evaluate overall impacts.

Substantial grants are given under the "development laws" for *environmental investment by private enterprises*, mostly ranging between 20 and 50% of the investment cost, peaking sometimes at 75%, according to the region of the country where the investment takes place. This applies for instance to filters, water and effluent treatment plants. The Ministry of Economy and Finance is responsible for these mechanisms as part of its duties concerning EU Structural and Cohesion Funds (Box 5.3).

2.5 Environmental expenditure

There is no recent overall survey on environmental expenditure in Greece. However, estimates can be derived from general government accounts, EC sources and business statistics. *Public pollution abatement and control (PAC) expenditure* (including waste, sewerage and wastewater treatment, air) reported in the general government accounts amounted to 0.6% of GDP in 2006 (Table 5.11). This expenditure increased by about 40% between 2000 and 2006, and at a rapid pace in the latest years with the implementation of EU co-financed projects. Municipalities, responsible for waste management, sewerage and wastewater treatment, carry out

Box 5.3 **Supporting competitiveness and corporate environment management**

To promote environmental efforts by enterprises, support measures were financed by the *Operational Programme* "*Competitiveness*" 2000-06. A first measure includes actions to support individual businesses in all sectors of the economy (manufacturing-processing, services, commerce, tourism) to develop and receive certification for *environmental management systems* conforming to ISO-14001 and EMAS (EU Eco-Management and Audit Scheme). Assistance is provided only for expenditure involving intangible actions (consulting services, certification fees) for proposals with a budget up to EUR 30 000. In the first round (2004), 72 enterprises were selected for funding, with a total budget of EUR 1.5 million. In the second round (2006), 180 enterprises were selected for funding with a total budget of EUR 2.8 million. The financial support conforms to the "de minimis" rule and is implemented with the aid of an Intermediate Agency.

A second measure concerns investments for the technological modernisation of enterprises and is implemented pursuant to Law 2601/98. It includes support to improve the environmental performance of enterprises by introducing and adapting *environmentally friendly technologies* in the productive process or by adopting best available techniques. Priority is given to enterprises falling in the scope of the IPPC Directive. It also includes support to establish new businesses or to expand existing businesses for dismantling buildings, for *reclaiming solid materials and waste*, or liquid materials and waste.

A third measure includes support for enterprises to implement environmental plans leading to *product certification with an ecolabel*, or environmental management systems. Support applies to both intangible actions (testing expenses, certification, consulting services) and acquisition of related equipment. Enterprises have been selected for funding in three rounds. In the first round, 57 enterprises were selected with a budget of EUR 7.2 million; in the second round, 37 enterprises were selected with a budget of EUR 4.5 million, and in the third round, 36 enterprises have been selected with a budget of EUR 4.4 million. The corresponding projects were planned to be completed in 2009.

about 80% of public environmental expenditure. *Public environmental expenditure* (including PAC, water supply and nature protection) amounted to about 0.8% of GDP in 2006.

EU funding, mainly through the Structural Funds and the Cohesion Fund, has been an important financial source of public environmental expenditure (Table 5.3). Over the programming period 2000-06, the total planned budget for *environmental expenditure*[14]

exceeded EUR 3.4 billion (excluding national matching funds), representing 12.5% of the total EU funds available for the period (including the Structural Funds allocated to the Third Community Support Framework, the Cohesion Fund, and the funds allocated through the Rural Development Plan 2000-06). This averages to 0.28% of GDP annually. When considering an extended definition of environment-related expenditure (including renewable energy, energy efficiency, sustainable transport, environment-friendly technology, agri-environmental support), the EU contribution to *environment-related investments* is about EUR 6.7 billion, representing an annual average of 0.56% of GDP (EUR 9.9 billion and 0.8% of GDP if national matching funds are included). For the programming period 2007-13, over EUR 6 billion of EU funding has been assigned programmatically for environment-related actions (in broad terms) in the National Strategic Reference Framework and the National Rural Development Programme, representing 26% of the total available EU contribution (excluding national co-financing).

Overall, *total* (*i.e.* government and business) *PAC expenditure* is estimated to be about *0.7% of GDP*, and *total environmental expenditure less than 1% of GDP*. This is a limited effort compared to other OECD countries in a comparable development stage, despite considerable EU support. It is suggested that Greece increases significantly its environmental financial effort: *i)* looking beyond 2013 and possible decreases in EU support; and *ii)* moving to fuller implementation of the polluter-pays- and user-pays-principles, thereby decreasing public support from national and EU sources.

Table 5.11 **Public environmental expenditure,**[a] 2000-06

(EUR million)

	2000	2001	2002	2003	2004	2005	2006
Total public PAC expenditure	733	728	763	792	916	966	1 033
of which: Investment	226	232	249	258	332	347	381
Total public PAC expenditure (% of GDP)	*0.5*	*0.5*	*0.5*	*0.5*	*0.6*	*0.6*	*0.6*
Water supply[b]	. .	330	256	236	268	309	325
Total public environmental expenditure (% of GDP)		*0.8*	*0.7*	*0.7*	*0.8*	*0.8*	*0.8*

a) At constant 2000 prices.
b) May include expenditure on wastewater.
Source: Eurostat; National Statistical Office.

Notes

1. In 2005, the Greek DMC of fossil fuels per unit of GDP (0.44 tonnes/USD 1 000) was more than twice the level of the OECD (0.20 tonnes/USD 1 000). Moreover, while coal accounts for about 40% of the DMC of fossil fuels in the OECD, this is more than 70% in Greece, reflecting its large endowment in brown coal (lignite). In other words, the DMC for coal in Greece (0.33 tonnes/USD 1 000) is more than four times the OECD average (0.08 tonnes/USD 1 000).
2. For example, the National Reform Programme (NRP) 2005-08 (prepared in the framework of the EU Lisbon Strategy and addressing structural reforms in Greece) identifies key challenges in a broad range of economic and social policy areas, including in the field of environment and energy.
3. Co-operation between Greece and the EU goes beyond financial transfers, and these accounting figures do not reflect what Greece brings to the EU, nor what it is receiving from the EU overall.
4. Financial allocations of EU funds are to be considered as planned expenditure. The financial allocation to environmental infrastructure and nature protection (mentioned in the text) is based on the EU classification of interventions, which is used in the framework of Structural Funds programming. It differs from the official Classification of Environmental Protection Activities (CEPA).
5. Including expenditure on renewable sources of energy, energy efficiency, sustainable transport modes (mainly railways and urban transport), environment-friendly technologies, agri-environmental support and sustainable forestry.
6. The European Commission allows to use 2000-06 funds until June 2009.
7. For example, some NGOs have voiced difficulties in commenting on a landfill project without knowing the overall regional or national policy and plan on recycling and waste reduction. In practice however, some regions (*e.g.* Epirus) have been successful in opening new landfills and closing illegal ones. This success is explained in part by the use of money from the Structural Funds to engage a dialogue with the community on the issue and come to agreement.
8. Full exemption applied until end 2007. Since January 2008 the exemption stands only for the biodiesel part over 5% in diesel blends; the same rate as for diesel applies now to the first 5% (YPAN, 2008).
9. To address widespread tax frauds linked to differentiated taxation depending on fuel end-use (*e.g.* substituting heating oil for more expensive diesel in vehicle), Law 3634/2008 (amending the national customs code) equalised the tax rates on diesel oil and replaced the original tax discount on heating oil with a tax refund mechanism. Households continue to benefit from the reduced tax for home heating oil during the winter season; the tax difference is reimbursed from the State to the filling stations, after fiscal control on oil sale and purchase data.
10. In the early 1990s, a 50% reduction on registration taxes (at that time equivalent on average to 50% of the purchase price) was granted for cars with catalytic devices, provided the purchaser scrapped his/her old car. This led to a renewal of one third of the car fleet (which was very old). The measure was abolished in 1994. In the following years, registration taxes were strongly differentiated according to engine size; as a consequence, purchases of large cars with high fuel consumption decreased.

11. Proposal for a Regulation of the European Parliament and of the Council setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO_2 emissions from light-duty vehicles COM(2007) 856 final.
12. Threshold and limit values have been defined for sulphur and nitrogen oxides, particulates, lead, benzene, carbon monoxide; ozone, arsenic, cadmium, mercury, nickel and polyaromatic hydrocarbons.
13. Concerning coal extraction, environmental terms are imposed for the operation and restoration of the mining area.
14. According to the official Classification of Environmental Protection Activities (CEPA), environmental expenditure includes PAC, water supply and nature protection.

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6 ENVIRONMENTAL-SOCIAL INTERFACE*

Features

- Environment and health risks
- Employment in environment-related sectors
- Education for sustainable development
- Environmental democracy

* This chapter reviews progress in the last ten years, and particularly since the 2000 OECD Environmental Performance Review. It also reviews progress with respect to the objectives of the 2001 OECD Environmental Strategy.

Recommendations

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Greece:

- implement the *environmental health action plan*; priorities for action should be based upon scientific research and economic analysis (*e.g.* reduced health expenditure, improved labour productivity, improved well-being);
- further develop an active and long-term *environmental employment policy*;
- continue efforts to collect, process and disseminate *environmental information* at national and territorial government levels;
- continue to encourage more active *public participation associated with decision-making*, as well as effective implementation of provisions for access to environmental justice and follow-up to judicial decisions; enhance the effectiveness of consultation procedures;
- take further steps towards the integration of environmental themes at all stages of *education*, including professional training.

Conclusions

Environment-related employment has increased, mainly related to large environmental infrastructure investments and to new government bodies created at national and local levels. Concerning environmental democracy, Greece ratified the Aarhus Convention in 2005 and transposed the related EU directives into national legislation, with a well-designed institutional and legal framework for *environmental information* and reporting in place. A wide range of environmental information is available free of charge and accessible through Web-based tools. The Greek legal system provides a broad recognition of individual and collective rights to a protected natural and cultural environment. *Access to courts* in environmental cases for individual citizens and NGOs is provided for in both administrative and judicial procedures. The Greek Ombudsman investigates cases of possible inappropriate administrative actions related to the environment. Mechanisms to assure *public participation* in environmental decision-making improved during the review period and public consultation is now widespread at all government levels. NGOs are full members of Management Bodies of protected areas and of Regional Water Councils and are actively involved in raising environmental awareness. *Environmental education* has received increasing attention and several projects have been implemented in primary and secondary schools. Local and national campaigns, as

well as extensive media coverage of environmental themes, have raised environmental awareness. Greece has enjoyed further gains in life expectancy and reductions in infant mortality. *Health risk factors* (*e.g.* drinking water quality, ozone and PM_{10} concentrations) are monitored on a regular basis throughout the country; a national legislation to contrast tobacco-smoke is in place. Several awareness raising initiatives have been addressing occupational health.

However, *employment* opportunities in environmental sectors are not being fully exploited in Greece. A comprehensive assessment of the impact of Greek environmental policy on employment would be very useful. The potential value of *public participation* in policy-making is still weakly acknowledged. Consultations often appear to be undertaken to fulfil legal obligations (*e.g.* at local level), especially when required by EU directives (*e.g.* Environmental Impact Assessment, Strategic Environmental Assessment, Water Framework Directive). A comprehensive framework for *environmental education* at different stages of education is missing; environmental themes are integrated in school curricula and training programmes mainly on a project-basis. Gaps remain in collecting and processing *environmental health* data, and little attention has been given to cost-benefit analysis in environmental health policy design.

♦ ♦ ♦

1. Policy Objectives

In a context of rapid economic growth, Greece has made *progress in a number of social indicators* (*e.g.* unemployment rate, income convergence, life expectancy), showing a gradual convergence of living standards with EU and OECD averages (Box 6.1 and Figure 6.1). However, there are persisting regional disparities (Table 6.1), the unemployment rate remains high (especially for women and young people), population is ageing, and migration flows are intensifying. The long term financial and economic sustainability of the Greek social protection system deserves special attention, and the quality of social services needs to be upgraded.

The *National Strategy Report on Social Protection and Social Inclusion 2006-08* sets the framework to address these challenges, building upon the National Action Plan on Social Inclusion (ESDEN), the National Strategy Report on Pensions and the National Strategy Report on Health and Long-term Care (all having the same time span). In particular, the ESDEN identifies four priorities and related policy measures: *i)* boosting employment, particularly for women, young people, long term unemployed and vulnerable groups; *ii)* reducing disparities in accessing education

Box 6.1 **Social context**

Between 1990 and 2006 Greece's *population increased* by 10.5%, above the OECD-Europe average (8.6%), and reached 11.2 million (Figure 6.1). The review period saw a much lower population growth (about 2.5% since 2000), comparable to those of many other European countries. The main driver of demographic growth is immigration, with an increasing share of foreign-born citizens. Greece faces *ageing of its population:* while 14.3% of Greeks are under 15 year old, 18.5% are over 65. Average life expectancy at birth has risen markedly, to reach 79.6 years.

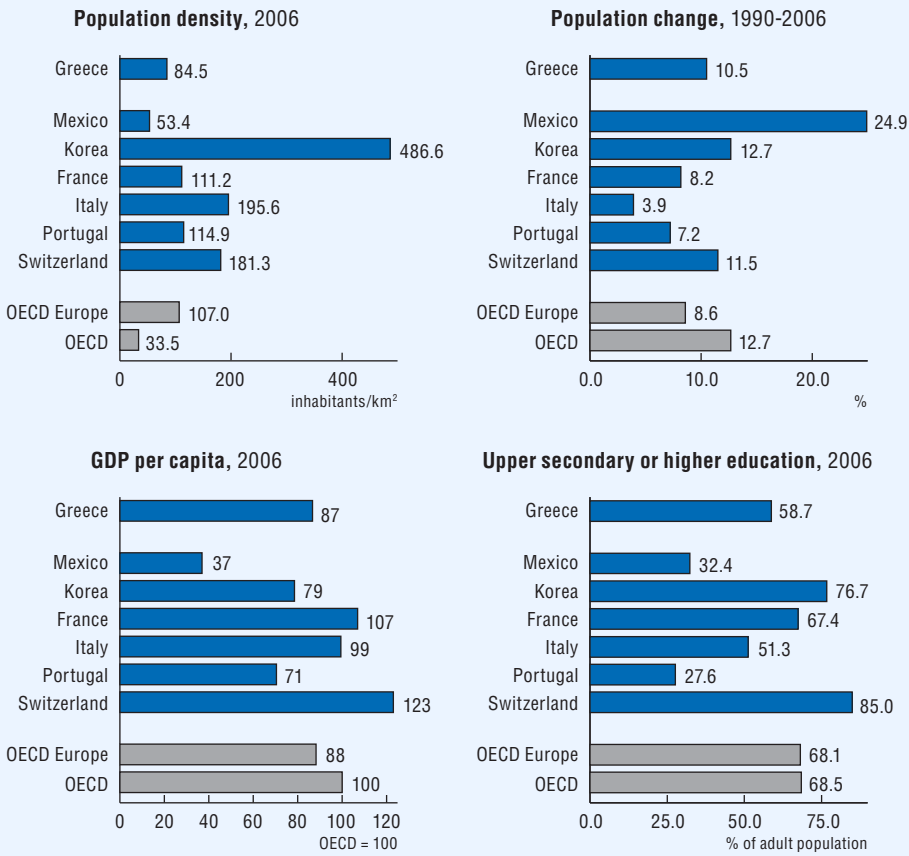
Population density averages 85.2 inhabitants per square kilometre, but varies greatly across the country (Table 6.1). Greece's settlement indicators show a very high population density in urban areas. Greece has one of the most concentrated urban structures in Europe with about 50% of the urban population in the country's two metropolitan areas of *Athens and Thessaloniki*. The majority of Greek population lives in or close to *coastal areas*. In many islands, the population increases two to ten-fold during summer periods due to tourism, with consequent pressures in environmental and sanitation services. Building construction in coastal areas continued at a high rate during the review period.

The difference between Greece's *GDP per capita* and that of other European countries has narrowed considerably, to the extent that Greece's GDP per capita is now quite close to the OECD Europe average, but with marked regional disparities (Table 6.1). Greece has a relatively high level of *income inequality*, above the OECD average (OECD, 2008). Progress have been made in recent years: the share of population living below the poverty threshold (40% of median income level) has continued to decrease from around 8% in 2000 to 7% in mid 2000s, but it is still higher than the OECD average (5.2%). The poverty rate remains higher in rural than in urban areas.

In a context of high economic growth, *unemployment rate* has steadily decreased from 11.3% in 2000 to 8.3% in 2007, but still remains among the highest in the OECD. High unemployment is particularly prevalent in some regions of the country (Table 6.1), and among certain vulnerable groups, particularly first-time job seekers (mainly the young) and labour market re-entrants (mainly women). Overall labour mobility is relatively low. The social protection system (*e.g.* children and elderly care) has traditionally relied upon informal networks and families (especially women).

Educational attainment is mixed. The share of adults with upper secondary education increased during the review period, reaching 58.7%. However, it remains below the OECD average and among the lowest in Europe. Educational attainment is significantly lower in rural than in urban areas. According to the OECD Programme for International Student Assessment, Greek 15-year-old students rank third last among OECD countries as for skills in reading, maths and science. As for tertiary and advanced education, the share of Greeks holding university degrees is also below the OECD average, studies take a long time and student dropout rates are high.

Figure 6.1 **Social indicators**



Source: OECD, Environment Directorate.

and training; *iii)* supporting families and the elderly; *iv)* social inclusions of vulnerable groups (*e.g.* disabled and immigrants). The ESDEN sets three key targets to 2010: increasing the employment rate to 64% (from 60% in 2005); reducing the poverty gap to 20% (from 30% in the early 2000s); reducing the school dropout rate to 10% (from 13% in early 2000s). The ESDEN objectives have been integrated in the National Strategic Reference Framework specifying the use of EU structural and cohesion funds for the period 2007-13. The *National Strategy Report on Social Protection and Social Inclusion 2008-10* and the revised ESDEN confirm these goals,

Table 6.1 **Regional indicators**

	GDP (%)	GDP per capita[a]	Value added		
			Agriculture (%)	Industry (%)	Services (%)
	2005	2005	2005	2005	2005
Greece	*100.0*	17.9	*4.3*	*22.2*	*73.5*
Anatoliki Makedonia and Thraki	*3.6*	11.8	*9.3*	*26.3*	*64.4*
Kentriki Makedonia	*13.9*	14.5	*6.0*	*29.2*	*64.8*
Dytiki Makedonia	*2.1*	14.4	*6.9*	*42.6*	*50.5*
Thessalia	*5.1*	13.7	*10.9*	*29.0*	*60.1*
Ipeiros	*2.2*	12.8	*8.1*	*21.8*	*70.1*
Ionia Nisia	*1.6*	13.9	*5.7*	*13.1*	*81.2*
Dytiki Ellada	*4.0*	11.0	*11.7*	*21.3*	*67.0*
Sterea Ellada	*5.3*	19.0	*8.5*	*52.3*	*39.1*
Peloponnisos	*4.7*	15.7	*8.7*	*39.8*	*51.5*
Attiki	*48.8*	24.4	*0.4*	*15.0*	*84.6*
Voreio Aigaio	*1.2*	12.3	*9.9*	*15.4*	*74.8*
Notio Aigaio	*2.7*	17.6	*3.1*	*15.5*	*81.3*
Kriti	*4.6*	15.3	*9.3*	*13.8*	*76.9*
	Population (%)	Density (inh./km^2)	Unemployment rate (%)	Graduates[b] (%)	Car ownership (veh./100 inh.)
	2006	2006	2007	2005	2004
Greece	*100.0*	85.2	*8.3*	*100.0*	36.8
Anatoliki Makedonia and Thraki	*5.4*	43.2	*9.7*	*4.7*	26.8
Kentriki Makedonia	*17.3*	101.9	*8.9*	*19.3*	32.2
Dytiki Makedonia	*2.6*	31.8	*12.1*	*3.8*	27.3
Thessalia	*6.6*	52.6	*7.8*	*4.5*	26.6
Ipeiros	*3.1*	38.2	*10.0*	*4.5*	25.8
Ionia Nisia	*2.0*	97.7	*9.0*	*0.8*	30.7
Dytiki Ellada	*6.6*	66.5	*9.6*	*10.7*	21.2
Sterea Ellada	*5.0*	36.1	*9.4*	*2.8*	20.5
Peloponnisos	*5.3*	38.5	*7.5*	*1.3*	19.4
Attiki	*36.0*	1 055	*7.6*	*41.0*	54.1
Voreio Aigaio	*1.8*	52.7	*7.9*	*1.3*	25.5
Notio Aigaio	*2.7*	57.6	*9.1*	*0.0*	28.2
Kriti	*5.4*	72.4	*5.3*	*5.3*	33.4

a) EUR 1 000/inh.
b) Graduates in tertiary education.
Source: Eurostat.

with renewed emphasis on children welfare, and identify further targets to be achieved by 2013: reducing the poverty risk to 16% (from 21% in 2006); reducing the poverty risk of children (0-17 year old population) to 18% (from 23% in 2006); increasing female employment rate to 52%.[1]

The objectives of the Greek policy for social protection and inclusion are in line with the 2002 *National Strategy for Sustainable Development* (NSSD) (Chapter 5). The NSSD addresses the social dimension of sustainability, and identifies broad guiding principles for designing and implementing an integrated programme towards social cohesion and solidarity, focussing on: *i)* exclusion from employment opportunities; *ii)* equal opportunities between men and women; *iii)* exclusion from public goods (*e.g.* health, education, housing, information); *iv)* prevention from exclusion risk, including prevention of illiteracy and support to families with children; *v)* protection of vulnerable social groups (*e.g.* repatriates, gypsies, immigrants and refugees). However, neither ESDEN nor the NSSD include specific objectives and policy actions to tackle *environment-related social issues*.

2. Environment and Health

The *National Strategy Report on Health and Long-term Care 2006-08* sets the key priorities of health policies: *i)* ensuring the access to healthcare to all socio-economic groups, taking into account the geographical diversity of the country (with isolated mountainous areas and several islands); *ii)* improving management and quality of healthcare services; and *iii)* ensuring economic sustainability of the healthcare systems. Total *health expenditure* increased during the review period (on average by 7.2%), reaching 9.1% of GDP in 2006, slightly above the OECD average, but below the OECD average in terms of health spending per capita (OECD, 2008).

The *protection of human health against environmental degradation* has traditionally been one of the objectives of Greek environmental policy, as stated in the 1986 Framework Law on Environmental Protection. However, environment-related health issues are not explicitly integrated in Greek health policy. Co-ordination among the Ministry for the Environment, Physical Planning and Public Works (YPEHODE) and the Ministry of Health and Social Solidarity (YYKA) needs to be enhanced. To strengthen institutional co-operation, an *ad hoc* inter-sectoral committee has been set up under the auspices of the Athens Academy of Sciences, with the involvement of the two Ministries and major universities and scientific institutes.

Greece finalised its *National Action Plan to Address Environmental Health Threats 2009-12* in December 2008, which provides an updated and comprehensive framework to address the environment and health interface.[2] The Action Plan sets several strategic objectives: *i)* reducing the population disease load due to

environmental factors, through the implementation of prevention programmes; *ii)* studying the environmental hazards and determining their relationship with health problems; *iii)* setting up a system to monitor the trends in environment-related diseases and the effectiveness of implemented actions; *iv)* reducing the exposure to environmental hazards at the workplace; *v)* systematically studying the impacts of climate change on citizens' health; *vi)* raising awareness of the population, particularly of the vulnerable groups, on the health effects of environmental hazards; *vii)* establishing a dedicated information system; *viii)* cooperating with European and international agencies and actors.

The Plan explicitly acknowledges the *potential economic benefits* that accrue from the reduction of the health risk factors related to the environment. It estimates the potential financial savings for the National Health System deriving from the minimisation of the morbidity by cancer, cardiovascular diseases and accidents associated to environmental risk factors (EUR 1.1 billion per year). Moreover, economic losses for EUR 2 billion could be avoided each year by reducing the environmental disease burden at the workplace. The Plan's *budget* is of nearly EUR 60 million for the period 2009-12 and is mostly funded by the EU funds (through the National Strategic Reference Framework 2007-13). The 80% of the budget is earmarked to the management of waste from the health-care sector.[3]

A number of *measures* are in place to address environment-related health problems and to implement relevant EU directives, including those associated to water quality and sanitation, air pollution and noise (Table 6.2). Health risk factors are monitored on a regular basis throughout the country, although local authorities' budget constraints and the inadequate number of certified laboratories often impair data collection, processing and reporting (*e.g.* in the case of drinking water quality). Several awareness raising initiatives have focused on occupational health. The *National Network of Healthy Cities*, first established in the 1990s with the support of the WHO and the EU, has been recently relaunched and involves over 50 municipalities. Most cities have developed their "health profile" and have implemented actions to improve the quality of life of city-dwellers (*e.g.* medical advice, awareness raising initiatives, hygiene control in school buildings). Some measures focussing on youth health (*e.g.* National Registers for Children's Health, measures for psychological health, health education programmes) were included in the 2007 *National Action Plan for Children's Rights*.[4] However, relatively little attention has been given to environmental impacts on children's health and to cost-benefit analysis in environmental health policy design.

Table 6.2 **Environment and health policy measures**

Risk factor	National policy/measures	Responsible authorities
Drinking water pollution	– National legislation approved in 2001 (pursuant to EU Directive 98/83/EC), specifying additional water quality parameters to protect human health (microbiological, parasitic organisms and chemical parameters). – Monitoring network of 66 sampling points (since 1995); samples are analysed by the General Chemical State Laboratory. – Local Authorities collect water quality data and report them to YYKA every 3 months.	YYKA; YPEHODE; Regional and prefectural health authorities; National Board of Food Control; Hellenic Centre for Infectious Disease Control.
Bathing water Pollution	– National legislation approved in 1986 (pursuant to EU Directive 76/160/EEC).[a] – Fortnightly microbiological tests of bathing waters (since 1994) from May to October, at over 2 000 bathing locations. – Blue flag awards.	YPEHODE (formulation of programmes and actions plans); YYKA (enforcement of abatement measures).
Housing hygiene	– The 1938 sanitary regulation includes provision on protection of water supply from pollution, water sanitation facilities and sewerage, waste disposal, smoke collection. – The Building Code (last revised in 2000) includes provision on aeration, illumination, fire protection, noise, heating, water supply and sanitation, and general safety. It applies to all dwellings requiring a building permit to be built, modified or extended. – Controls conducted by Public Health Inspectors.	YYKA (sanitary regulation); YPEHODE (building code and building permits); local authorities (waste collection and disposal).
Outdoor air pollution	– National legislation approved in 2002 and 2005 (pursuant to EU Directives 96/62/EC and 2002/3/EC): mandatory limits for SO_2, NO_x, PM_{10}, lead and ozone in ambient air. – Monitoring network of 34 automatic stations. – Restriction on private cars traffic in the inner ring of Athens (total ban or circulation restricted to cars with even or odd number plates on alternating days), 30% reduction of central heating and relocation of industrial complexes (since 1982). – Phasing out of oil for combustion use in Athens historic centre and replacement with natural gas (since 2000). – Renewal of the bus fleet and other urban transport measures (*e.g.* underground network, park-and-drive).	YPEHODE, in co-operation with YYKA and the ministries of development and transportations; EYEP.
Environmental tobacco smoke in outdoor air	– National legislation approved in 2003 (pursuant to EU Council Recommendation 2003/54/EC): smoking is allowed only in designated indoor areas (separated from non-smoking areas and occupying not more than half of total sitting area) and outdoor areas.	YYKA.
Noise pollution	– National legislation (pursuant to EU Directives 2002/49/EC, 2002/30/EC and 2000/14/EC). – Noise regulations: noise from night clubs (since 1985); minimum distances of recreational activities (*e.g.* carnivals, circuses, open air cinemas) from dwellings (since 2000); public silence during midday and night time (since 1996). – Classifications of industrial activities according to noise and nuisance levels (high, medium or low) as referred to in town plans (since 2003). – Noise maps and action plans.	YPEHODE; Civil Aviation Authority (airport noise); Ministry of Development; police.

Table 6.2 **Environment and health policy measures** *(cont.)*

Risk factor	National policy/measures	Responsible authorities
Chemicals	– National provision to implement the EU REACH regulation (EC 1907/2006). – Ban on leaded gasoline. – Regulations of chemicals in building materials (*e.g.* asbestos, creosote, flame retardants). – Monitoring of food and water.	General Chemical State Laboratory.

a) Directive 76/160/EEC is repealed by Directive 2006/7/EC; member states were required to transpose this directive by March 2008.
Source: European Environment and Health Information System; WHO European Environment and Health Committee.

As most OECD countries, Greece enjoyed further gains in *life expectancy* and reductions in *infant mortality* over the review period, owing to improvements in living conditions, public health interventions and progress in medical care. Life expectancy at birth increased from 78.5 years in 2001 to 79.6 years in 2006, higher than the OECD average (78.9). The infant mortality rate fell from 5.1 deaths per 1 000 live births in 2001 to 3.7 in 2006, lower than the OECD average (5.2). The health status is perceived as good by nearly 78% of the population. However, several indicators are of concern: cardiovascular diseases and cancers are the primary causes of death in Greece and may be related to environmental factors and to *tobacco smoke*.[5] In 2004, Greece had the highest rate of daily smokers among adults of all OECD countries (38.6%); more than 90% of 13-15 year old children are exposed to environmental tobacco smoke in their homes. The *obesity* rate among adults (22%) is among the highest in OECD-Europe (OECD, 2008), and it is increasing especially among children. Greece has one of the highest *DALYs*[6] *due to environmental factors* in OECD-Europe (20 DALYs/1 000 inhabitants); environmental factors account for 16% of DALYs (WHO, 2007).

The main environmental risk factor is *outdoor air pollution*: 1.3 DALYs/ 1 000 inhabitants per year were estimated to be due to air pollution in 2004, the highest value in OECD-Europe (WHO, 2007). In the second half of the review period, ambient air quality has improved in many areas of the countries and extreme events (*e.g.* the Athens cloud of photochemical smog called "nephos") have virtually disappeared. Nonetheless, repeated exceedances of standards for ozone and particulate matters continue to occur in major cities, and urban population exposure to these pollutants

stays largely above the European average (Chapter 2). Health damage costs associated to air pollution are estimated between EUR 5.5 and 10.2 billion/year (*i.e.* between 3.5% and 6.7% of Greek average annual GDP in the review period); in per capita terms, health damage costs range between 506 and 937 EUR/year, slightly below the EU25 average (AEA Technology Environment, 2005).[7]

Concerning *water quality and sanitation*, significant investments have been made in recent years in wastewater treatment infrastructure, with the support of EU funding. The vast majority of the population is connected to the sewerage system (with or without treatment) and 65% of the population is connected to treatment plants (Chapter 3). This has contributed to improve the quality of coastal waters in some problematic areas (*e.g.* in Saronikos and Thermaicos Gulfs). Overall, the status of bathing waters in Greece is among the best in Europe. Drinking water is considered of generally good quality, and the number of children affected by water-related disease is very small. Nonetheless, a few outbreaks of waterborne diseases were reported during the review period (ENHIS, 2007a); dangerous substances have been detected in drinking water in some part of the country,[8] due to uncontrolled industrial waste disposal, the proximity of water supply pipes to sewerage pipes or septic tanks, and the poor maintenance of the supply and sewerage networks (Greek Ombudsman, 2005). This has raised concerns also about polluting substances and heavy metals penetrating the food chain (ENHIS, 2007b). Further, covering the water supply and sanitation needs of small islands and remote mountainous villages remains challenging.

3. Environmental Employment

During the review period, Greece has experienced high economic growth accompanied by a steady *decline of unemployment* and an increasing rate of female participation. Nonetheless, the Greek unemployment rate (8.3% in 2007) remains well above the OECD average (5.8%), and the female unemployment rate is twice that of the OECD (Box 6.1). Unemployment levels differ among regions, ranging from 5.3% in Kriti (Crete) to over 10% in Ipeiros (Epirus) and Dytiki Makedonia (Table 6.1).

The *net labour market effects* of Greek environmental policies have not been assessed systematically. Estimates from 2004 indicate that the pollution management sector accounts for about 0.6% of Greek workforce; this is among the lowest share in Europe and well below the 2.5-3.2% of top countries (*e.g.* Austria, Denmark and Poland). *Employment in Greek eco-industries* fell by nearly 18% in the period 1999-2004, paralleling the 8% decrease in total turnover (Ernst and Young, 2006). In 2004, the turnover of eco-industries was about 1.3% of GDP, one of the lowest in Europe. Solid

waste management and recycling, wastewater treatment and water supply are by far the largest sectors (accounting together for 85% of total eco-industry turnover), and are mainly driven by the large investments needed to comply with the EU legislation. Greek businesses are gradually progressing in corporate environmental management and development of green products: during the review period, EMAS registered organisations increased from 1 in 1999 to 62 in 2008, and Ecolabel licenses increased from 9 in 2001 to 23 in 2008. Greece does not have a detailed *environmental employment strategy*, but various policy initiatives have been taken to stimulate employment in environment-related sectors (Box 6.2). The environmental dimension was integrated into some recent programmes related to the labour market, such as the Operational Programme "Human Resource Development" 2007-13 (partly funded by the European Social Fund). In 2006, the Employment Observatory Research – Informatics (PAEP) conducted a study on "Environment and Employment", forecasting a *growth in environment-related employment for forthcoming years*, mainly linked to the implementation of the EU environmental legislation and the use of EU funds. For example, the implementation of the Operational Programme "Environment" 2000-06 is estimated to create more than 4 600 direct jobs, mainly in government bodies at central level (*e.g.* YPEHODE, Central Water Agency, Environmental Inspectorate) and decentralised level (*e.g.* management bodies of protected areas), as well as in environmental public utilities. Eco-tourism and renewable energy sources are considered the most promising sectors. New employment opportunities are expected in the environmental research and consultancy sector (*e.g.* for environmental impact assessment of projects and plans).

4. Environmental Education

Greece developed a *National Plan for the implementation of the UNESCO and UNECE Strategy for Education for Sustainable Development* (ESD), within the framework of the United Nations Decade of Education for Sustainable Development 2005-14.[9] The Plan envisages the approval of a law on the education for sustainable development. A National Committee for ESD, involving all relevant ministries and environmental NGOs, was established to coordinate ESD initiatives. The Department of Health and Environmental Education within the Ministry of Education and Religious Affairs (YPEPTH) is responsible for environmental education and awareness in primary and secondary education. The Coordinators of Environmental Education (one or two in each school district) are responsible for coordinating ESD activities among schools and liaising with YPEPTH.

YPEPTH has promoted several *ESD initiatives* at school level, as well as specific training programmes for more than 20 000 educators. School programmes generally last from two to six months; they are included in ordinary school hours in primary

Box 6.2 **Environmental employment and training initiatives**

The *National Employment Agency* (OAED) is a public institution supervised by the Ministry of Labour and Social Protection of Greece and mainly funded by contributions of employees and employers. OAED promotes training and employment programmes in various domains, to improve professional qualifications of workers and support vulnerable groups (*e.g.* women, young people, long-term unemployed, migrants) in accessing the labour market.

During the review period, OAED carried out several *training and employment activities specifically targeted at the environment*, among which:

- Financial assistance (up to EUR 9 000) to the unemployed to create small enterprises in the fields of culture and environment (*e.g.* bookstores, production and sale of traditional products, landscape gardening, waste recycling). The programme addressed nearly 6 500 unemployed.
- Financial incentive to environmental businesses (*e.g.* recycling companies, pollution control companies) to hire the unemployed.
- Training programme in the field of environment, offering to 3 000 young unemployed training in local government agencies and non-governmental organisations.
- Financial support scheme to local government agencies to employ 6 000 workers in reforestation and flood control projects in the areas damaged by the 2007 forest fires (Box 7.3). The programme budget is EUR 64.8 million.
- A few environmental employment projects were supported within the framework of the EU Community initiative EQUAL (for the promotion of equal opportunities in accessing the labour market), including: *i)* the development partnership "Green Amphiktiony of work" (EUR 1.5 million and 238 participants), supporting the entrance of vulnerable groups into the labour market; *ii)* the partnership for the development of a life-long learning system in environmental fields (EUR 1.9 million and 200 participants); *iii)* the partnership "Bio Breed" (EUR 1.5 million and 400 participants) for the development of organic livestock farming; *iv)* the Thessaly and northern Aegean development partnership "Social and vocational rehabilitation in recycling" (EUR 1.2 million and 20 participants), which supports the creation of companies specialised in the recycling of electric and electronic waste.

education, and represent an extra-curricular activity in secondary schools. Since 2004, 40 000 programmes of environmental education and 45 000 programmes of health education have taken place in primary and secondary schools. Schools also participate in 31 national thematic networks on sustainable development. About 12 000 environmental and health awareness initiatives have been promoted in schools each year, including contests on environmental themes. Some 50 schools participate in ESD activities within

international networks sponsored by UNESCO (the South Eastern Mediterranean Environmental Project and the Associated Schools Project Network). Information and communication technology instruments are increasingly used to support environmental education (*e.g.* dedicated Web-forums hosted on the YPEPTH's Website).

Sixty *Centres of Environmental Education* (CEE) have been established at regional level and are linked in a National Network of CEEs and in 14 regional networks. They offer targeted environmental education programmes (*e.g.* for students, employees, teachers and educators), providing accommodation and learning facilities (*e.g.* laboratories, computer halls, and libraries). CEEs develop environmental education guidelines, teaching and study material. Since July 2007, CEEs have published a magazine on ESD.

However, environmental themes are not included in school curricula at all levels of education; *ESD initiatives are promoted on a project basis* and participation is voluntary. Educators and school children participating in ESD activities represent less than 10% of their respective populations. While education material has been increasingly made available, it is not regularly published and updated. There is very little public budget specifically allocated to ESD.

5. Environmental Democracy

5.1 Access to environmental information

Following the ratification of the *Aarhus Convention* in 2005 and the transposition of the EU Directive on public access to environmental information (2003/4/EC) in 2006, Greece has fully regulated the provision of information and statistics on the environment and the *citizens' right to access environmental information*. Joint Ministerial Decision (JMD) 11764/653/2006 mandates public authorities to make available environmental information upon request within specific deadlines (from 20 days to two months) or to justify their refusal, and to assist the public to access the requested information (*e.g.* in better specifying the request or in identifying the competent authority). In case of refusal, the applicant may resort to a Special Committee for obtaining a review of the public authority's decision. Information are provided free of charge.[10] This JMD extended to the environmental domains the provisions of the Greek Constitution and the Administrative Procedure Code on the citizens' right to access official information and documents. Public Relation Departments operates in each ministry, including YPEHODE. However, the lack of human and financial resources represents an obstacle to the timely disclosure of requested information (UNECE, 2008). The Greek Ombudsman (Box 6.3) noted that full access to information on the environment has yet to be accomplished throughout the country.

Box 6.3 **The Greek Ombudsman**

The Greek Ombudsman is a constitutionally based independent authority, established in 1998. It provides its services to all citizens free of charge. The mission of the Greek Ombudsman is to *mediate between the public administration and private individuals*, to protect citizens' rights, to ensure compliance with the rule of law and to combat mistakes in the administration. As mediator, the Ombudsman addresses recommendations and proposals to the public administration, but it does not impose sanctions. The Ombudsman has competence at all levels of government.

The Ombudsman deals with any matter pertaining to the public administration, following the submission of a written *complaint* by any individual, legal entity or association, who has a direct interest in the case. The Ombudsman can intervene in case of: refusal of the public administration to provide information or insufficient provision of information, unreasonable delay in processing applications, infringement of laws and procedures, administrative irregularities or omissions, and discrimination against individuals. Complaints are assigned to one of its *five sectoral departments*: human rights; social protection; quality of life; state-citizen relations; children's rights. The complainant is kept informed at each stage of the process. The investigation is completed with the drafting of a final report. Reports on the Ombudsman's activities are issues on an annual basis and made available through the internet.

The *environment* falls under the department of quality of life. Since 2000, the deputy Ombudsman of this department has received over 2 000 complaints per year, including on natural environment (30%), urban environment (25%) and encumbrances of property (15%). Each annual report focuses on specific topics, including those relating to the environment, such as management of natural areas, access to environmental information, water supply and wastewater treatment. For each topic, major deficiencies are reported and recommendations are made.

Greece has been active in promoting the Aarhus Convention *internationally*, hosting international seminars on its implementation and access to environmental information within OECD countries, and promoting the development of environmental information systems in Bulgaria and in countries of south-east Europe.

5.2 Provision of environmental information

Greece has made important progress in implementing the *2000 OECD EPR's recommendation*"ensuring the publication of comprehensive environmental information". YPEHODE is the *chief responsible authority* for production of environmental data, statistics and indicators, as well as for reporting; the Ministry cooperates with the National

Statistics Agency and the National Centre for Environment and Sustainable Development (NCESD).

A *National Environmental Information Network* was set up in recent years, to collect environmental data at national level, exchange information between competent administrations and agencies, and disseminate information to the general public. It covers the main environmental domains (*e.g.* air, water, nature, waste, impact assessment studies, emissions from stationary and mobile sources, establishments covered by the EU "Seveso II" Directive), and provides the basic official information necessary to fulfill reporting obligations to EU and international organisations. The Network is currently being upgraded (with the financial support of the EU) towards an integrated Web-based system, covering further environmental themes and collecting data from an increasing number of institutions. The upgraded system will include an English version, and serve as national node for the Aarhus Convention Clearing-house Mechanism and the EU-wide Shared Environmental Information System.

Several *activities to collect and disseminate monitoring data and statistics* on the environment were conducted during the review period and are planned for the near future. The *Pollutant Emission Register* has been operating since 2004 in the framework of the EU IPPC Directive (96/61/EC), and has been upgraded to comply with the European Pollutant Release and Transfer Register (E-PRTR) Regulation. NCESD is developing *sustainable development indicators*. The National Statistic Agency is developing a system of *environmental accounts*, in cooperation with the Ministry of Economy and Finance and YPEHODE. The first expected outputs are the National Accounting Matrix with Environmental Accounts (NAMEA) for air emissions and energy, and the forest accounts.

Emphasis has been placed on developing systems for *emergency situation warning*. In case of air pollution alert, updated information are provided to the population every hour through the media and the Internet; a dedicated phone-line is operating to inform Athens residents. The National Emergency Plan for Civil Protection (XENOKRATIS) includes the development of forecasting and early-warning systems to timely inform the competent authorities and the population.

Despite all this recent progress, some environmental *information gaps* remain. Greece has not produced reports on the state of the environment on a regular basis. An updated report prepared by the NCESD is forthcoming. In some cases, reporting in response to EU and international agreements obligations has not been timely or satisfactory. Statistical information on national emissions has not always been adequate, especially for fine particles, persistent organic pollutants and heavy metals. In response to a decision of the Compliance Committee of the Kyoto Protocol, the national inventory system of greenhouse gas emissions was upgraded in 2008 to meet the international

reporting requirements (Chapters 2 and 8). The territorial coverage of the air monitoring network needs to be extended. The effectiveness of drinking water quality monitoring is prejudiced by poor quality assurance of monitoring systems. Further efforts are needed to fill the gap in economic information on the environment (*e.g.* environmental expenditure, environment-related taxes, employment), thus strengthening the analytical basis for decision-making. Such efforts would both respond to the requirements of evidence-based decision-making and of an informed democratic debate on the environment.

5.3 Access to justice in environmental matters

The 2001 constitutional revision explicitly acknowledged the protection of the environment as both a *constitutional subjective right* and "a duty of the State" (Article 24), thereby requiring the State to "adopt special preventive or repressive measures for the preservation of the environment, in the context of the principle of sustainability".

Access to justice in environmental matters is secured mainly through general judicial and administrative procedures; specific provisions are set out in the 2006 JMD on access to environmental information (EU Directive 2003/4/EC) and in the 2007 JMD on access to information and public participation in Environmental Impact Assessment (EIA) processes (EU Directive 2003/35/EC). Citizens can take legal actions against private activities and public authorities' decisions (or omissions), either to prevent environmental damages or to claim compensation.

The *legitimacy of public authorities' actions* (including for failure in assuring public participation in EIA procedures) can be challenged through administrative procedures,[11] and through resort to the administrative courts. Pending the decision, the execution of the contested act may be suspended upon request, due to its potential negative impact on the environment (*e.g.* in case of planning and construction projects). The Council of State is the Supreme Court for administrative justice; the Fifth Division of the Council was established in 1992 specifically to deal with environmental cases. The *Ombudsman* represents an alternative means for accessing justice in case of misuse of power and inappropriate administration (Box 6.3). Victims of *environmental damages* (typically pollution) can resort to the civil courts to claim compensation.

In principle only individuals being directly, personally and presently affected by an authority's decision or a private activity are entitled to take legal actions. Nonetheless, in environmental cases the scope of *legal standing* has been expanded by Council of State's sentences, recognising that environmental protection is a collective and supra-individual constitutional right, and somehow introducing actio

popularis in environmental matters. *Non-governmental organisations* (NGOs) can stand in legal procedures, but must meet some requirements, including the main statutory objective of environmental protection. The courts have not always been consistent in recognising legal standing to NGOs (Milieu, 2007). Citizens from other States can participate in court proceedings.

The *costs* for promoting legal actions in environmental matters are virtually null in the case of administrative reviews, but can reach relatively high amounts for judicial procedures: since an applicant to judicial review must be represented by a lawyer, actual expenses greatly depend upon legal counselling fees, a part of which must be paid in advance. Trial costs (including the legal counselling fees) are finally charged to the defeated party. Applicants may be exempted from paying the standard stamp duties and the trial deposit fee (in the range of EUR 10-30) if they are deemed in poor financial condition. Legal aid is provided to poor litigants in cases of resort to civil courts, but not to NGOs. The high costs of judicial procedures represent an obstacle for resorting to courts, especially for NGOs, as shown by the few civil actions undertaken.

5.4 Public participation and awareness

Building upon EU legislation, the Greek legal framework provides mechanisms for *public participation in decision-making* in environmental matters, notably in the course of environmental permitting (especially of IPPC installations), environmental impact assessment (EIA) of projects, strategic environmental assessment (SEA) of plans and programmes, approval of the general master city plans. The general public, environmental NGOs, institutional and socio-economic stakeholders can submit their comments to the competent public authority. However, some NGOs complain that information are not made readily available, time allowed for submitting comments is relatively short, consultations are launched in a fairly late stage of the decision process, and in many cases observations are not taken into account. On the other hand, decision-makers generally perceive participation procedures as costly and time consuming legal obligations. Further, in many cases, the various stakeholders appear relatively unprepared to effectively participate. The Greek Ombudsman pointed out that further steps are needed to ensure transparency at all stages of the decision-making process and access to environmental data, thus facilitating public participation.

Despite the progress in the last decade, the *Greek civil society* remains overall underorganised and without much influence: NGOs are few, do not attract a significant number of members or amount of funds, are unevenly spread throughout the country and have a markedly urban character (Sotiropoulos and Karamagioli,

2005). Environmental NGOs represent a remarkable exception, and have managed to attract interest and financial support in the last few years.

About 260 *environmental NGOs* are registered in Greece. The most influential organisations remain the national branches of international environmental NGOs (*e.g.* Birdlife, Friends of the Earth, Greenpeace and WWF) and a few Greek associations (*e.g.* Arcturos, Hellenic Society for the Preservation of Nature, Society for the Protection of the Mediterranean Seal, Sea Turtle Protection Society). These organisations are well inter-linked, represent stable counterparts of governmental bodies, have secured public funding (especially from EU), and are given specific environmental management responsibilities, mainly in nature conservation. NGOs are undergoing a "professionalization" process and their members generally have a high educational level (Botetzagias and Boudourides, 2004). YPEHODE financially support (partly through EU funds) NGOs' environmental activities, notably awareness raising initiatives and nature conservation projects. NGOs participate in specific environmental government bodies, such as the Regional Water Councils (Chapter 3), the Management Bodies of protected areas and the Natura 2000 Committee (Chapter 4). Representatives of NGOs are often invited to take part in the Greek delegations to international official meetings.

Despite progress, *environmental awareness* in Greece appears to be lower than in other countries. According to a 2008 Eurobarometer survey, the vast majority of Greeks believe that the state of the environment is rather bad and influences their quality of life, but less than half of respondents feel well informed about environmental issues. In general, awareness appears to be dependent on higher education levels and younger age.

Notes

1. The female employment rate (employment to population ratio) was 48.1% in 2007 (OECD Labour Force Statistics).
2. This Action Plan is part of the overall National Strategy for Public Health. The improvement of the environmental performance of hospitals and health units (*e.g.* rational use of energy and disposal of hazardous waste) is one of the Strategy's specific objectives.
3. The remaining budget is allocated to actions within the following priorities: *i)* strengthening research, documentation and training; *ii)* improving information and awareness raising on the health effects of environmental hazards; *iii)* measures for prevention, intervention and early detection of environmental hazards.
4. Greece has not prepared a specific Children's Environment and Health Action Plan. The development of the National Environment and Health Action Plans (NEHAP) across the European Region was first agreed at the Second Ministerial Conference on Environment and Health (Helsinki, 1994). At the Fourth Ministerial Conference on Environment and Health (Budapest, 2004), countries committed to develop by 2007 action plans to protect children's health against environmental hazards or to revise their NEHAPs accordingly.
5. As of 2004, 49% of total deaths are due to cardiovascular diseases; 25% to cancers (WHO, 2006). Some estimates indicate that the morbidity by cancer, cardiovascular diseases and accidents attributed to environmental factors represents about 14%, 16% and 21% respectively (Ministry of Health and Social Solidarity, 2008).
6. The disability-adjusted life-year (DALY) is a summary measure that combines the impact of illness, disability and mortality on population health.
7. These estimates are based on the VOLY (Value of Life Year) approach, applied to changes in life expectancy due to air pollution from particulate matters and ozone. The VSL (Value of Statistical Life) approach applied to the change in premature deaths leads to a higher value, ranging between EUR 8.8 and 16.4 billion/year (AEA Technology Environment, 2005).
8. For instance, dangerous substances were found in the water table of the Asopos River. However, the municipalities that were using the river basin's water for drinking purposes are now connected to the Athens water supply network, managed by EYDAP.
9. All academic years of the Decade 2005-14 are named after sustainability issues: Water – Blue Planet (2006), Consumption and Environment (2007), Forest – Green Planet (2008), Agriculture, Nutrition and Quality of Life (2009), Energy and Environmental Friendly Energy Resources and Local Community (2010), Education for Human rights (2011), Health and Productive Procedures (2012), Human Environment and Sustainable Management (2013), Active Citizens (2014).
10. There are plans to introduce the possibility for public authorities to charge to provide environmental information, within the limits set by EU Directive 2003/4/EC.
11. Hierarchical control (generally requesting YPEHODE to annul or modify subordinate authorities' decisions), quasi-judicial recourse (before the authority who approved the act), and special recourse before Committees of local and regional authorities.

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7

LAND-USE AND SPATIAL PLANNING*

Features

- Implementation: theory and practice
- National Framework for Spatial Planning and Sustainable Development
- Cadastre and the National Forest Registry
- Forest fires and unauthorized construction
- Desertification

* This chapter reviews progress in the last ten years, and particularly since the 2000 OECD Environmental Performance Review. It also reviews progress with respect to the objectives of the 2001 OECD Environmental Strategy.

Recommendations

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Greece:

- streamline the *administrative procedures* associated with environmental impact assessments and the application for planning and building permits; reduce building and housing *construction without prior planning*;
- ensure adequate control and strict enforcement of the existing legal framework regarding *construction without prior building permit*;
- complete the *National Cadastre and the National Forest Registry* as soon as possible;
- adopt and implement the proposed Framework Plans for *Coastal Areas and Islands* and for *Mountainous Areas*; set up a transparent monitoring system to *track and report on the effectiveness of the Frameworks* for Spatial Planning and Sustainable Development;
- increase the rate of *reforestation of burned and degraded forestlands*;
- raise *awareness and understanding of sustainable development* among the major stakeholder groups and in the Greek society at large.

Conclusions

Considerable investments in *transport infrastructure* (*e.g.* major motorways in the west and north of the country) and *energy infrastructure* during the current review period have created better prospects for a more balanced distribution of economic development throughout Greece. Similar improvements in Athens (including a new metro and a new airport), have changed the city for the better. At the outset of the review period, Greece incorporated the principles of sustainable development in its spatial planning legislation. For the first time, the country armed itself with the *legislation* that is necessary to create a comprehensive planning framework to guide the spatial aspects of economic and social development and the protection of its natural and cultural heritage at a national, regional and local planning scale. Since then, *12 strategic Regional Framework Plans* for Planning and Sustainable Development have been adopted: one for each of the country's 13 regions except for the Athens Metropolitan Area, which already had its own master plan. The country's first national strategic spatial plan, the *General Framework*, and the Specific Framework Plan for Renewable Energy Sources were approved in 2008. The *Specific Framework Plans* dealing with the tourism and industrial sectors are expected to be approved in mid-2009. Greek authorities claim some success in bringing down the

incidence of unauthorised construction, which has been a longstanding problem. Greece also made progress with the establishment of a national cadastre. The review period saw the creation of numerous industrial parks, which in the long run will help remove industries from unsuitable locations.

It is still too early to assess the effects of all the planning activities on what is actually happening "on the ground". The reality so far has been one of spontaneous urbanisation whereby construction has often preceded planning, notably in the *coastal zone, on islands, and on the fringes of urban areas*. Policies specifically aimed at Integrated Coastal Zone Management are absent. The problem of *forest fires* is partially due to the weak planning system, including the lack of a complete *National Cadastre* and of a *National Forest Registry*. The reforestation of burned and degraded forestlands slowed down during the review period. Towns and cities suffer from a dearth of open space and green areas. Planning decisions often suffer time delays, partly because issues need to be referred to the central administration. Ombudsman reports also suggest that the *administration of planning law by local authorities* still is far from efficient, including in terms of the required environmental impact assessments, carried out *a posteriori* or bypassed altogether. Finally, the new framework plans will, by themselves, not secure good implementation and outcomes, and much will depend on a balanced interpretation of the term "sustainable development": it appears that in many decisions to date, the word "development" has been given much greater weight than the word "sustainable".

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1. Trends in Land Use and Pressures

Greece's geography is highly fragmented due to its mountainous terrain and hundreds of inhabited islands. These physical characteristics have economic repercussions in terms of transport infrastructure (*e.g.* the high cost of road construction, the need to provide ferry services to small islands) and also influence land use. Arable and permanent cropland occupies nearly 30% of the country's total area; permanent grassland accounts for 36% and forests for about 29%; other land uses (*e.g.* urban areas, infrastructure) account for the remaining 6%.

Also highly fragmented is the pattern of land ownership. More than 80% of Greek households are owners of at least one plot of land, a situation that had always to be taken into account in the land policies of any Greek government. In towns and cities, plot sizes can be as small as 50 m^2, and the average in Athens is no greater than

180 m^2 (Economou *et al.*, 2007). Also, plot ratios (floor area of a building compared to the total area of the plot on which it is constructed) tend to be high, leading to dense urban areas.

Urban areas

Urbanisation has been a strong driver of land use change throughout the post-war period and about three-quarters of the Greek population of 11 million now live in urban areas. Moreover, Greece has *one of the most concentrated urban structures in Europe* with about 50% of the urban population resident in the country's two metropolitan areas of Athens (3.8 million inhabitants) and Thessaloniki (1 million). Also, around 80% of the urban population live in the 11 largest cities, while 20% live in the 72 cities with a population of between 10 000 and 50 000 inhabitants (Economou *et al.*, 2007). Compared to many other countries, there are few medium-sized (between 50 000 and 500 000 inhabitants) cities. The construction of tourist facilities and secondary residences now constitutes a strong driving force behind continued urbanisation. At the other end of the scale, the emptying of small settlements in isolated areas (islands, mountain regions) also remains a concern, even if the populations of such settlements can grow by a factor of four during the summer months.

The current *form of Greek cities and towns*, to a large extent, is the product of the spontaneous urban development that sprouted in a planning vacuum before and, especially, after the 1940s (Stefanou and Mitoula, 2006). While this often gave rise to lively cities, it also produced unwelcome mixes of incompatible land uses, such as factories and workshops located in residential areas. Today, the extension of urban activities beyond designated urban zones, and illegal construction[1] in coastal areas, on burned forest land, and along major highways remains a persistent (albeit waning) concern, causing problems such as traffic congestion, urban sprawl, a lack of communal and green space, and damage to sensitive natural areas.

Countryside

About *half of Greece's territory* (*i.e.* mountain areas, garrigue (scrubland), grasslands and areas with infertile soils) *is not or only very lightly exploited.* The majority of forests and other wooded land is managed for production purposes (including the gathering of firewood); other forest uses include hunting, grazing, and tourism/recreation. Commercial forests produce black pine, beech, fir and oak; there are also many degraded forests that could be turned into productive ones. Most forestland extends over the northern and western part of the mainland. Fire, grazing, illegal cutting and insects are the main pressures on forests.

One-fifth of the country's land area (predominantly land covered in forest and garrigue, but also agricultural land) has been incorporated into the *Natura 2000 network*. For each site, a Specific Environmental Study must be carried out and subjected to public scrutiny before legal protection can take effect; as of end 2008, 87 such studies covering 53% of the designated area had either been completed or begun (Chapter 4). Also, proposals for works and activities in these areas must be approved by YPEHODE.

Much of the country's agricultural produce is *intensively grown on a limited area of fertile, irrigated lowlands*, giving rise to considerable environmental pressures; changing EU agricultural policies are expected to alleviate this situation somewhat in the future (Chapter 3). The total area under arable and permanent crops (including trees not grown for wood) amounted to 37 590 km^2 in 2005, a decline of 5% since 1990. This aggregate decline was made up of decreases in the areas planted with cereals, which were offset by an increase in the areas planted with olive trees and cotton. Cereals (mostly wheat and maize) are the dominant crop (12 500 km^2 in 2005), whereas cotton is the next important crop (3 660 km^2).

2. Spatial Planning and the Environment

Spatial and land use planning in Greece have a *chequered history*. Due to the absence of implementable planning legislation, much of the post-World War II urban development was uncontrolled (Anastasiou, 2007). Following the adoption in 1975 of a new Constitution, which under Article 24 obliges the State to protect the natural and cultural environment, a series of planning laws were enacted, but in some cases these were not fully implemented. The link between environment and spatial planning was explicitly established as early as 1976 in the country's first dedicated planning law titled "About Spatial Planning and Environment". Structural spatial plans were drawn up for all prefectures in the mid-1980s, but these never acquired legal status. Despite that, for more than a decade these structural spatial plans served as the only available coherent spatial reference for investment and project decisions at prefecture level, and for spatial or environmental studies (*e.g.* EIA) at lower administrative levels.

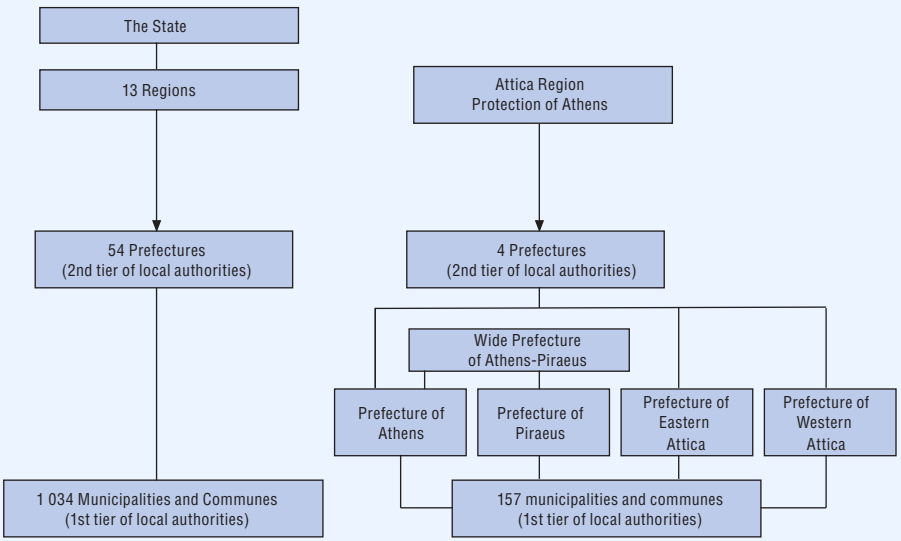
The problems caused by the lack of effective spatial policies (*e.g.* land use conflicts, urban sprawl and illegal construction, landscape and environmental degradation) have *compromised the efficient organisation of space* and are hampering both economic development and the protection of the environment. Poor coordination among competent authorities has led to the under-use of some of the spatial tools that have been available (*e.g.* transposition of floor area ratio, use of compensation offset mechanisms).

2.1 Institutional framework

Central government, regions, prefectures and municipalities

According to the Constitution of the Hellenic Republic, the administration of the State shall be organised according to the principle of decentralisation. Owing to a succession of *institutional reforms of government responsibilities at different levels* in the 1980s and 1990s, Greece counts two levels of government: the state government and the local self-government. The State government is administrated at both central and decentralised (regional) levels, while the local self-government consists of two further levels. Attica (effectively the Athens-Piraeus metropolitan area) has special arrangements (Figure 7.1). The central government has retained much of its predominance, notwithstanding various decentralisation efforts undertaken during the past two decades. Effective decentralisation is still hindered by the small size of many municipalities and communes, in spite of their number already having been reduced in 1997 from about 6 000 to 1 000. The Government is currently considering a further institutional reform that will reduce the number of municipalities, prefectures and regions.

Figure 7.1 **Administrative structure**



Source: Ministry of the Environment, Physical Planning and Public Works.

In *central government*, the Hellenic Ministry for the Environment, Physical Planning and Public Works (YPEHODE) is responsible for spatial planning at the national and regional level. The National Council for Spatial Planning and Sustainable Development is a statutory stakeholder forum with the role of advising the Government on spatial planning issues. YPEHODE is also responsible for the elaboration, approval and implementation of master plans, statutory town plans, housing plans and environmental protection programmes. The Ministry of the Interior is responsible for local government.

In line with the concept of the "Europe of Regions", the regional level was created in the 1990s. The country now counts *13 regions*, which are the decentralised dimension of the central state administration. Each Region is headed by a Secretary General, who is appointed by the Ministerial Council; he is the representative of the central government, responsible for implementing government policies on regional issues. Regions have a wide range of responsibilities.[2] Concerning the environment, they are responsible for vetting the General Town Plans of the municipalities, drafting and approving Regional Waste Management Plans, approving development proposals (with associated EIA), and supervising municipal and prefectural planning authorities.

The *54 prefectures* represent the second level of local self-government and are headed by a prefect (elected since 1998). The prefect is assisted by prefectural councils and committees. The responsibilities of prefectures include planning and programming, economic development, social development, culture and quality of life. As a consequence of High Courts' Decisions, some responsibilities of the Prefectures were attributed to the Regions or the Central Government. Four prefectures are located in the Attica region. In parallel, the Organisation of Athens (ORSA) was established to deal with the specific planning and environmental problems of the large metropolis. A similar Organisation was established for the metropolitan area of Thessaloniki.

Greece counts *914 municipalities and 120 communities*; the latter are mostly places of special character, such as historic towns.Together they constitute the first level of local self-government,[3] and are responsible for the administration of local matters. During the review period, a large effort (partly funded through the EU) helped improve the institutional capacity of the new local bodies (*e.g.* staff training, introduction of new technology, cooperation with municipalities in other EU countries). More than half of municipalities' budgets consist of transfers from the state (central and regional) level. Thus, both levels of local administration (municipalities and prefectures) are financially significantly dependent on the state government (Lalenis and Liogkas, 2002; Economou *et al.*, 2007).

A new generation of planning legislation

In the late 1990s, Greece equipped itself with two key laws that, for the first time, enabled the country to take a *comprehensive and rational approach to organising its national and local territories* for the benefit of economic development, social cohesion and its natural and cultural heritage. Spatial planning in Greece now occurs at three administrative levels: national, regional and local (prefectural and municipal). Plans prepared at a lower level generally require approval at the level above it. Since 2006, plans have also been subject to strategic environmental assessment, in accordance with EU Directive 2001/42/EC on that topic.

Law 2508/1997 on the Sustainable Development of Towns is the key law for the organisation of built-up areas, and specifies two types of plans. One, with a broader character, includes: *i)* the master plans, named "Structure Plans and Programmes for the Environmental Protection" for major cities like Patra, Larissa, Volos, Ioannina; and *ii)* the municipal spatial plans, which are named, depending on the size of the settlement, as "General Town Plans" ("for main towns" above 2 000 inhabitants) or "Plans of Spatial and Settlement Organisation for Open Towns" ("for main towns" under 2 000 inhabitants) (Table 7.1). The other is the equivalent of the conventional municipal land use plans found in most countries; all urban areas operate this type of plan.

Table 7.1 **System of spatial and urban planning**

LAW 2742/1999 ON SPATIAL PLANNING AND SUSTAINABLE DEVELOPMENT NATIONAL FRAMEWORK FOR SPATIAL PLANNING AND SUSTAINABLE DEVELOPMENT	
General Framework Plan (the "National Plan")	National plan sets out policy regarding competitive land uses, requirements for EIA, national transport links, etc.
12 Regional Framework Plans	Regional elaboration of national plan.
Specific Framework Plans[a]	Set out development goals for special areas of the country, sectors of activities or networks of national importance, and technical, social and administrative services of national interest.
LAW 2508/1997 ON THE SUSTAINABLE DEVELOPMENT OF TOWNS	
Master Plans (for large areas around a major urban centre) and Municipal Spatial Plans (for the entire territory of a municipality)	Policy on land uses, population forecasts and housing needs, transport and other infrastructure, environmental protection, etc.
Land use plans for built-up areas	Plans with more details, designation of sites for specific uses, building regulations, etc.

a) During the review period, five specific Framework Plans were under consideration:for Industry, Tourism, Renewable energy resources, Coastal zones/Islands and Mountainous Areas.
Source: YPEHODE.

The law further provides for public participation, and promotes the reuse of the built space to prevent urban sprawl; it provides for subsidies to local authorities to enable them to rehabilitate neglected urban areas, upgrade buildings, protect the environment and conserve energy and natural resources. In addition, the *Building Permits Law* 3212/2003 and the 1999 *General Building Construction Code* (GOK) define building permitting procedures and building construction standards. Urban development can be restricted in areas that present particular environmental characteristics (*e.g.* islands and mountains), through the identification of *Zones of*

Box 7.1 **The National Framework of Spatial Planning and Sustainable Development**

The *National Framework* for Spatial Planning and Sustainable Development was conceived to fulfil a pivotal role in Greece's effort to achieve sustainable development. The Framework can be said to be idealistic in that it offers Greek society a vision of where, and to a certain extent how, development should take place to make it sustainable. But it also is practical in that it creates a structure for decision-making about the *ordering of the national territory* so that productive activities, residential areas and natural habitats can coexist in a mutually supportive way. The National Framework's strategic goal is a viable spatial development, based on the creation of an integrated grid of urban centres and other key territorial elements, which will contribute to the international competiveness of the country, promote the social and economic cohesion, and protect the environment. Its objectives are: *i)* enhancement of the country's role at international, European, Mediterranean and Balkan level; *ii)* regional development, and territorial cohesion; *iii)* conservation of the environmental and natural resources, the cultural heritage and the landscape; *iv)* treatment of the acute problems caused by climate change; and *v)* provision of guidelines to the subjacent levels of planning.

The *various framework plans* already or soon to be adopted show intended land uses, national and sectoral economic objectives and areas to be protected. The plans set out five main goals for the next 15 years: *i)* spatial organisation of key national urban centres; *ii)* spatial organisation of infrastructure networks of strategic importance; *iii)* spatial organisation, specialisation and complementarity of productive sectors; *iv)* spatial organisation of metropolitan areas, urban networks and mountainous, rural, coastal and island areas as well as other critical areas, conservation of rural areas and the rational use of natural resources and cultural heritage; and *v)* geographic restructuring of the country, for the creation of viable administrative and development units at inter-regional level.

The Greek authorities anticipate that the certainty and flexibility provided by the Framework, combined with its environmental provisions, will encourage Greek and international enterprises to make *new investments*.

Urban Control (Table 4.2). During the review period, YPEHODE designated two such zones: Mykonos in 2005 and Parnitha in 2008. Once approved, the new urban plans (master plans and municipal spatial plans) will ensure that land use and environmental protection requirements are defined for the entire country.

Table 7.2 **Selected aims of the National Framework for Planning and Sustainable Development**

Aspect	Aim
Spatial organisation of the main centres and axes	Create an integrated grid of centres and axes that will contribute to the social and economic cohesion of the national space and to the competitive position of the country.
Spatial structure of strategic infrastructure networks	Ensure the interconnection of all important urban centres and facilitate equal access to transport services, particularly in remote locations such as islands and mountainous regions.
Energy sector	Meet power demand throughout the country and keep up a constant effort for energy savings in all sectors. Enhance energy security through renewables, indigenous resources and alternative fuels. Control environmental performance of energy sector. Specific Framework Plan for Renewable Energy Sources: sets rules to facilitate optimum use of wind energy (*i.e.* best possible spatial concentration of facilities, economies of scale) while protecting the natural and man-made environment.
Communication sector	Ensure equitable access to communication and information infrastructure.
Agriculture sector	Achieve economic growth without downgrading the ecological and cultural importance of the countryside. Enhance the role of agriculture in maintaining physical resources.
Industrial sector	Contribute to regional development. Specific Framework Plan for Industry: promotes a multi-centric model of spatial organisation; rationalises industry's current spatial distribution.
Tourism sector	Promote the rational development of the sector by making optimal use of Greece's comparative advantages in terms of geographic position, climate, multitude of islands and beaches and cultural assets. Improve the environment in tourist areas and safeguard the viability of resources. Specific Framework Plan for Tourism: sets rules concerning the location and density of tourism facilities; encourages landscape protection in tourism zones.
Agricultural space	Improve the quality of the countryside as a place suitable for living, recreation and development, particularly in the primary sector.
Mountain areas	Re-establish productive activities, maintain population numbers. Specific Framework Plan for Spatial Planning of Mountainous Areas: re-establishes productive activities, retains population.
Coastal areas and islands	Maintain the cohesion and accessibility of remote coastal areas and the Aegean Islands. Specific Framework for Spatial Planning of Coastal Zones and Islands: uses comparative advantages of coastal areas and each island.

Source: YPEHODE.

Law 2742/1999 on Spatial Planning and Sustainable Development deals with strategic spatial planning of the entire territory at a national and regional level. The law is consistent with the European Union's European Spatial Design Perspective (ESDP) adopted earlier in the same year. Its three main goals are: *i)* promotion of economic and social cohesion; *ii)* rational management and protection of natural resources and cultural heritage; and *iii)* promotion of an integrated and competitive regional development. More specific aims for different sectors and types of area have also been defined (Table 7.2). The key feature of Law 2742/99 is the creation of the *National Framework for Spatial Planning and Sustainable Development* (Box 7.1) consisting of: *i)* a General Framework Plan (the "National Plan"); *ii)* Specific Framework Plans; and *iii)* Regional Framework Plans for each of the regions, except Attica (Athens region) which has its own structural plan (Box 7.2). The planning horizon for all these plans is 15 years. Local master and land use plans under Law 2508/97 must be consistent with the Framework Plans.

Box 7.2 **A case apart: the Athens Metropolitan Area**

The city of Athens and the surrounding region of Attica occupy a *dominant position in Greece*. Although the area covers only around 3% of the total land area of the country, it is home to more than one-third of the Greek population (about 3.8 million people), contributes to half of the Greek GDP, and accommodates one-third of the nation's industrial activity. Over 55% of private vehicles owned nationwide are registered in the Athens Metropolitan Area (AMA). The AMA continued to grow, maintaining its share of population and economic activity, despite regional policies aimed at channelling investment away from Attica, considered to be saturated, towards other regions in order to encourage a more even demographic and economic development pattern across the national territory.

The Region of *Attica differs from the other regions of Greece in terms of governance*, because many of the functions normally carried out by the Region are exercised in Attica by the State or special agencies, such as the Organisation of Athens (ORSA), which was created in 1985 and is responsible for the planning and environmental protection of the AMA. The main element of ORSA's legal mandate is to prepare, monitor and review the Athens Metropolitan Region Structure Plan. It is also responsible for coordinating the spatial aspects of the programmes and actions of all 369 public sector agencies (*e.g.* development agencies and utilities of various description, but also public libraries and sports organisations) in the AMA.

The purpose of the 1985 *Master Plan and Programme for the Environmental Protection of Athens* is to set the frame for detailed legally binding "lower tier" spatial plans and building control instruments, as well for individual projects. It also contains a series of either restrictive/dissuading or "recommendation-type" policy measures not

Box 7.2 **A case apart: the Athens Metropolitan Area** *(cont.)*

linked to specific implementation programmes. No active role is assigned to the private sector stakeholders, who have to conform or else to try to negotiate a modification of the regulations in force. However, in practice it has proven to be difficult to actually implement the Plan. Not only is there the sheer number of public agencies with some administrative authority or obligation for Athens, but also the Plan lacks meaningful statutory powers and is based on land use zoning that has insufficient regard for social, economic and environmental issues. Enforcement is uneven, exacerbated through a lack of appropriate structures and resources to monitor and promote more effective planning (Sykianaki-Kylika, 2006).

Nevertheless, the quality of life in Athens and the AMA has enjoyed a *change for the better in recent years*. After several decades of low investment, the infrastructure projects carried out in the Athens region since the mid-90s under the Attica SOS programme broke with traditional regional policies and gave the AMA a new airport, ring roads, a new Metro, a tramway, and an upgraded bus system. With the move of polluting industrial and power plants outside of Athens, and a range of other measures (Chapter 2), air quality has improved with respect to several pollutants (though not for ozone and PM_{10}). A new museum near the Parthenon and a very large pedestrian area (encompassing historic cultural sites, green areas, residential and commercial districts) are changing the face of Athens.

There is now greater recognition of the need to *better structure growth in the Athens region rather than simply curtail it*. There is also a greater understanding of the international role of Athens in a global economy, which demands better planning and investment strategies. A key challenge will be to maintain the sense of urgency, good will and civic pride that have emerged as the positive after-effects of the 2004 Olympic Games.

Further spatial planning objectives

Objectives regarding spatial planning can also be found in the *2002 National Strategy for Sustainable Development* (NSSD), which recommends a poly-centric urban structure. For urban areas the NSSD advocates adoption of a "solid city" approach adapted to Greek particularities, and reduction of urban sprawl by means of low-density peri-urban settlements. Regarding rural areas, the key NSSD objectives include the suppression of uncontrolled urban sprawl outside existing towns, the creation of dedicated zones for specific purposes such as commerce, industry or animal husbandry, and the reduction of dispersed tourism facilities. This chapter will show that limited progress was made on meeting some of these objectives.

Several of the *recommendations of the 2000 OECD Environmental Performance Review* of Greece are also relevant to this chapter. Some important progress was made during the review period, but further steps are still needed (Table 7.3).

Table 7.3 **Performance against the recommendations of the 2000 OECD Environmental Performance Review**

Recommendations	Performance
Complete the national cadastre as soon as possible.	About one-third of the estimated 37.5 million property rights has been covered be the cadastral surveys, approximately half of which has been validated; the other half is expected to be validated by 2011. Anticipated completion date is now 2018.
Strengthen enforcement of land use regulations and building codes through increased capacity and presence of national and local administrations at territorial levels, making full use of mechanisms to involve citizens in relevant decision-making processes.	The Ombudsman's annual reports show there remains much scope for further improving the enforcement of land use regulations, even if the problem of illegal building has been reduced.
Further involve local authorities and other appropriate local partners in the preparation of land use plans.	Some progress appears to have been made, but many local authorities still need to build capacity in this area.
Pursue the implementation of the recent institutional law on spatial planning and sustainable development, through specific legal instruments for the sustainable development of coastal areas providing for monitoring of the state of coastal areas, protection measures for the coastal land strip and coastal waters, and full protection of designated natural coastal areas of high ecological and cultural value.	The National framework plan, 12 regional framework plans and two specific framework plans (renewable energy resources, prisons) have become operative during the review period. The Specific Framework Plan for Industry was submitted to the Government Committee for approval, and that for Tourism was submitted to the National Council of Spatial Planning for consultation. Two further plans for coastal areas and islands, and for mountain areas were in preparation in 2008.
Elaborate and implement a national plan for integrated coastal zone management, including measures to ensure the preservation of coastal lands of special natural value (*e.g.* through a coastal land bank).	Not done, but a Specific Framework for Spatial Planning of Coastal Zones and Islands, based on EU recommendations for Integrated Coastal Zone Management (ICZM,) was in preparation in 2008.
Develop integrated, partnership-based sustainable development strategies under local Agenda 21 plans in appropriate urban and coastal areas.	See Chapters 5 and 6.
Review measures to control industrial growth in urban areas, examining them from environmental, economic and social points of view.	The Specific Framework Plan for industry is expected to be adopted in early 2009. Nearly 50 industrial parks were established.
Enhance emergency planning for the prevention and mitigation of flood and earthquake damage, especially in areas where population and physical assets are concentrated.	A new Civil Protection Law (3013/2003) was adopted in 2003 and a dedicated secretariat established within the Ministry of the Interior. The fires of the Summer 2007 showed that preparedness measures at the time were still inadequate.

Source: OECD, Environment Directorate.

2.2 Implementing the planning legislation

Difficulties with current practices

The *day-to-day operation of the current urban planning system*[4] is sometimes the cause of frustration on the part of the regulated community. Complex planning procedures and building regulations create various interpretation and implementation difficulties to both authorities and owners. Delays are also caused by the consequences of a 2005 judgment of the Council of State (Greece's highest administrative court), which ruled that urban planning falls within the jurisdiction of the central state, implying that urban planning regulations must be approved at central, rather than prefectural, level. However, in many cases, the implementation of the planning regime falls under the responsibility of the municipalities, which often lack the adequate technical staff. A further obstacle is that planning implies certain constraints on private property rights, an issue perhaps even more contentious in Greece than in many other countries (Anastasiou, 2007), due to an incomplete cadastre coverage and a high number of private properties.

The *practice of constructing houses and buildings without prior planning approval and/or building permit* is so widespread that construction has often preceded urban planning. Areas outside towns and cities, *i.e.* beyond areas covered by a land use plan, are formally regulated under a 1985 Presidential Decree. Nevertheless, a law dating from the 1920s permits anyone owning a piece of land in a rural area not covered by a land use plan (98% of the total) and of at least 4 000 m^2 in size, to build a house regardless of whether the piece of land is served with basic services such as water, sewerage, solid waste collection and electricity. This law enjoys much popular support and it is therefore politically difficult to change it. Moreover, there are lots much smaller than 4 000 m^2 which are developed, not seldom with floor area ratios much higher than those permitted in areas covered by a land use plan. Once a building has been illegally erected, it can be difficult to effectively sanction the owner: high fines are imposed but not always fully collected, and court-ordered demolition can be suspended by prefectures. As soon as the number of illegal houses reaches critical mass in a particular area, the zoning of the land can be changed *a posteriori* to reflect its *de facto* urban use. Much of the *urban sprawl* in Greece can be attributed to this mechanism.

The *dearth of open space and green areas* in urban areas is another consequence of the weak planning regime. The 2005 annual report of the Greek Ombudsman observes that although any reduction in total green space within a municipality is not permitted, municipal authorities still allow new building (albeit for community purposes such as social or sporting clubs) on open spaces without offsetting the loss of green space elsewhere. This situation may be reversed in Athens, where two large

new urban parks (one on the site of the old airport,[5] the other one in the area of Goudi) have been on the drawing board for some years now. The annual reports of the Ombudsman also frequently report cases of public complaints about unauthorised private use of public areas (such as for cafes and restaurants) either tacitly accepted by the relevant authority or tolerated because differences of view among multiple competent authorities thwart any official response.

Ombudsman reports further cast *doubt about the effectiveness and credibility of the Environmental Impact Assessment Studies* concerning the selection of the most appropriate location for proposed activities. The Ombudsman observed that the EIA process is, in some cases, losing credibility because studies are commissioned only after all the main decisions have already been taken, or because the whole process is bypassed altogether.

Putting the new plans into place

Much planning activity took place during the review period. Concerning Law 2508/97, about 30% of the country's municipalities developed their General Town Plans in early 2008, although few have been approved by the regions, as required. The master plans of Ioannina, Patra, Larissa and Volos are at the final stage of their development process, before being enacted by Presidential Decrees; in parallel, the four Organisations for the implementation of these master plans will be established. Concerning Law 2742/99, all Regional Framework Plans had been adopted by 2003 and are now operational. In 2001 the Specific Framework Plan for the prisons was enacted. The first General Framework Plan (the National Plan) and the Specific Framework Plan for Renewable Energy Sources were approved in 2008. As of end 2008, the Specific Framework Plan for Industry was at the final stage of the process (*i.e.* the approval by the Government Committee), and that for Tourism was under consultation; two other Specific Framework Plans (*i.e.* for Coastal Zones and Islands, and for Mountain Areas) were in preparation.

Greece now has the necessary institutional *framework for making sustainable long-term land use decisions* in place, including Strategic Environmental Assessment and Environmental Impact Assessment. The effectiveness of all these plans "on the ground" will gradually become apparent through the land use decisions to be taken from now on. The true test of the new system will lie with:

– trade-offs made in concrete cases, between development and sustainability, notably Government-sponsored development projects, which tend to be larger ones;

– willingness and ability of the actors to find win-win solutions in cases of apparent conflict;

– simplification of administrative procedures to make the planning regime more user-friendly; and

– completion of environmental studies for all Natura 2000 sites, without which these sites will not be robustly protected.

For these reasons the *implementation of the plans should be closely monitored*, in line with Article 13 of the General Framework Plan, which requires qualitative or quantitative indicators to be defined within six months of the framework entering into force.

It has taken almost a decade and a large effort for the concepts of Laws 2508/97 and 2742/99 to be translated into the current set of framework and urban plans. The *planning regime envisaged by these two laws needs to be completed and put into practice*. The new planning regime needs to be effectively implemented, amongst other things, to eradicate the practice of unauthorised construction. Support from across the political spectrum will be needed.

Cadastre and National Forest Registry

Completion of the cadastre and the national forest registry will be part of the answer. Greece has been working on its *National Cadastre since the last decade*. As of 2008, the system had been established and was operational in 6% of the total area of the country and incorporated approximately 6.3 million property rights, or about 17% of the expected total number. About 340 municipalities were included, in the first set of cadastral surveys, of which 326 now have an operational cadastre and are served by the 95 cadastral offices. In 2008, a second wave of cadastral surveys was launched, covering additional 107 municipalities (3 100 km^2 and 7.3 million property rights). These surveys (expected to be completed by 2011) cover the metropolitan areas of Athens and Thessaloniki, as well as 22 prefecture capitals. In 2009, a third set of cadastral surveys will be launched to cover 11 more municipalities (485 km^2 and 103 000 rights). Those municipalities cover the mount "Parnitha", which was damaged by a fire in 2007. Completion of the cadastre had been anticipated for 2010, but verifying ownership claims and subsequent appeals have been taking longer than expected. Completion is now due for 2018, by which time, the system will cover 132 000 km^2 (the entire country) and about 37.5 million property rights. The absence of a national cadastre, of course, is a *source of uncertainty* and therefore a brake on investment. It is also a real hurdle in the effort to address unauthorised constructions, because a number of buildings are being built without their owners having clear title to the land involved. First priority in extending the cadastre lies with districts near large urban areas or tourist destinations, since these are the most at risk from unauthorised construction.

A related issue is that the Greek Constitution prohibits the conversion of forestland to other uses, but there still is no official record of what land is considered forestland and what is not. Forested areas, notably those close to Athens and in coastal areas, are receiving significant pressure from building activities. The completion of the *National Forest Registry* (*i.e.* the identification of all forest areas) is of paramount importance to safeguard public land and to limit forest fires by arson (Box 7.3).[6] The Government announced in early 2008 it aimed to complete the registry in four years time.

Box 7.3 **The fires of 2007**

In the summer of 2007, Greece experienced its *worst wildfire season*. Hot temperatures, including three consecutive heat waves of over 40 °C, and severe drought rendered the 2007 summer unprecedented in modern Greek history. The conflagration consisted of a series of very big events that broke out in several areas across Greece throughout the summer. From end June to early September, over *3 000 forest fires* were recorded across the country. At one stage, 300 sites were ablaze at the same time. The most destructive and lethal fires broke out on August 23, expanded rapidly and raged out of control until August 27, until they were put out in early September. The fires mainly affected western and southern Peloponnese, and southern Euboea. In total 84 people lost their lives to the fires including fire fighters. A total of 270 000 hectares of forest, olive groves and farmland were destroyed, representing about *2% of the total area of Greece*. Around 150 000 ha of forest were burned in the Peloponnese and more than 30 000 ha of burnt land were located within Natura 2000 protected sites, of which two-thirds of the Parnitha National Park. The cost to agriculture and the economy was significant.

Forest fires have always plagued Greece. *Naturally caused forest fires* may be understood as a positive element in natural forest dynamics: especially in fir forests, they cause the rejuvenation of over-aged tree stands and the elimination of pests (fungi, insects). Those caused by lightning only occur every 200-400 years, allowing the forest to regenerate naturally in the intervals. The danger of permanent forest losses mainly results from a shortening of the intervals between fire events. In the *lowlands*, it is difficult to reduce the fire frequency, because population density is high and summer drought lasts for about four months. On the other hand, maquis vegetation in the lowlands is fairly well adapted to frequent fires and thus able to regenerate within a few years or decades. In the *mountains*, the situation is very different. Very few settlements exist above 1 000 m altitude and extreme summer drought is restricted to the months of July and August, but mountain forests require 100-200 years to reach their pre-fire height and structure.

Box 7.3 **The fires of 2007** *(cont.)*

However, the fires in forest and scrub vegetation that make the headlines mainly originate from human negligence and arson. To combat *negligence*, raising the fire awareness of residents and visitors, notably in mountain areas, clearly must be part of the solution. Now that the mountain regions are gaining in popularity as recreation areas, the risk of increasing the frequency of fires is also growing. It has been suggested that more checkpoints and ranger patrols are needed to inform and supervise forest visitors. During extreme heat waves, when the danger of fire in the mountains is especially high, forest areas could be closed temporarily to all visitors. Similarly, provisions for emergency responses to fires should be strengthened.

To combat *arson*, it will be essential to eliminate the incentives for arson (including any incentive for the possible conversion of forestland to building areas). This will require a set of measures, such as the clarification of property rights (*i.e.* the completion of the national cadastre) and the delineation of all forest areas through the national forest registry, now in preparation. It will also require a stricter enforcement of already existing legislation (*e.g.* the forest protection laws) and of measures (such as Law 3621/2007) preventing the suspension of court decisions to demolish unauthorised buildings in areas designated as forest restoration areas.

Within the scope of the development of the National Cadastre, Greece carries out a cartographic project for the *mapping of forests and forestland* in the whole country at a scale of 1:5000. This project is expected to be completed in 2009; it will represent a first base to define property rights in forest areas. In parallel, a cartographic project to *map all the coastal zones* (including rivers and lake banks zones, and coastal zones of the islands) is ongoing and is expected to be completed in 2009. The resulting maps will help to identify property rights along the coast, as well as to support coastal zone management.

3. Sectoral Planning Frameworks

3.1 Specific framework plan for renewable energy sources

Greece will *need to substantially increase its electricity generating capacity from renewable energy sources* (RES) if it is to meet its indicative target of 20.1% by 2010 (Chapter 2).[7] The projected gross inland electricity consumption in 2010 is 71.9 TWh; the contribution of renewable electricity should therefore amount to approximately 14.4 TWh. Electricity produced from large hydroelectric installations is expected to be

4.6 TWh in 2010; thus electricity produced from other RES should total 9.9 TWh, corresponding to an installed capacity of 4.3 GW, compared to the installed RES capacity a little over 0.5 GW as of 2006.

The *regulatory framework concerning RES* is, first of all, aimed at meeting the above target and promoting investment in the sector, including through simplification of permitting procedures for RES projects. Regulation concerning the environmental and siting issues associated with the development of RES first began with Law 2941/2001, which dealt with RES installation in forest and scrubland, which under regular planning law enjoy greater protection from development than other areas.[8] Also, in 2006, two Joint Ministerial Decisions (JMDs)[9] were issued setting out specific requirements for the preliminary and final environmental impact assessments of RES installations.

Within the overall regulatory framework for RES, it is the function of the *Specific Framework Plan for Renewable Energy Sources* to deal with issues surrounding the siting of RES installations. Approved in 2008, it establishes siting rules and criteria that aim to balance the need for viable RES facilities and the protection of the natural and cultural environment. The guidelines vary according to the type of area and energy source.[10] The Framework will serve as guide to licensing authorities as well as investors, so that the latter will be oriented to locations they know to be suitable from a spatial planning perspective. It appears, then, that Greece has established a coherent decision-making process for the development of RES that will allow all economic, social and environmental considerations to be evaluated together and submitted to public scrutiny, and for decisions to be taken without avoidable conflicts and undue delays. Again, it will depend on the decisions taken in concrete cases, whether this process will actually achieve its balancing role.

3.2 Specific framework plan for industry

Compared to other member countries, *Greece has always had a small industrial sector*, consisting predominantly of small and medium-sized enterprises (SMEs). The country counts fewer than 350 IPPC installations.[11] In 2006, the manufacturing sector employed 11.6% of the labour force, whereas construction accounted for 7.3% and mining 0.4%. Industry is highly concentrated in certain areas with around half of the value added located in the wider Attica area and Central Macedonia.[12] On the other hand, a close-up view of the location of industrial plants shows that as many as 90% of sites are *highly scattered throughout urban and peri-urban areas*, giving rise to nuisances and incompatible land uses.

A common complaint by industries wishing to establish or expand is the *uncertainty regarding siting requirements for their plants* and the resulting lengthy and complicated permitting procedures sometimes resulting in unsubstantiated

refusals. From an environmental perspective, problems may arise when enterprises are issued permits without considering cumulative effects on the environment (Greek Ombudsman, 2005). During the review period, the Government took several measures aimed at reducing both the "red tape" associated with the licensing of industrial activities and the nuisance caused by these activities.[13] For instance, a 2003 Ministerial Decision attributes to each type of industrial and enterprise activity (depending also on installed power or production capacity) a "nuisance value" (high, medium, low), which are terms used in the urban planning legislation.[14] The degree of nuisance determines, therefore, whether a particular industry can be installed in a defined geographic area.

The adoption of the General and Regional Framework plans (approved during the review period), as well as the *Specific Framework Plan for Industry* (at the final stage of approval by the Government Committee) will contribute greatly to making siting issues more tractable and the associated outcomes more predictable. The Specific Framework Plan for Industry includes an action programme and guidelines for the localisation and the use of land by industrial activities: *i)* at national level, by defining the main poles and development axes, as well as the areas where specific requirements should be applied (*e.g.* coastal areas, islands and mountain areas); and *ii)* at regional and sub-regional levels. It also includes directions for local and urban plans and sectoral guidelines for industries with specific location needs (*e.g.* agricultural and food products).

The Specific Framework Plan for Industry also regulates *industrial parks*. In the last years, 48 industrial parks of different types were established, a number of them complete with shared environmental infrastructure. For the moment, only few enterprises have settled in these areas, but the intention is that, in the long term, many of the industries now located at inappropriate locations, would move to these parks.

Concerning *industrial risks*, lists of all "Seveso" installations across the country have been compiled and hazard maps of three extensive industrial areas (two in Attica and one in Thessaloniki) and some smaller ones are available and are used in land use planning. They are part of the emergency planning to protect the population against large-scale technological accidents. Hazard mapping for contaminated land has so far been limited due to lack of information.[15]

3.3 Specific framework plan for tourism

The tourist sector constitutes for Greece *one of the main sources of national wealth*, contributing directly and indirectly about 18% of GDP, generating approximately 850 000 jobs and contributing significantly to regional development. The tourist

infrastructure in Greece is still characterised by mass "sea and sun" tourism, although efforts are being made to broaden its base to such areas as cultural, eco- and agro-tourism. Also, the sector is highly concentrated geographically, with 65% of hotel beds and 70% of independent rooms located in the south Aegean, Ionian, Crete, Attica and central Macedonian districts. Efforts to achieve a more even geographic spread of tourist areas date from at least 1994 (Development Law 2234/94).

Tourist activities are putting pressure on coastal resources and causing degradation of the coastal environment (air, water, soil, etc.). The intense urbanisation of coastal zones (not always in accordance with good planning) has a negative impact on the aesthetic quality of the landscape and built environment, and also affects the potential for future development. Seasonal pollution and degradation due to inadequate infrastructure, is also an issue.

Some *spatial planning measures specifically aimed at tourism* have been available during the review period, though they have not been widely used. One such tool is the power of the Greek National Tourism Organisation to impose "Areas of Controlled Tourism Development" (also called Tourist Control Zones) on local master plans; the measure has been applied in a limited number of cases to prescribe certain types of development and proscribe others. Another tool is the Area of Integrated Tourism Development (POTA), which aims to control tourism development and improve tourism services and infrastructure, in selected areas with rich natural and cultural heritage. The definition and approval of such areas is part of the implementation of the national or regional spatial plans, after an assessment of the social, economic and environmental dimensions. Nevertheless, more account should be given to environmental considerations, such as the carrying capacity of the natural systems, in developing in tourist areas.

The *Specific Framework Plan for Tourism* (under consultation as of end 2008) represents a step in the right direction, because it explicitly brings the environment into the equation. Its aim is to provide guidelines and criteria for the spatial organisation and development of tourism in Greece (including the localisation of associated infrastructure), and to improve the competitiveness of the tourism sector, while ensuring the protection of the environment and social cohesion. The Plan defines a framework for planning and permitting at lower levels, and provides for the definition of an action programme for the next 15 years (2008-23). The public consultation phase of the new plan revealed a wide range of views on the balance among economic, social and environmental aspects of tourism development.

4. Geographic Planning Frameworks

4.1 Coastal zones and islands

The coastal and marine environment of Greece, with its beautiful landscapes and important ecosystems harbouring numerous rare species, is *one of the country's major economic and environmental assets*. Greece has therefore been an active participant in the European Union's activities to implement Integrated Coastal Zone Management (ICZM) in accordance with Recommendation 2002/413/EC, as well as in various projects through the Mediterranean Action Plan (MAP). Also, during its latest presidency of the EU in 2003, Greece convened an International High Level Conference on "Coastal Areas and Cities in Europe".

Greece's *coastal zones are subject to strong development pressures* (*e.g.* pollution, exploitation of natural resources, urbanisation for tourism and holiday homes) as well as natural hazards (*e.g.* erosion). An estimated 85% of the Greek population lives less than a 45-minute drive away from the seashore and one-third live in a 2 km-wide coastal strip. Also, an estimated 80% of industrial activities, 90% of tourism and recreation, most of fisheries and aquaculture, 35% of agricultural land (often of high productivity), and a significant part of infrastructure (*e.g.* harbours, airports, roads, the electricity network, telecommunications) are situated in the coastal zone. Islands are however often presenting indicators of development under national average, as they often suffer from geographic isolation and lack of economic opportunities (besides tourism).

The *policy instruments hitherto used in coastal zones and on islands have not been able to deal well with this concentration of uses*, and to effectively contain unauthorised buildings. Tools designed specifically for integrated coastal zone management do not exist, and the general tools available are often too narrow in scope to be of much help. For example, in areas without a Master Plan, Development Control Zones (ZOE) can be designated under the Land Development Law,[16] but the scope of this instrument for ICZM is limited as it only deals with the regulation of development. Also, the Environmental Law 1650/86 provides several potentially useful policy tools (*e.g.* designation of protected areas and landscapes, as well as some economic tools such as exchange of land areas, compensation, transfer of floor area ratio), but a number of these cannot be used because the corresponding Presidential Decrees have not been signed yet. Another factor in the weak decision-making structure is the welter of government agencies at various levels with overlapping roles in the planning and implementation of policies and measures concerning coastal areas and islands.

The Greek authorities are rightly promoting the *Specific Framework for Spatial Planning of Coastal Zones and Islands*, which includes an action programme and incorporates the principles of the EU recommendation on ICZM, as the fulcrum of coastal zone management. The framework is being prepared and is intended to be approved in 2009. As long as their spirit is respected, resolute implementation of the 12 regional Framework plans and approval and implementation of the Specific Framework for Spatial Planning of Coastal Zones and Islands are bound to improve integration. Even so, the plans will need to be accompanied by other policy instruments specifically adapted to the pressures at play in these vital areas.

4.2 Mountain areas

Mountain regions cover 70% of mainland Greece and flat land is restricted to many small coastal plains. The mountains, which form part of the Alpine system, generally stretch from north-west to south-east. They are highest and most rugged in the north-west, where the Grammos Mountains rise to 2 519 m and the Pindos Mountains to over 2 285 m, although the highest mountain in the country, Olympus at 2 917 m, is in east-central Greece.

Greek mountain regions are amongst the poorest areas in the country and suffer from *geographic isolation and lack of economic opportunity*. Government development efforts[17] focus on improving accessibility (*e.g.* construction of the north-south Ionian highway in the west of the country and east-west Egnatia Highway in northern Greece) and extending water and electricity supply. In all mountain areas, measures have been taken for the conservation, regeneration, and expansion of forests, even though the reforestation rate of burned and degraded forestlands almost halved during the review period (Greek National Committee for Combating Desertification, 2006). Measures have also been taken to induce the local population, especially the young, to remain in mountain areas by promoting alternative livelihood opportunities through the development of eco- and agro-tourism, as well as mountain and cultural tourism (Box 7.4); and the promotion of the use of local resources, for example mineral resources.

Mountain areas are also prone to a variety of *natural hazards*, such as erosion and landslides. During the review period, Greece adopted a new Law for Civil Protection (Law 3013/2003), which charged the General Secretariat for Civil Protection (under the Ministry of Interior) with the formulation of prevention plans and programmes for all kinds of natural and technological risks, taking appropriate preparedness measures and undertaking prevention, response and recovery actions. To the extent that the General-Secretariat had already put these measures into place in 2007, they were severely tested by the devastating fires of August 2007 (Box 7.3). Ensuring that paper plans for *flood emergency* procedures will work in practice, for

Box 7.4 **Kalarrytes, Syrrako and the 21st century**

Cars cannot reach the narrow, cobblestone streets of Kalarrytes and Syrrako, two beautiful traditional mountain villages (altitude 1 200 m) in the *Tzoumerka district* of Greece's north-western Epirus region. Built against the steep hillsides of the Pindos range, the two historic villages *used to be thriving centres* of animal husbandry (cattle, sheep and goats) and the production and trade of wool (which was woven into capes of such quality that Napoleon ordered large numbers to outfit his Grand Army), mohair and cheese. The 750 km^2 of upland grassland surrounding the two villages were estimated to support 50 000-75 000 sheep. Kalarrytes was a centre for silver jewellery making and the reputed hometown of the well-known Bulgari dynasty. Syrrako counted as much as 3 500 inhabitants during 1913 census.

Almost *100 years later*, the 2001 census recorded a population of just 273 for Syrrako and 223 for Kalarrytes. Even these numbers are inflated, because they include many former locals choosing to be counted in their hometown (where they are also on the electoral roll), while actually living elsewhere and only spending the summer months in the district. Agriculture is in decline, but the villages have been protected as traditional towns since 1975 and are attracting some visitors. Wastewater still is a problem and the inhabitants hope that funding under the National Strategic Reference Framework 2007-13 will be forthcoming. A General Town Plan under Law 2508/97 is in preparation.

The question of how these two villages, and others like them, will survive and prosper in the 21st century is not an idle one, and was explored in the 2002 OECD Territorial Review of Tzoumerka. The recently established Tzoumerka *National Park* is expected to bring new life to the area, and new opportunities can be created now that two *new motorways* bring the Tzoumerka district closer to markets. Further, the *internet* could allow new residents formerly tied to the large cities to settle in the villages. Regardless of the kind of future the people of Tzoumerka will carve out for themselves, it is clear that carefully husbanding the district's *environment and natural resources* (forests, grasslands, water) must be part of the solution.

instance by way of occasional practice runs, should also be on the agenda. Hazard maps based on geological, slope gradient, rainfall and seismic hazard data (identifying 3-4 levels of hazard) have been prepared for the whole territory of Greece (1:100 000). The entire country has also been mapped (1:200 000) in terms of the risk from forest fires. The Ministry of the Interior is funding a programme[18] to assess earthquake risks at the local authority level.

Beyond these efforts, Greek authorities are rightly promoting the *Specific Framework for Spatial Planning of Mountainous Areas*. Its adoption and implementation should contribute to the economic, social and environmental development of mountainous areas.

The framework is in preparation; it is intended to be approved in 2009. It will include guidelines for the sustainable and competitive development of the mountain areas, and for their better integration into the country's economic and social system. The framework aims at strengthening the demographic and production bases of these areas, while ensuring the protection of their natural and cultural assets.

5. Desertification

A recently-concluded mapping effort initiated by the Greek National Committee to Combat Desertification indicates that *34% of the country is impacted to a high degree* by desertification, 49% is moderately affected, while 17% is at low risk.[19] The pressures are numerous: overgrazing of fragile land; improper water management; inadequate protection of vegetative cover exacerbated by forest fires; and inappropriate agricultural practices. Greece's climate, with long, dry summers and high evapo-transpiration rates, favours desertification in the eastern areas of Peloponnese, Sterea Hellas and Thessaly, the central and southern areas of Macedonia, central and eastern Crete, and the Cyclades islands in the Aegean Sea. The resulting loss of productive arable land from soil erosion and salination and the over-pumping of aquifers to compensate for water losses have exacted a heavy economic and social penalty on the country. The *threat of global warming* raises even higher the stakes that Greece has in its investments in desertification control.

The National Action Plan

Greece's anti-desertification objectives and programme priorities are set out in the *National Action Plan* concerning desertification (approved in 2001 through a Common Ministerial Decision). Implementation is co-ordinated by the 15-member *Greek National Committee to Combat Desertification* (established in 1996, one year prior to Greece's ratification of the 1994 UN Convention on Desertification). The Ministry of Rural Development and Food ensures secretarial and technical support to the committee, which brings together relevant ministries, universities and research institutes and NGOs to: formulate proposals for combating desertification; co-ordinate national, regional and local action plans; pursue co-operation with the EU and other international bodies on desertification programmes; promote research; and raise public awareness.

The National Action Plan was designed to provide a broad, multi-sectoral framework for planning and programme implementation at the national, regional and local levels. As it has evolved, the National Plan is an *amalgam of anti-desertification related policies and actions* carried out by a wide spectrum of institutions, and which rarely bear a "desertification" label. Consequently, it is not possible to identify overall

funding levels for this issue area. Elements of the Action Plan cover: the agricultural, forestry, water resources and socioeconomic sectors, infrastructure, countryside development, desertification research and monitoring. Objectives include: establishing long-period set-aside for agricultural lands; afforestation; clarification of land ownership in forests; extension of water storage facilities; definition and assessment of best land management practices for the protection of natural resources.

Since 2003, a wide array of desertification-specific projects have been carried out to assess better the extent and impacts of desertification within the country, estimate the effectiveness of policies and measures already undertaken,, and propose new remedial and preventative steps. In addition, *substantial levels of funding* are being allocated to other projects that contribute to the anti-desertfication fight, but which are not designated as desertification-related activities in the budgets of the implementing ministries and institutes. For example: EUR 650 million has been allocated by the Greek government for re-establishment of lands impacted by forest fires over the 2007-10 period; in 2006, expenditure to support early retirement of aged farmers and afforestation of agricultural land amounted to EUR 236 million and EUR 19 million, respectively (including contribution from the EU); over the period 2000-06, EUR 122 million were spent to support organic farming.[20]

International co-operation on desertification

At the regional level, Greece together with Italy, Portugal, Spain, Monaco and Turkey constitute an "*Annex IV Group*" under the UN Desertification Convention, having agreed to co-ordinate their actions within the framework of a special annex for the northern Mediterranean. Other than occasional meetings, however, the Group has been largely inactive.

In its 4th National Report on Implementation of the UN Desertification Convention (December 2006), the National Committee to Combat Desertification identified a *series of* "*negative indicators*" *of performance* to date. They included insufficient progress in reforesting areas burned or otherwise deforested; a delay in the completion of cadastral plans; and the lack of an effective national land use plan. The Committee also acknowledged a *delay in establishing local anti-desertification committees* as called for in the 2001 version of the Greek National Plan. Given the need to mobilise the support of local communities and citizens in anti-desertification efforts, the creation of the local committees, backed up by expanded public education efforts, deserves priority attention. The likelihood of a growing threat to the economic and social welfare of inhabitants of large expanses of Greece's arid and semiarid areas from desertification exacerbated by climate change makes this all the more critical.

Notes

1. The term "illegal construction or building" is used to describe the construction of houses without building permit, either on privately owned land or as private construction on public land (*e.g.* burned forestland).
2. Amongst other matters, Regions are responsible for civil protection, planning and development, migration and social inclusion of third country residents, public works, water and other natural resources, energy, trade, agricultural development, fishery, spatial planning, environment, forest development and protection, social solidarity, civil property, national legacy, decentralisation, supervision of the actions of first and second level local authorities.
3. The mayor and the president of the community are the heads of the municipalities and the communities respectively, and they are assisted by collective bodies (such as councils and committees). The representatives of the first level local self – governments are elected by direct universal suffrage for a period of four years.
4. Other pieces of the spatial planning legislation are: *a)* Urban Development Law 1337/1983; *b)* Law on the Extension of Cities and Towns, protection natural and built environment and associated Arrangements 2242/1994; *c)* General Building Construction Code.
5. The park in the old airport area would be the largest park in the country.
6. As in many other countries, fire is a convenient way of changing a forest into other land uses. It is often hard to prove that a building is constructed on a public land, after that a fire has damaged the forest. In court, the Forestry Department must prove that a plot was a forest before the development, which is difficult in the absence of registers or official maps, although aerial photography can sometimes help.
7. Ratio of electricity generated from renewables to gross inland electricity consumption; target set out in Law 3468/2006, which transposes EU Directive 2001/77/EC.
8. Greek forest laws allow certain exemptions for large-scale infrastructure works for public benefit from development restrictions applicable in forests and scrublands; Law 2941/2001 extended these to include RES installations. More generally, the same law waived the requirement to obtain building permits in the case of wind farms and solar energy installations.
9. See Joint Ministerial Decision 104247 and 104248/25.5.2006.
10. Exclusion areas and incompatibility zones are specified for wind farms (*e.g.* area with priority habitats, core areas of national forests). Limitations are set to the maximum density of wind energy facilities depending upon the type of area. The Specific Framework Plan for RES defines the criteria for the integration of specific facilities in the surrounding environment, with emphasis on the visual and landscape impacts.
11. Establishments subject to Directive 1996/61/EC on integrated pollution prevention and control.
12. Since the mid-80s, however, industrial activity has to some extent been decentralised off the Athens area, a positive development in the densely populated area of the capital. This phenomenon can be attributed to a 1984 moratorium on new industrial activities in the Athens area instituted by Presidential Decree 84/1984. The moratorium was in place for more than 15 years, but has now been lifted. Also a number of industrial and power plants were moved from Athens to its periphery in Attica.

13. Law 3325/2005, on the establishment and operation of industrial and handicraft facilities, simplifies and accelerates permit procedures.
14. See Ministerial Decision 3727/724/5.8.2003 on the "Correlation of industrial and enterprise activity with the degree of nuisance described in urban planning legislation".
15. Greece supports the proposal for a framework EU Directive on the protection of soil.
16. For the purpose of concentrating urban development, safeguarding sensitive areas and stopping unplanned construction. Between 1983 and 2005, about 60 such zones were designated in coastal zones and on islands.
17. The ministries of Economy and Finance, Environment and Agriculture all have policies concerning the sustainable management of mountain areas. Laws 1892/90 and 2234/94, target the economic development of mountain areas.
18. The Thisseas programme has allocated EUR 340 000 from national sources over 2005-09 for this purpose.
19. FAO estimates in 2005 were that 47% of Greece's land area was severely impacted by human-induced land degradation (compared to 35% for Spain, 28% for Italy, 21% for Portugal and 69% for Turkey).
20. For the period 2007-13, the National Rural Development Programme (NRDP) allocates EUR 1.7 billion to improving the environment and the countryside (second axis of the NRDP), which comprises EUR 890 million for agri-environmental measures, including support to organic farming (Chapter 4).

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8

INTERNATIONAL CO-OPERATION*

Features

- Climate change
- Trade and investment
- Environmentally sound shipbreaking
- Development assistance
- Regional co-operation mechanisms
- Marine issues
- Desertification

* This chapter reviews progress in the last ten years, and particularly since the 2000 OECD Environmental Performance Review. It also reviews progress with respect to the objectives of the 2001 OECD Environmental Strategy.

Recommendations

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Greece:

- continue efforts to *reduce greenhouse gases* with a view to achieving the EU emissions reduction target set for Greece; enhance efforts on energy efficiency and renewable energy sources;
- encourage Greek leadership within the IMO-ILO-UNEP framework in support of the *Convention on the Safe and Environmentally Sound Recycling of Ships*;
- strengthen the protection of *water quality in near shore marine areas and bays* through improved development siting, upgraded wastewater treatment and effective enforcement of existing national and EU environmental legislation and regulations; ensure that the environmental regulations governing water quality in the *aquaculture industry* are adequate to protect human health and environmental sustainability, and are fully enforced;
- strengthen *customs inspection and enforcement capacity* (expanded staff, improved training, better technology) to control illegal trade in endangered species, ozone depleting substances and hazardous waste;
- further utilise bilateral, regional and multilateral mechanisms to expand *co-operation with neighbouring countries* on the environmental management of transboundary waters;
- strengthen the environmental content of the *Development Assistance Programme* as it continues to grow, while ensuring that major development projects funded by Greece are subject to environmental reviews, where appropriate.

Conclusions

Although faced with the imperative of achieving near-term economic growth, Greece has embraced and promoted *long-term sustainable development* by implementing national actions to achieve, *inter alia*, the goals of the World Summit on Sustainable Development, the UN Millennium Development Goals and the EU Strategy for Sustainable Development. As a donor country, Greece's *development assistance programme* has improved substantially with the establishment of the "Hellenic Aid" Department within the Ministry of Foreign Affairs. It has supported improved environmental governance and programme effectiveness at the international level by pressing for institutional reform and better programme coherence (*e.g.* within UNEP and the UN Commission on Sustainable Development), and by ratifying virtually all major multilateral environmental conventions. Greece has also made an

intensive effort to transpose the *EU environmental legislation* into domestic law. Significant progress was made in the *maritime transport* area in protecting the environment and improving the safety of life and property at sea; *fisheries management* was strengthened through national actions under the EU Common Fisheries Policy. Progress was made in protecting *endangered species* under the CITES convention, and in implementing the provisions of the Basel Convention on *transboundary movement of hazardous waste*. In the area of *climate change*, Greece has established institutional arrangements and developed analyses and plans to meet its commitments under the Kyoto Protocol and the EU burden-sharing agreement. Greece has also intensified its efforts to engage its neighbours in co-operative efforts to address water quality and water flow issues associated with *transboundary rivers and lakes*. Greece has provided effective leadership of the *Mediterranean Component of the EU Water Initiative* (MED EUWI) since its launch in 2003.

While performance improved markedly in the past few years, Greece needs to intensify its efforts to comply adequately with the *EU environmental legislation*. In a number of areas (waste, natural areas, water management) gaps exist between the high quality of analysis/planning and actual programme implementation. Greece is behind schedule in achieving EU targets for renewable energy use and reduction of energy consumption. Despite the progress in the enforcement of laws and regulations to control illegal *trade in endangered species, ozone depleting substances and hazardous waste*, Greek authorities need to remain vigilant and to be adequately staffed and equipped to carry out these tasks. Concerning *coastal waters*, while their quality is generally excellent, pollution hotspots remain problematic due to uncontrolled development and inadequate wastewater treatment; management of coastal wetlands and protected areas needs to be improved and decoupled from EU financial support. While there are plans to progressively increase the *Official Development Assistance*, its environmental content remains quite small, and provisions do not exist for systematic environmental reviews of all proposed major development projects. Greece should be a leader within the IMO-ILO-UNEP framework on *environmentally sound shipbreaking*, commensurate with its commitment to sustainable development and its development assistance policy objectives. *Co-operation with neighbouring countries* on transboundary water and marine issues remains challenging, requiring further political and programme initiatives by the relevant countries.

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1. Policy Objectives, Institutions and Mechanisms

1.1 Policy objectives

During the 1999-2007 period, Greece pursued *five major policy objectives* concerning international environmental co-operation:

- contribute to the international follow-up to the *World Summit on Sustainable Development (WSSD) and the Millennium Development Goals*: as reflected in Greece's leadership role in the EU Water for Life Initiative focusing on the Mediterranean Region (MED EUWI) and in the strengthened Development Assistance Programme;
- join other countries in addressing *threats to the global commons*: climate change, stratospheric ozone depletion, world fish stocks, marine pollution;
- contribute to sound environment management and sustainable development *in Europe* as an active member State of the European Union: transposing and implementing EU Directives, accepting burden-sharing targets;
- obtain the *co-operation of other countries and international bodies* in addressing environmental problems affecting Greece: transboundary water management, prevention of oil spills, conservation of fish stocks and protection of biological diversity;
- strengthen *Greek engagement in multilateral and regional environmental bodies*, *e.g.* UN Environment Programme (UNEP), UN Commission on Sustainable Development (CSD), International Maritime Organisation (IMO).

The recommendations of the previous *OECD Environmental Performance Review of Greece* set out more specific policy objectives:

- ratify the international environmental agreements already signed or supported by Greece;
- continue transposing EU environmental directives and fully implement them;
- reinforce domestic means and institutional capabilities available for fulfilment of duties related to international environmental co-operation;
- ensure full implementation of international commitments on nature protection;
- continue to implement measures aimed at preventing and mitigating marine pollution;
- strengthen measures aimed at conserving energy with a view to combating climate change and reducing air pollution;
- take appropriate measures so as to be able to meet international commitments covering SO_x emissions and stabilisation targets for NO_x emissions.

Looking to the future, the National Strategic Reference Framework for 2007-13, a central reference document for the *programming of EU funds at the national level*, sets out as the strategic vision that "Greece should be an outward-looking country with strong international presence and a competitive and productive economy; a country with emphasis on education and the quality of young people, technology and innovation, and respect of the environment".

1.2 Institutional responsibilities

Responsibility for implementing Greece's international environmental commitments involves almost every *government ministry and institute* to some degree. Ministries having distinct international environmental mandates are:

- Ministry for the Environment, Physical Planning and Public Works (YPEHODE) (overall international environmental policy and programme implementation; air, water, hazardous waste and ozone programmes; transboundary air and water issues; environmental inspections; climate change policy and National Emissions Trading Scheme; funding of international environment agencies and Secretariats of multilateral environmental agreements.
- Ministry of Foreign Affairs (foreign policy guidance; transboundary water negotiations; bilateral protocol negotiations; development assistance through Hellenic Aid[1]).
- Ministry for Development (energy policy and programmes; renewable energy and energy conservation; industrial pollution prevention and major industrial accidents as a joint responsibility with YPEHODE).
- Ministry of Rural Development and Food (desertification; agri-environmental measures; forest protection; aquaculture; biodiversity and biosafety; fisheries policies; irrigation).
- Ministry of Mercantile Marine, Aegean and Island Policy (marine safety and transport; ship and land-based marine pollution; response to oil spills).
- Ministry of Economy and Finance (funding for of some international organisations; management of chemical substances through the General Chemical State Laboratory; export credit reviews; Hellenic Customs Service for the interdiction of illegal trade in, *e.g.* endangered species, hazardous waste and ozone-depleting substances).
- Ministry of the Interior, Public Administration and Decentralization (aspects of relations with international organisations; administration of EU Cohesion Fund).
- Ministry of Employment and Social Protection (safety in shipbreaking industry).

– Ministry of Health and Social Solidarity (food safety in the fisheries sector; quality of water for human consumption; environment-related health issues).

An array of *quasi-public and private institutions* also plays an important role. These include the National Center for the Environment and Sustainable Development (an information-oriented advisory body supervised byYPEHODE) and the Centre of Renewable Energy Sources (CRES). Further, some 430 national *environmental NGOs* are included in Hellenic Aid's register of non-governmental organisations qualified to participate in the Greek Development Assistance Programme, many of which are represented on government-sponsored advisory councils and inter-ministerial committees (*e.g.* on biodiversity, development assistance and sustainable development).

Numerous *prefectures and local governments* have responsibilities linked in part to obligations Greece's has assumed under regional and global environmental conventions and protocols (*e.g.* on marine water quality, coastal fisheries and aquaculture, maritime safety, biodiversity management and contingency planning for industrial accidents).

1.3 Mechanisms of co-operation

Bilateral mechanisms

Greece's *country-to-country environmental co-operation* principally involves neighbouring states, and takes a variety of forms. "Bilateral Memoranda of Understanding (MOUs) on Environment and Sustainable Development" provide general frameworks for co-operation on a range of possible issues. The MOUs are elaborated by the YPEHODE and managed during ratification process by the Ministry of Foreign Affairs. For the most part they involve *ad hoc* meetings of experts, data and information exchange, training, and joint research and monitoring. Such umbrella agreements currently exist with Cyprus[2] (1996), Turkey (2001), Bulgaria (2005) and Albania (2005). Others have been signed, but not ratified, with Georgia and the Former Yugoslav Republic of Macedonia (FYROM). Under the MOUs, Greece has co-operated *inter alia* with Cyprus[3] on protection of soil, water and the marine environment; with Turkey on desertification and flood control on the Evros/Meric River; with Bulgaria on transboundary water monitoring; and with Albania on water pollution monitoring and establishment of a Permanent Commission on Transboundary Water Issues.

Specialised agreements, including "*bilateral protocols*", are concluded between Greek thematic ministries and their foreign counterparts to pursue joint activities on *specific thematic issues* (*e.g.* transboundary waters, energy, fisheries). They have a long history, stretching back to the 1960s when Greece and Turkey began to co-operate on

joint management of water flows on the Evros/Meric river. Later examples included a 1995 agreement with Bulgaria on water sharing and use on the Nestos and Ardas rivers; a 2005 agreement with Albania to establish a Joint Greek-Albanian Commission for transboundary water management issues; and a 2007 accord with Albania on energy co-operation (headed by the Ministry of Development on the Greek side). In addition, Greece and its neighbours have negotiated a number of bilateral protocols on "Economic and Technical Co-operation", managed by joint ministerial-level councils, which on occasion address issues of environmental management and sustainable development. Responsibility for these resides with the Ministry of Foreign Affairs, and secondarily with the Ministry of Economy and Finance.

Greece's expanding *Development Assistance Programme* provides another avenue for bilateral environmental co-operation as it now extends to over 80 countries. To date, however, environmental projects have been carried out in less than a quarter of them.

Regional mechanisms

Greece's environmental co-operation at the regional level involves participation in a broad array of conventions (Reference II.B) and programmes. This is dominated by Greece's membership in the European Union and the many environment-related policy and programme commitments this entails.

During the review period, Greece's domestic, regional and global environmental efforts have been *heavily influenced by EU environmental directives and regulations*, as well as regional and multilateral conventions and programmes. These efforts have also benefited from *EU financial support*. The European Commission has also been able to catalyse through the hosting of meetings and financial support for joint projects between Greece and non-EU members in key issue areas, such as Greece-Bulgaria-Turkey collaboration on Evros River water management. Similarly, the EU's "INTERREG III A" cross-border co-operation programme, financed on a 50-50 basis by the European Regional Development Fund, includes a component on the enhanced conservation of common or similar environmental and cultural resources. Under the 2000-06 phase of this long-running programme, Greek experts have been involved in a range of projects with counterparts in Italy, Bulgaria, Albania, the FYROM, Cyprus[4] and Turkey.

Greece has a relatively good record in *transposing EU legislation on the environment into domestic law*, especially as the result of a major effort to do so over the past three years. Over the entire 1999-2007 period, however, the conversion of and follow-up to EU directives was in some cases slow or considered incomplete by the European Commission (EC, 2006), resulting in referrals of Greece to the European Court of Justice for non-compliance (*e.g.* on illegal waste dump cleanup; providing and

implementing a legal regime for protected areas). Greece also proposed more stringent environmental criteria in major EU directive and regulations proposals, some of which were eventually incorporated in the final legislative texts.[5] The conversion of EU legislation into Greek law and implementation of the associated policy and programme commitments is an ongoing process and challenge (Chapter 5).

Concerning *OECD*, Greece is a long-standing member, and has accepted a broad spectrum of OECD Council Decisions and Recommendations on environmental issues. It became a full *member of the Organisation's Development Assistance Committee (DAC)* in 1999, and also holds membership in the International Energy Agency (IEA). Greece's participation in the OECD's environmental work programme has focused on chemicals and waste management activities, peer reviews and data and information management. Follow-up to OECD Council Decisions and Recommendations has been slow, but is progressing.

Concerning the *UN Economic Commission for Europe* (UNECE), with its ratification in 2005 of the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, Greece is now a *party to the five major environmental conventions* of the UNECE. The others are the Conventions on Environmental Impact Assessment in a Transboundary Context; on Transboundary Effects of Industrial Accidents; on Protection and Use of Transboundary Watercourses and International Lakes; and on Long-range Transboundary Air Pollution (LRTAP). Regarding the latter, Greece has *not yet ratified key protocols* which set out quantified targets for the reduction of sulfur emissions, heavy metals, volatile organic compounds (VOC) and persistent organic pollutants (POPs), but is on the verge of doing so. Greece has been contributing funding for the UNECE Cooperative Programme for Monitoring and Evaluation of Long-range Air Pollution in Europe (EMEP), but has been slow in providing the air pollution data required under the programme. Greece is leading the "Education for Sustainable Development" (ESD) Initiative within the UNECE.

Concerning the *Council of Europe*, Greece supports numerous activities in the areas of wetlands, forests and wildlife conservation that it views as directly or indirectly supportive of major Council of Europe environmental initiatives. The latter include the 1979 Bern Convention on Conservation of European Wildlife and Natural Habitats; the programme of Pan-European Nature Co-operation, intended as Europe's contribution to the global Convention on Biological Diversity; and an Ecological Networks Programme which includes the Emerald Network. Greece has signed and is close to ratifying the 1999 European Landscape Convention. Concerning the *NATO Committee on the Challenges of Modern Society* (CCMS), Greek scientists and technical experts, from both government and private sector, continue to participate in a number of the pilot projects sponsored by the CCMS.[6]

Concerning *regional seas*, Greece has assigned especially high priority to the *1976 Barcelona Convention* concerning Protection of the Mediterranean Sea against Pollution and its implementing programme, and also to accords and co-operative activities on managing fish stocks in regional seas. The UNEP Mediterranean Action Programme (MAP) Co-ordination Unit is based in Athens. However, ratification of several of the protocols under the Barcelona Convention is pending. Environmental co-operation is also a component of the 2000 "*Adriatic-Ionian Initiative*". This engages Greece, Albania, Bulgaria, Bosnia and Herzegovina, Croatia, Italy, Slovenia and Serbia in a multifaceted work programme centred on promoting political and economic growth in the region. Greek authorities view this as an opportunity to strengthen co-operation on confronting water pollution in the Ionian Sea. Greece is a member of the Black Sea Economic Co-operation (BSEC), a multilateral political and economic initiative which includes environmental protection as a specific area of co-operation.

Global mechanisms

Greece is a party to a broad spectrum of multilateral environmental agreements (Reference II.A), and the associated action plans and implementing programmes. Prominent among them are the *global conventions, protocols and programmes* on climate change, stratospheric ozone depletion, biological diversity, desertification, marine pollution, and hazardous waste management.

Greece assigns a high priority to the *International Maritime Organisation (IMO)* and its agreements and work programme on marine transport and pollution. Greek officials and experts also participate actively in the work under the UN Framework Convention on Climate Change and the Kyoto Protocol, *UNEP* on transboundary water management, ozone depletion, forest management, hazardous waste, and biodiversity, as well as in the Global Environment Facility (GEF) mechanism.[7] Other priority international organisations for Greece's environmental work include the *UN Food and Agriculture Organisation (FAO)* on desertification, fish conservation and aquaculture issues; and the *World Trade Organisation* on environment-trade relationships. The *United Nations Educational, Scientific and Cultural Organization (UNESCO)*'s work programme on environmental education and scientific research is also of considerable importance.

2. Global Issues

2.1 Climate change

Beginning with ratification in 1994 of the UN Framework Convention on Climate Change (UNFCCC), Greece (along with other EU member states) has

accepted a series of commitments for reducing the emission of greenhouse gases (GHG). Since then, and particularly since the last OECD Environmental Performance Review in 2000, Greece has *implemented a commendable variety of analytical, institutional, legislative and policy responses* (Box 8.1).

Commitments

As a party to the UNFCCC, Greece accepted responsibility for gathering and sharing information on its GHG emissions (*e.g.* through annual National Inventory Reports and periodic National Communications to the Convention Secretariat), and for designing and implementing strategies for reducing emission levels and adapting to climate change. In 2002, Greece along with the other EU member states ratified the Kyoto Protocol, thereby accepting *quantitative targets for GHG* reduction which were subsequently allocated under a "burden-sharing agreement" adopted at the European Union level. The EU member states collective commitment under Kyoto is to reduce GHG emissions in the 2008-12 period by 8% below the levels of the base year (1990 in most cases). Under the burden sharing allocation, Greece, in light of its relatively low level of GDP and its economic growth aspirations, is allowed to *increase its GHG emissions but by no more than 25% from base-year level*.

Subsequently, at the March 2007 European Summit, the Heads of State and Government agreed to achieve at *least a 20% reduction in GHG emissions in Europe by 2020* compared to 1990 (and even 30% if other industrialised countries commit to comparable emission reductions). In addition, in December 2008 the EU Council reached the agreement on the "climate and energy package to 2020", which sets out the contribution expected from each member state to meeting this and other climate and energy related targets, as well as the measures to achieve them.[8]

Institutions

YPEHODE is responsible for co-ordinating Greece's climate change activities, while a variety of other ministries incorporate various elements of the country's response policies and programmes into their efforts. Especially prominent is the Ministry of Development (YPAN), whose energy-related mandate is central to the successful implementation of Greece's climate change strategy. Inter-ministerial planning and co-ordination is carried out through a *Committee on Climate Change* established in 1996 and chaired by YPEHODE, with representation from YPAN and the ministries responsible for foreign affairs, internal affairs, economy and finance, merchant marine, agriculture and rural development, transportation and communication. Ultimate responsibility for approval of all policies and measures relating to climate change mitigation resides in the Greek Council of Ministers. In February 2008, the national GHG inventory system was reorganised, amongst the other things, to adapting it to the inventory and reporting

Box 8.1 **Major events in Greece's response to climate change**

1994	1994 Greece ratification of 1992 UN Framework Convention on Climate Change (UNFCCC).
1995	Adoption of the 1st National Climate Change Programme ("Hellenic action plan for the abatement of CO_2 and other GHG emissions"). First national communication submitted to UNFCCC Secretariat.
1996	Inter-ministerial Committee on Climate Change established.
1997	Second national communication submitted to UNFCCC Secretariat.
1998	Agreement at EU level on community burden sharing for GHG reduction (overall EU target – 8%; Greece target + 25%).
2000	Preparation by the National Observatory of Athens of "Planning of national actions for the next decade in the energy sector in compliance with the Kyoto Protocol".
2002	Ratification by Greece (and other EU member states) of the 1997 Kyoto Protocol. EU Council Decision 2002/3581, setting out burden sharing allocations of EU members. 2nd National Climate Change Programme approved, covering the 2000-10 period.
2003	Third National Communication submitted to UNFCCC Secretariat.
2004	EU Emission Trading Scheme Directive transposed into Greek law (Joint Ministerial Decree 54409/2632). First National Allocation Plan published, setting out emission trading rights for the 2005-07 period. Greek national GHG emissions and removals inventory report (1990-2003) submitted to UNFCCC Secretariat and European Commission.
2005	Approval by the European Commission of Greece's First National Allocation Plan.
2006	National Greenhouse Gas Trading Bureau and National Registry in place. First NAP approved (Joint Ministerial Decision 36028/1604/2006). Second National Allocation Plan (NAP), for the 2008-12 period submitted to European Commission. Fourth national communication, report on Demonstrable progress and initial report under Article 7 of the Kyoto Protocol submitted to UNFCCC Secretariat.
2007	Revision of the 2nd National Climate Change Programme. European Council agrees to binding targets for reduction of GHG emissions, share of renewable energy in energy consumption, biofuels and energy savings by 2020 concerning all EU members. Council Ministerial Decision (9267/46807) on emission trading and Kyoto mechanisms.
2008	Ministerial Circular 918/2008 "Structure and operation of the National GHG Inventory system". Second NAP approved (Joint Ministerial Decision 52115/2970/2008).

requirements of the Kyoto Protocol (Decision19/CMP.1).[9] YPEHODE, within which a climate team was established, has the overall responsibility for the national GHG inventory, and cooperates with other relevant ministries (namely the Ministries of Development, Economy and Finance, Transport and Communications, Rural Development and Food) where "focal points" have been identified. The National Technical University of Athens is assigned, on a contract basis, the technical and scientific support for the preparation of the annual national inventory. After some initial difficulties, the system became fully operative and was considered compliant with the Kyoto Protocol reporting obligations in November 2008.

Greece is placing emphasis on *energy research and development* in support of its Kyoto Protocol and EU burden-sharing commitments, with research and development (R&D) activities on biofuels, energy efficiency, renewable sources, co-generation, building efficiency and emissions control. This is managed centrally by the General Secretariat for Research and Development of YPAN. The *Centre for Renewable Energy Sources (CRES)*, a public institute supervised by YPAN, provides a link between government-sponsored research and industrial applications.

Beyond the central government, major responsibilities for the implementation of Greece's GHG efforts, including specific legislative requirements emanating from transposed EU directives, are assigned to the corresponding *regional authorities*.

Policies and measures

Greece's climate change policy, strategy and programme plans are set out in the Second *National Climate Change Programme*, adopted in 2002 and revised in 2007.[10] The Programme places heavy emphasis on achieving GHG emission reductions commitments by: changing the fuel mix to include a higher percentage of natural gas and renewable energy sources; improving energy efficiency and conservation in all sectors; effecting structural changes in agriculture and transportation; reducing emissions in waste management; and expanding R&D efforts to serve longer-range needs (YPEHODE, 2006a). The 2007 revision of the National Programme drew on the results of a monitoring and evaluation component which was funded under the 3rd EU Community Support Framework.

Greece transposed the EU Directives 2003/87/EC, 2004/101/EC, which established a common *GHG trading system* (EU ETS) and linked it to the other market mechanisms of the Kyoto Protocol. The EU ETS has been operational since 2005. With the first National Allocation Plan (NAP) for Greenhouse Gas Allowances 200507, initial CO_2 emission allocation rights were assigned within Greek industry. As approved by the European Commission in 2005, Greece was allocated 223.3 million tonnes of CO_2 (Mt CO_2) equivalent for the period

(74.4 Mt CO_2 per year), including reserve for new entrants, for 139 industrial and power generation units. Given that emissions from these facilities had been previously estimated to be 228.1 million tonnes over the period, the allocation required an overall 2.1% reduction of emissions by the participating installations. The NAP for the period 2008-12, as approved by the European Commission and integrated into the Greek legislation, implies a 16.7% reduction of the business-as-usual projected emissions of the participating installations. It covers 140 installations and allocates 341.5 Mt CO_2 equivalent for the five-year period (68.3 Mt CO_2 equivalent per year), including reserve for new entrants. In 2006, a Bureau for GHG Emissions Trading was set up within YPEHODE, and the National Centre for the Environment and Sustainable Development was assigned responsibility for the registry management.

Greenhouse gas emissions

In 2006, *Greece's GHG emissions*, excluding emissions and removals from land use, land use change and forestry (LULUCF) amounted to 133 Mt CO_2 equivalent compared to 104.7 Mt CO_2 in 1990 and 128.3 Mt CO_2 in 2000 (Table 8.1). The base year emissions of Greece (1990 for CO_2, CH_4, and N_2O, and 1995 for F-gases), the baseline against which performance in reducing the principal GHG is measured, were adjusted to 106.99 Mt CO_2. The largest contributor to Greece's GHG emissions continues to be the energy sector (about 80% of the total), followed by industrial processes, agriculture, and waste.

Table 8.1 **GHG emissions,** 1990-2006

	1 990	2000	2006	1990-2006	2000-06
	(1 000 tonnes CO_2 equivalent)			(% change)	
CO_2[a]	79 223	100 521	104 449	*31.8*	*3.9*
CH_4[a]	9 034	9 009	8 424	*–6.8*	*–6.5*
N_2O[a]	12 008	11 108	10 322	*–14.0*	*–7.1*
HFC	935	4 486	4 648	*397.1*	*3.6*
PFC	258	148	71	*–72.6*	*–52.5*
SF_6	3	4	4	*45.6*	*12.0*
Total (including LULUCF)	101 389	125 277	127 918	*26.1*	*2.1*
Total (excluding LULUCF)	104 676	128 257	133 116	*27.2*	*3.8*

a) Including emissions and removals from LULUCF.
Source: Inventory submission to UNFCCC, September 2008.

Carbon dioxide, principally from the production, transport and use of energy, was the dominant GHG emission in 2006 (82%), a percentage that has remained fairly steady over the past decade. On a per capita basis, Greece's output of CO_2 (from energy use) in 2005 of 8.6 tonnes per person exceeded the overall OECD Europe average of 7.6 tonnes. Over the 1990-2005 period, the country's per capita CO_2 emissions increased by 23%, reflecting the rapid expansion of the use of oil for combustion and a continued reliance on lignite for power generation. Greece's *CO_2 emissions in relation to both GDP and the Total Primary Energy Supply* also outpaced the OECD Europe average, although in both cases there was a decrease in intensity over the 1990-2005 time frame, most notably a 13% decrease in the ratio of CO_2 emissions to GDP (Figure 8.1).

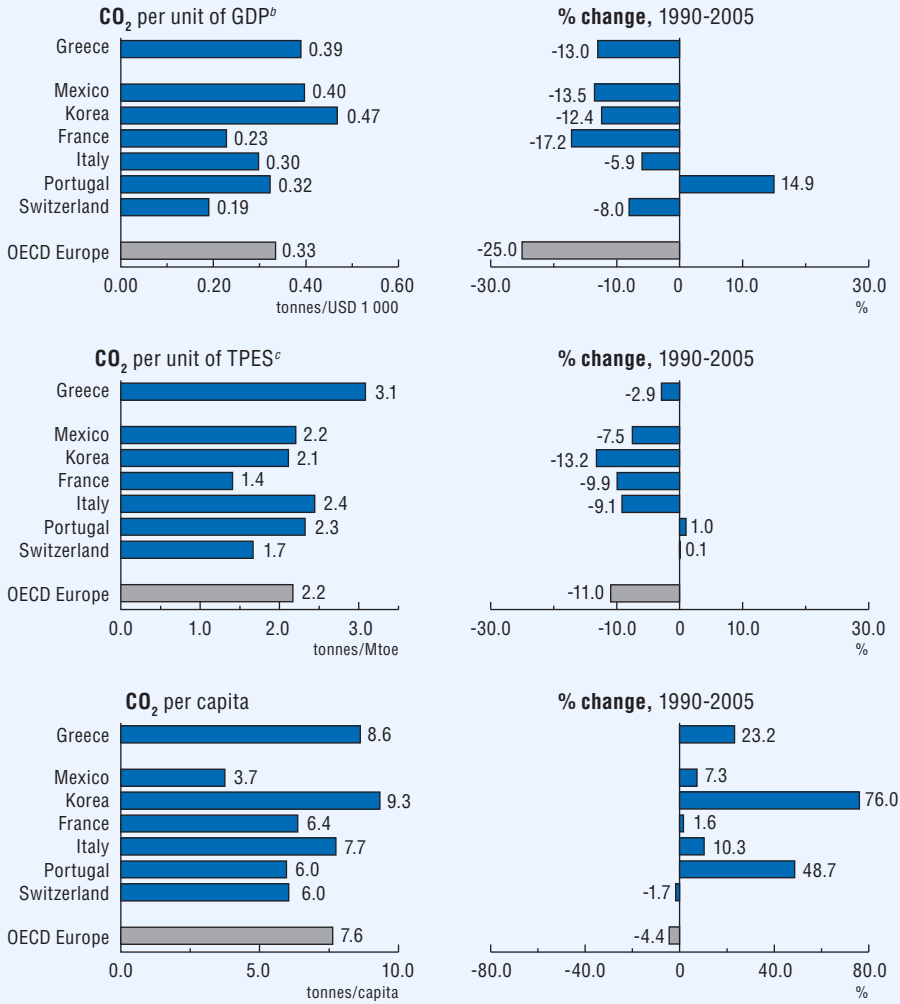
Other greenhouse gases include methane (6.3% of the 2006 GHG total), principally from Greece's agriculture and waste sectors; nitrous oxides (7.8%) from agriculture and transport; and hydrofluorocarbons (HFCs) (3.5%), which have been growing in importance for refrigeration and air conditioning as substitutes for ozone-depleting chlorofluorocarbons.

Performance evaluation

Since its ratification of the UNFCCC and the Kyoto Protocol, Greece has taken *important steps (political, organisational, legislative, and programmatic)* to meet the obligations it has assumed. Public awareness of needs and opportunities has been elevated; government ministries have been mobilised to address the GHG reduction challenge; an evolving national programme has been developed; data acquisition and reporting to the Convention Secretariat and the EU has been strengthened; and a strong legal basis and policy direction for action has been achieved (YPEHODE, 2006b). In the face of the concurrent need to promote economic growth and rising living standards, actions taken to modify the national energy mix and to find energy savings have contributed to *some relative decoupling of CO_2 emissions and GDP*. The Government has also come to view the national emissions trading scheme as an important tool for achieving substantial GHG emission reductions.

Greece is on the *right track to meet its Kyoto protocol target* of limiting the increase of GHG emissions to 25% from base-year level by 2008-12. In 2006, the growth in GHG emissions compared to the base-year level was 24.4%, slightly below the burden-sharing target. According to Greece's projections, existing policy and measures will allow to limit emissions growth within 24% above the base-year level during the period 2008-12. Greece expects to overachieve its Kyoto target by implementing additional measures and using carbon sinks, which could reduce emissions to a level 22.2% above base-year emissions (Table 8.2).

Figure 8.1 **CO_2 emission intensities,**[a] 2005



a) Includes CO_2 emissions from energy use only; excludes international marine and aviation bunkers; sectoral approach.
b) At 2000 prices and purchasing power parities.
c) Total primary energy supply.
Source: OECD-IEA (2007), CO_2 emissions from fuel combustion; OECD (2007), *OECD Economic Outlook No. 82.* OECD-IEA (2008), *Energy Balances of OECD Countries.*

It will *take an aggressive, dedicated effort* to meet the ambitious EU goals beyond 2012. A number of key climate-related targets accepted by Greece under other EU directives will be difficult to meet. CRES models indicate that Greece's use of renewable energy, for example, will likely account for 14.4% of total energy consumption by 2010. YPAN indicates that reaching the indicative target of 20.1% of RES in gross electricity consumption by 2010 would imply producing 14.45 TWh of electricity from RES, and to nearly double installed capacity, from 4 GW to 7.7 GW (YPAN, 2007). In October 2007, the EC launched infringement procedures against Greece and 11 other member states for failure to meet a 30 June 2007 deadline for submitting national strategies for achieving a 9% energy savings target by 2016 (as required under the 2006 EU Directive on energy end-use efficiency and energy services). However, the economic slowdown in 2008 and 2009 will imply some revision of the estimates and projections for the coming years.

As rightly reflected in the second National Climate Change Programme, Greece will need to achieve *more advances* in fuel switching, energy conservation and efficiency in all sectors; to modify agricultural practices and modes of transport; and to accelerate GHG reduction in the industrial and waste management sectors. An important, crosscutting priority is the need to make *greater use of economic incentives* (including taxes, charges and grants) to stimulate corporate and individual

Table 8.2 **Projections of GHG emissions by sector**

(Gg CO_2 equivalent)

Sources/sinks	1990	1995	2000	2005	2010		2015	
				With measures	With measures	With additional measures	With measures	With additional measures
Energy	77 623	81 952	98 780	105 430	106 713	104 664	113 570	105 503
Industrial processes	8 843	11 462	13 002	12 826	11 595	11 595	13 205	13 205
Solvents	170	153	145	158	161	161	164	164
Agriculture	13 514	12 489	12 331	12 450	11 587	11 587	11 731	11 731
Waste	4 445	4 433	3 931	3 327	2 511	2 511	2 832	2 832
Total	104 595	110 489	128 189	134 191	132 567	130 518	141 502	133 435
% from base-year	*98*	*103.4*	*120*	*125.6*	*124.1*	*122.2*	*132.5*	*124.9*

Source: YPEHODE.

behaviour in the direction of GHG emission reductions. Greece could also consider utilising the Clean Development Mechanism and Joint Implementation.[11] Greece has been analysing their possible use but has not yet decided to proceed.

Concurrent efforts should be undertaken by the government to *identify and eliminate disincentives to change, and conflicting policies*. As presently constructed, the national GHG emission trading system could have the perverse effect of encouraging old lignite-fuelled power plants to be maintained, and new ones constructed, if operators can obtain allocation permits at a too-low price.[12]

In pursuing progress towards overall Greek commitments on climate change, it is important to keep in mind, and to publicise, the *significant associated and ancillary benefits* to Greek society from investments of time, energy and financial resources in confronting the GHG reduction challenge. Measures taken to achieve greater energy conservation and efficiency, limiting the use of lignite as a major fuel source, and reducing emissions of nitrogen oxides are also vital for achieving other national priorities, including energy security and protection of public health through improved air quality.

2.2 Stratospheric ozone depletion

In 1988 Greece ratified the (1987) *Montreal Protocol on Substances that Deplete the Ozone Layer*. It has subsequently acceded to four amendments adopted by the Parties to expand the scope of chemical coverage, tighten controls of ozone-depleting substances (ODS), and improve the scientific and technical basis for control decisions (London, 1990; Copenhagen, 1992; Montreal, 1997; and Beijing, 1999). As a "non-Article 5" (developed country) Party under the Protocol, Greece accepted a commitment to reduce by 75% the production and consumption of the principal ODS, chlorofluorocarbons (CFCs) and halons, by 1994 from its 1986 baseline production, and then to eliminate their production completely by 1996. Two exceptions were provided: Parties could produce a limited amount of controlled ODS for their own "essential domestic uses", and also a 15% above-baseline amount to help Article 5 developing countries to meet their "Basic Domestic Needs" (BDN). As a member state of the EU, Greece has also been bound by a number of *EU decisions and regulations*. In 1994, the Montreal Protocol obligations were incorporated into Community legislation, and in 2000 the controls on ODS production, use, trade and recovery for EU members were strengthened beyond those stipulated under the UN Protocol through Regulation (EC) 2037/2000 (Ozone Layer Regulation).

By 1996, Greece had *fully met, on schedule, its Montreal Protocol and EU phase-out obligations* for CFCs and halons. Its 1986 baseline CFC production of 14 045 tonnes (ozone depletion potential) had been reduced to 906 tonnes, an amount

that fell within the Protocol's BDN allowance of 2 106 tonnes (UNEP, 2005). Following this phase out, the principal issues for Greece have involved: adhering to the phase-out schedule for other major ODS (*e.g.* methyl bromide, carbon tetrachloride and HCFCs); eliminating prohibited ODS that remain in the domestic inventory (*e.g.* CFC in air conditioning equipment); training of both personnel to manage ODS removal, recycling and destruction, and customs officials to thwart smuggling; and eliminating the residual CFC production allowed under the Protocol's BDN exemption.

Under EU legislation, member states are required to undertake specific measures to control the placing on the market and use of controlled ODS as well as to promote recovery, recycling, reduction and destruction of controlled substances. Further, they must *report periodically to the European Commission* on measures taken to implement the Ozone Layer Regulation and their effectiveness. This involves providing information on the facilities available to handle ODS, the amounts of substances recycled and destroyed, minimum qualification requirements for personnel engaged in ODS handling and destruction, and penalties established for individuals and firms that use banned substances (*e.g.* for refrigeration, air conditioning and cleaning solvents).

In 2003, EU member states announced their intention to *voluntarily cut back the production of CFC's allowed under the BDN exemption*. This was in response to the large quantities still being produced in developing countries which, by keeping the price of CFCs low, was retarding the introduction of ODS alternatives. Greece, one of a few EU countries with remaining CFC production, committed itself to a 5% reduction in 2004 of its maximum CFC production allowance (from 1 168 to 1 095 tonnes), noting that it would review the commitment in 2005. Greece subsequently reported production of 2 793 tonnes in 2004, and then corrected this to 1 152 tonnes (slightly above its 1 095 tonnes target), indicating that it had transferred the difference in its allowance to the UK. In 2006, the BDN production issue was mooted as the sole remaining CFC production facility in Greece was closed. The same year, Greece ceased production of HCFCs in compliance with EU legislation.

In 2006, the European Court of Justice ruled that Greece had, despite repeated requests by the European Commission, failed to comply with the reporting requirements. Since then, Greece has met its reporting obligations. The European Commission also ruled in early 2007 that Greece was not conducting *proper surveillance of ODS imports* as called for under Regulation (EC) 2037/2000. This concern resulted from the black market and smuggling associated with CFCs and other ODS chemicals banned from production in EU countries but which were being produced legally in Article 5 developing countries (or were being diverted after production under the BDN exemption). In late 2007, Greece

transposed the 2000 EU Ozone Layer Regulation into law, and committed itself to moving quickly to comply fully with the range of EU obligations.

A central licensing system was established to *control permitted trade of ODS*. Inspections of imports and exports are performed by Greek customs authorities who are authorised to specify penalties according to an "illegal trading code". Unlicensed ODS are returned to the country of origin at the importers expense. *Recovery of banned ODS* from end-of-life vehicles and electrical/electronic equipment is now receiving priority attention. Banned chemicals are sent to other EU countries that have approved facilities for ODS destruction, consistent with Greece's waste management legislation and international regulations. Transboundary movements are overseen by the Solid Waste Management Department of YPEHODE. Other recovered ODS, appropriate for recycling or recovery, are either sent abroad or forwarded to licensed Greek facilities which are monitored by the Environmental Inspectorate.

Greece has made considerable progress in contributing to the global effort to protect the stratospheric ozone layer. Nonetheless, *much remains to be done* under the Montreal Protocol and EU legislation. Priorities include: curbing illegal trade in ODS; reducing the consumption of ODS not yet entirely banned but which are under phase-out schedules; and eliminating the remaining national inventory of banned chemicals (including halons in the maritime sector).[13]

2.3 Trade and investment

Endangered species

Greece has made substantial progress since 2000 in controlling the illegal movement of threatened or endangered species of animals and plants into and out of the country. The basis for action has been Greece's commitments under the 1973 *Convention on Trade in Endangered Species of Wild Fauna and Flora (CITES)* which Greece ratified in 1992, and the 1997 *EU Wildlife Trade Regulation (338/97)* which enforces CITES and provides additional measures of control.[14] The EU Directives on Birds and Habitats also provide Greece with guidance and obligations on endangered species protection and trade.

Management responsibility for CITES resides in the Ministry of Rural Development and Food (Department of International Conventions), with designated regional authorities competent to issue CITES permits. Enforcement is carried out by the Customs and Excise Duties General Directorate of the Ministry of Economy and Finance, and the Hellenic Police Headquarters in Athens. A computer control system to track and authenticate trade is in place, and Greek authorities work with Interpol on interdiction of illegal activities.

Greece prohibits the export of endemic species, and allows legal import, transit or export of CITES-listed species only in a small number of ports. Over the last decade, reports and confirmed *incidents of illegal trade* involving Greek firms and citizens, coupled with the more stringent EU control regulations, have prompted the government authorities to adopt additional and strengthened control measures.

Under a 2006 Joint Ministerial Decision, additional implementing provisions for CITES were established, and the scope of coverage expanded. The *strengthened control measures* include: a scheme of "simple permits" for the export, import, re-export and re-import, and the general movement of all flora and fauna species; the augmentation of staff of the responsible Regional Administrative Bodies for CITES; and preparation of new documentation by the Ministry of Rural Development and Food to facilitate the identification by customs officers of CITES species. The inspection and enforcement function has been further upgraded by the holding of capacity-building workshops and provision of improved equipment for control officials; and the creation of a registry of companies which trade in wild fauna and flora to assist with monitoring.

The encouraging progress Greece has made in recent years in implementing CITES and EU obligations was cited by the World Wildlife Fund in a 2007 review of the status of environmental legislation in Greece (WWF Greece, 2007). Nonetheless, given the strength of the international market for certain endangered and threatened species, *Greek authorities need to remain vigilant* to ensure that CITES requirements are fully met. This will require continued training and equipping of customs officers; ensuring that adequate, trained manpower is available at the prefecture and local levels; maintaining a strong public information campaign; and enforcing laws consistently with strong penalties for CITES infractions.

Hazardous waste

Some *330 000 tonnes of hazardous waste* are being generated annually in Greece, principally by industry, healthcare facilities and transport activities. Overall, 42% of total hazardous waste production is oil and liquid fuel waste (which is almost all recovered); 14.5% is end-of-life and out-off-specification products and 13.4% is waste from thermal processes, especially steel and aluminium. Hazardous waste are produced in Attica (48.5%), Central Macedonia (12.6%), Sterea Ellada (10.2%), Thessaly (6.9%) and Western Greece (5.2%). Of the total volume of hazardous waste produced, *4 442 tonnes were exported* in 2006, compared to 3 262 tonnes in 2003 and 905 tonnes in 2001. The largest amounts of hazardous waste exported were biocides and phytopharmaceuticals, waste dyes, inks and paints, and PCBs (polychlorinated biphenyls).[15] Greece imports only *waste oils and lead batteries* for recovery purposes. Greece has not imported hazardous waste for disposal.

Greece has been responsive to a variety of environmental commitments and obligations assumed under global and regional accords on the *transboundary movement of hazardous waste*. The *UN Basel Convention* (1989) on the Transboundary Movement of Hazardous Waste and their Disposal, which Greece ratified in 1994, establishes a control procedure for the export and import of hazardous waste among the convention parties. Greece has fully adopted the Basel procedures that require prior notification of waste exports and imports, and written consent from the concerned authorities before any transboundary movement takes place, based on waste lists agreed to by the Convention parties. In 1995, an amendment ("Basel Ban") was adopted which prohibits all exports of hazardous waste destined for disposal from OECD to non-OECD countries. Greece is in the process of ratifying the amendment (which has not yet entered into force). The Basel Convention provisions, including the "Basel Ban" amendment, are already implemented by Greece through the EU Waste Shipment Regulation (WSR).[16] Greece's waste management activities are also *compliant with OECD procedures and guidelines* on transboundary movement of hazardous waste and with the Izmir Protocol (1996) to the Barcelona Convention on Protection of the Mediterranean Sea from Marine Pollution, which prescribes controls on hazardous waste movement and disposal.

Based on data collected from 2004 to 2007 from waste producers, the *first National Plan on Hazardous Waste* was approved in 2007 (Joint Ministerial Decision 8668/2007). It is based on the polluter-pays-principle: the companies generating hazardous waste are to bear the cost of their environmentally sound management, including safe disposal. The National Plan estimates that, of the 330 000 tonnes of hazardous waste produced each year, 62% is sent for disposal and the rest designated for recovery. An estimated additional 600 000 tonnes of hazardous waste are kept in storage by their producers. The recovery, environmental evaluation and rehabilitation of these storage sites are expected to be completed by the end of 2011.

Based on EU policy, Greece has been attempting to promote the use of waste as secondary raw materials and to *reduce the amount of hazardous waste generated*, by providing subsidies and other incentives. The focus has been on promoting the application by industry of advanced technologies for recycling and recovery, as well as introducing cleaner technologies in the production process.

Shipbreaking

Since the 2000 OECD Environmental Performance Review of Greece, the *management of end-of-life ships* containing hazardous materials has become a highly visible and contentious international environmental issue. This is the result of numerous reports of unhealthy working conditions, and environmental degradation,

associated with unregulated shipbreaking and salvage operations in low-wage countries of Asia, particularly India, Bangladesh, China and Pakistan.[17] Given inadequacies in the regulations and equipment needed to deal effectively with the hazardous substances contained in old ships (*e.g.* asbestos, PCBs, tributyltin and oil sludge), there are too often incidents of serious pollution of the water and soil in coastal areas, contamination of natural habitats and fishing grounds, and accidental injury, deaths and chronic environment-related illnesses in the workplace. This situation is likely to worsen over the coming years. A large number of vessels in the world's fleet are approaching the end of their useful lifetime, and there is an obligatory phasing-out of single-hull tankers under European Union legislation and international conventions. A number of international bodies are thus working on the design and negotiation of a binding global regime to protect human health and the environment during shipbreaking operations (Box 8.2).

The end-of-life ship dismantling situation attracted *international attention* at the beginning of this decade. In 2001, the International Chamber of Shipping produced an Industry Code of Practice along with a form to be used by ship owners and recyclers in preparing an inventory of potentially hazardous materials on board. During the period 2002-04, the International Maritime Organisation (IMO), the International Labor Organisation (ILO) and the Secretariat of the Basel Convention (BC) all issued technical guidelines on dismantling of ships to help protect the environment and health by promoting best practices. The OECD Working Party on Environmental Performance has given attention to this matter, in its second cycle of reviews, since the 2000 OECD Environmental Performance Review of Norway.

Given differences in approaches and perspectives, as well as the complexities involved in establishing environmentally-effective and economically-sound regulations (*e.g.* ships may become "waste" under Article 2 of the Basel Convention and at the same time be defined as "ships" under other international rules), the IMO, in co-operation with the ILO and the Basel Convention Secretariat, has been co-operating in the development of the *International Convention on the Safe and Environmentally Sound Recycling of Ships*. The text of the Convention was approved at the 58th session of the Maritime Environmental Protection Committee (MEPC) of the IMO; the Convention is expected to be adopted by an *ad hoc* diplomatic conference in Hong Kong (China) in May 2009. Greek experts and officials from government and industry have been actively involved in the ongoing analyses and negotiations, with some international and national environmental NGOs complaining that the Greek position in the negotiations has been too heavily influenced by its shipping industry seeking minimalist regulation of the shipbreaking trade. It appears, however, that Greek industry's major objective is to ensure that a truly worldwide accord is reached to ensure a "level playing field" of environmental and health obligations for all countries.

Box 8.2 **Environmentally sound shipbreaking**

In 2001, the OECD established a system for controlling the transboundary movement of hazardous waste among its member countries which is sensitive to the ship dismantling problem. *OECD Council Decision C(2001)107/FINAL*, as amended, requires that vessels and other floating structures destined for breaking up must be "properly emptied of any cargo and other materials arising from the operation of the vessel which may have been classified as a dangerous substance or waste", if it is to qualify for inclusion in a "green list" of products not subject to various controls.

In 2004, the signatories to *the Basel Convention* agreed that, under a 1995 *Basel Ban Amendment* (which is not yet in force), ships can be considered as hazardous waste depending on their contents, and thus would be covered by the Convention's rules governing transboundary movement of hazardous substances. Consequently, the Basel parties agreed that end-of-life vessels which have not been cleaned of hazardous substances should not leave an EU member country without permission of the importing country, and that any shipbreaking should be performed in an environmentally sound manner.

This decision was subsequently enshrined in EU legislation. The *EU Waste Shipment Regulation*, controlling the movement of hazardous materials within the EU and between a member state and third countries, was revised in 2006 (Regulation (EC) 1013/2006) to include in its scope of coverage end-of-life vessels containing hazardous substances. It also implements at the Community level both the Basel Convention as amended and the Basel Ban. Community law is, however, applicable only to EU-flagged ships or to ships leaving or entering EU waters in accordance with the UN Convention of Law of the Sea. This leaves important loopholes and omissions. For example, there is evidence that EU-flagged ships sometimes change flags before being dismantled in a developing country. Further, numerous EU-owned but non-EU flagged ships leave for scraping destinations from places outside EU jurisdiction. An additional complication is that a ship is considered to be a "waste" when it is "discarded" by the owner, which leaves open the question of when exactly some ships are discarded (*e.g.* an owner may claim that his decision to discard was made on the high seas, after leaving an EU port).

This would prevent the emergence of an EU regional approach which could result in Greece's competitive disadvantage *vis-à-vis* non-EU shipping states, and to a large flagging out from the Greek flag (and EU flags, in general) rendering regional measures ineffective. Another concern of the shipping industry is to make sure that when the Convention enters into force, a sufficient number of ship recycling facilities worldwide will fulfil its environmental and safety requirements.

As one of the world's leading maritime countries, Greece clearly has a major stake in the outcome of the deliberations on a binding global accord on end-of-life ship scrapping. It is also in a position of great influence. In 2003, Greece was *first among the OECD countries which exported end-of-life ships*, with 110 destined for dismantling. Of these, only 16 were Greek-flagged vessels; the remainder were Greek-owned but flagged in other countries. During the 2001-03 period, of the 20 companies worldwide that exported the most end-of-life ships, seven were Greek firms which together exported 80 of the 209 total vessels.

It will take some years (perhaps until 2015) for the Convention on the Safe and Environmentally Sound Recycling of Ships to come into force. And even then, it is likely that some countries will fail to ratify the agreement. Therefore *interim steps will need to be taken* by Greece and other shipping countries to address the long-term consequences of unregulated disposal of hazardous waste from end-of-life ships in developing countries for short-term economic profit. In the near-term, the Greek Government should continue to support the adoption of the new convention as soon as possible and encourage all Greek ship owners to follow rigorously the (voluntary) technical guidelines on "best practices" prepared by the IMO, ILO and BC to ensure that end-of-life vessels owned by Greek individuals and companies, wherever flagged, are sent to dismantling operators with good environmental records.

With respect to ship dismantling *within the EU*, there are still relatively limited facilities as operations have shifted to Asian countries offering lower labour costs and environmental regulations. Greece has two facilities (Bacopoulos and Savvas Pireus) with good environmental records, but which handle only relatively small end-of-life ships (ferries and fishing vessels).

Chemicals management

Greece's efforts to ensure sound environmental management of chemicals and other toxic substances involved in international trade have, in recent years, been focused largely on the transposition and implementation of EU directives and regulations. This has involved, in particular, the *comprehensive EU REACH system* (Registration, Evaluation, Authorisation and Restriction of Chemicals) which came into force in 2007. Under REACH, which brings together some 40 EU laws on chemical safety into one system, and fills earlier gaps, the chemicals industry must report systematically on the safety of chemicals produced or imported in large quantities. Further, public access to information on chemical safety is to be expanded significantly. A European Chemicals Agency (ECHA) located in Helsinki under the EU REACH legislation oversees the programme and receives reports from EU member states on their implementation progress.

Greece has also maintained a long-standing involvement in the *OECD's Environmental Health and Safety programme*. With the exception of the component on Good Laboratory Practices and occasional workshops in other areas, Greek involvement in OECD chemicals activities has, however, been limited and sporadic in recent years. Greece experts have been more active in the area of food safety, hosting a meeting of the OECD Task Force on the Safety of Novel Foods and Feeds in Athens in 2006.

At the multilateral level, Greece participates in *UNEP's International Registry of Potentially Toxic Chemicals* (UNEP-IRPTC) and the *Intergovernmental Forum on Chemical Safety* (IFCS). It is also a party to the 1998 Rotterdam Convention on Prior Informed Consent for Hazardous Chemicals and Pesticides (ratified in 2003) and the 2001 Stockholm Convention on Persistent Organic Pollutants (POPs) (ratified in 2006).

The *government's institutional focus for chemicals management* is the Inspectorate for Industrial Chemicals and Pesticides under the Ministry of Economy and Finance. The Ministry also oversees the General Chemical State Laboratory which maintains a National Register of Chemical Products and serves as the national focal point for the IFCS programme as well as Greece's technical contact for REACH. The Ministry of Rural Development and Food, and Ministry of Health's Poison Center, also play important roles in promoting the safe use of chemicals in Greece. Given the new requirements associated with REACH, it would be timely for the government to *review the existing institutional mandates and arrangements*, with a view to eliminating programme overlap, filling gaps and ensuring that staffing levels are adequate.

Corporate environmental responsibility

With respect to the environmental behaviour of *Greek firms with overseas operations*, a unit within the Ministry of Economy and Finance (the Unit for International Investments of the Directorate for International Developments and Co-operation) serves as the requisite National Contact Point for promoting and monitoring the *OECD Guidelines for Multinational Enterprises* which cover, *inter alia*, environmental and social responsibilities. The Guidelines have been made available to the general public, and are available electronically on the Websites of both the Ministry of Economy and Finance and the Greek Investment Protection Agency (ELKE). Indications are, however, that Greek industry has made *only very limited use* of either the National Contact Point or the Guidelines.

Greece also participates in the OECD's Export Credits Group which approved, in 2007, a strengthening of the environmental requirements for the *provision of export credits and credit guarantees by government export credit agencies* to national firms

competing for overseas sales. The Export Credit Insurance Organization, established in 1988 and supervised by the Ministry of Economy and Finance, is the responsible body in Greece, and has established policies and criteria for environmental decision-making.

2.4 Development assistance

While Greece continues to receive large net funding from the EU (Table 5.2), *Greece has become a donor* country. In the early 1990s Greece had initiated its bilateral aid activities. In 1997, the first medium-term assistance programme (1997-2001) was launched, budgeted at USD 400 million. In 1999, Greece joined the OECD's Development Assistance Committee (OECD/DAC).[18]

Programme evolution

Greece's *development assistance programme* has evolved substantially since 2000 with respect to scope, structure, coherence and level of expenditure. Financial outlays remain small, however, compared to development funding by OECD donor countries; and financial support for environmental management activities is modest.

The second *five-year Programme of Development Co-operation and Assistance of Greece (2002-06)* provided the broad policy framework for Greece's development support efforts, along with programme objectives and priorities. It was endorsed by an Inter-ministerial Committee for the Co-ordination of International Economic Affairs, chaired by the Ministry of Foreign Affairs. Representation comes from the Ministries of Economy and Finance, Development, Mercantile Marine, Aegean and Island Policy, Transportation and Communication as well as the Foreign Ministry, with other ministries (including YPEHODE), participating in discussions of particular issues. The Committee oversees on a continuing basis the content and co-ordination of the development programme, and endorses each five-year programme. The third five-year programme, which is currently being prepared, integrates the bilateral aid activities carried out by 17 entities in 12 Ministries, including YPEHODE.

The *General Directorate for International Development Co-operation (Hellenic Aid)* was established in 1999 within the Ministry of Foreign Affairs. During 2002-03, its mandate was broadened, and the competencies and the budget for development co-operation previously located in the Ministry of Economy and Finance were transferred to it. Hellenic Aid is also mandated to engage, co-ordinate and co-finance *participation from the private sector*. Some 430 Greek NGOs were listed in its development co-operation register in 2007, compared to 150 in 2002. A National Advisory Committee on NGOs, chaired by the Ministry of Foreign Affairs, was established by law in 1999 with representation from government ministries and

agencies and civil institutions. While intended to meet twice a year to formulate and recommend policies related to activities by development NGOs, the Committee was never activated. It was replaced by an *ad hoc* advisory group which is convened as necessary to address particular sectors and issues.

In 2004, an *Action Plan for Co-ordination and Harmonisation* was adopted by the government with guiding principles and measures for strengthening Greece's development assistance programme, including an intensified effort to fulfil the UN Millennium Development Goals (MDGs). The Action Plan takes into account international commitments emanating from the MDGs, the 2000 Barcelona Process, the Monterrey Conference (2002), the 2003 Rome Declaration on Harmonization, an OECD/DAC Good Practice Paper on aid delivery, and the 2004 Marrakech Memorandum on Managing for Development Results. It also identifies geographic and sector priorities as well as areas for increased attention, including expanded co-operation with international bodies and partnership approaches with recipient countries.

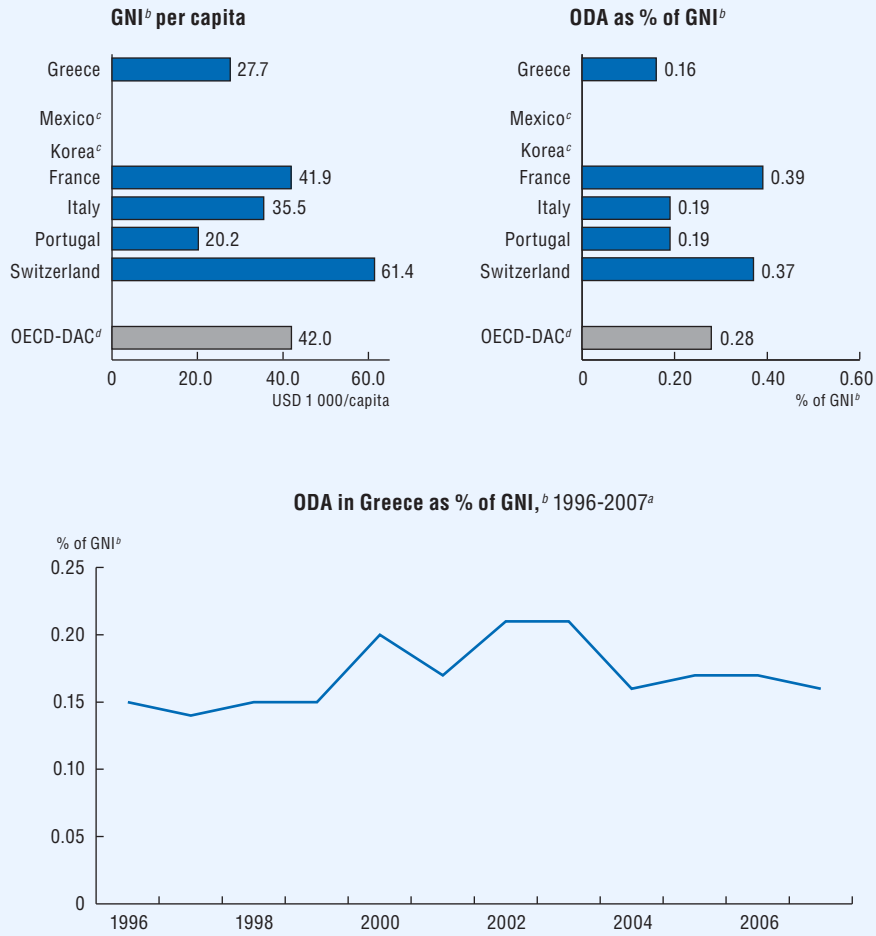
Six major objectives have been defined for Greek development assistance, and applied in both developing and transition countries: combating starvation and poverty; pursuing steady and sustainable economic growth (and the integration of aid recipients into the world economy); promoting peace and security; enhancing the application of democratic principles, the rule of law and human rights; mobilising and developing human resources, with emphasis on the equitable participation of men and women; and protecting the environment and natural resources (Ministry of Foreign Affairs, 2007).

Bilateral aid and multilateral support

In terms of outlays for *Official Development Assistance* (ODA), in 2007 Greece's ODA was USD 501 million (compared to USD 226 million in 2000 and USD 321 million in 2004). Of the 2007 total, USD 249 million was provided bilaterally (all in the form of grants), while USD 252 million was distributed through multilateral channels. In 2007, the ratio of ODA/GNI for Greece stood at 0.16%, after 0.20% in 2000 and 0.16% in 2004 (Figure 8.2). Greece's announced current goal is to progressively increase the ODA/GNI ratio to 0.35% in 2010 and 0.51% in 2012, subject to final approval of the 3rd five-year Programme of Development Co-operation and Assistance 2008-12 (Figure 8.2). It compares to an OECD/DAC average of 0.28, an EU 15 average of 0.40 and the UN goal of 0.7%.

Greece's *bilateral assistance* has, from its inception, been focussed on countries in the Balkan and Black Sea regions. As some of these countries have become ineligible for development assistance (*i.e.* as they accede to the EU or join OECD/DAC), the list of aid recipients has broadened to include countries of the Middle East

Figure 8.2 **Official development assistance,** 2007[a]



a) 2007: provisional data.
b) Gross national income in USD at current exchange rates.
c) Korea and Mexico are not members of the OECD Development Assistance Committee.
d) Member countries of the OECD Development Assistance Committee.
Source: OECD-DAC.

and Sub-Saharan Africa. Plans are to increase the annual percentage of aid allocated to Sub-Saharan Africa to 20-25% of the total outlay. In 2005 the National Development Programme listed 21 "priority" countries.[19] With the expansion of Greek aid to African and Asian countries beginning in 2003, the number of developing and transition countries receiving some form of assistance (including a large number of scholarships), numbered 83 in 2006.

A *broad spectrum of development sectors* receives Greek bilateral support. These include environment and natural resources along with health, education, agriculture, culture and sports, democratisation and human rights, institution-building, micro-credit programmes and income generation. In 2006, the bulk of the investments were devoted to government and civil society (24%), health (13%), education (12%), and emergency assistance (11%). General *environmental protection* accounted for only 1.2% of disbursements of bilateral assistance in 2006, while water supply and sanitation support amounted to some 0.5%.

While most *multilateral funding* (90%) is being directed to the development assistance efforts of the European Union, this is not counted as national multilateral aid (as for other EU member countries). The remainder (which is counted as multilateral aid) is disbursed to some 40 UN and other development programmes administered by, *inter alia*, the World Bank, World Health Organisation, Global Fund to Combat AIDS, OECD/DAC and the Economic Community of West African States. Smaller contributions are being made to a number of international environmental institutions, notably the Global Environment Facility (GEF), the International Union for Conservation of Nature (IUCN), the Montreal Trust Fund and the UNEP Environment Fund. While the Ministry of Foreign Affairs (Hellenic Aid) is the co-ordinator for bilateral aid, the Ministry of Economy and Finance is the main actor on multilateral support. Since the latter manages both EU and the International Bank for Reconstruction and Development (IBRD) funds, it controls upwards of 92% of multilateral disbursements.

Environmental development assistance

In 1999, *YPEHODE began a Bilateral Development Assistance Programme* within the framework of the overall national programme. It was built on priorities and obligations associated with OECD/DAC, UN institutions (particularly UNCSD, UNEP and UNESCO), the Rio conventions on biodiversity, climate change and desertification, and Greece's bilateral environmental memoranda of understanding with neighbouring countries. YPEHODE's efforts focused on capacity building, and promoted the principles of demand-driven projects and local ownership. Thematic priorities included water and natural resources management, wastewater and solid waste management, climate change, and establishment of transboundary networks and monitoring

mechanisms. In 1999, 22 projects were supported under the YPEHODE Programme, carried out by Greek universities and scientific institutions, with a budget of EUR 1.87 million over the 1999-2005 period. In late 2000, 38 additional projects were launched, with time frames up to four years and a budget of EUR 6.16 million. NGOs (19) were included for the first time as project implementers, receiving 45% of the second-tranche budget. On a geographical basis, Balkan countries received 65% of the support; SE Mediterranean countries 32%; and Black Sea countries 3%.[20]

Since 2002, however, no new bilateral environment assistance projects have been funded as the emphasis has shifted to completing projects already underway and most important, to *directing environmental funds toward regional and global programmes and initiatives*. The latter have included: the United Nations Development Programme for its work on environment and energy; the European Bank for Reconstruction and Development for technical assistance in the field of environment in the Balkans; the United Nations Industrial Development Organization's Office in Athens, for Investment and Technology Promotion; and the European Union-Africa Infrastructure Trust Fund for projects in the sectors of transport, energy, water and information technology.

Since the 2002 WSSD, the Greek Government (YPEHODE and the Ministry of Foreign Affairs, with Secretariat support from the Global Water Partnership-Mediterranean) has taken the lead of the *Mediterranean Component of the EU Water for Life Initiative (MED EUWI)*. MED EUWI seeks to make progress in poverty eradication, health, and in sustainable economic development in the Mediterranean and South-Eastern Europe, and to promote peace and security in the region. The MED EUWI coordinates individual donors (bilateral ODA, World Bank, GEF, development banks) on a demand basis, and mobilises additional funding from the European Commission (about EUR 1.07 million for 2006-08). These funds complement MED EUWI's annual core funding provided by the Greek Government.

Greece also voluntarily contributed EUR 6.85 million over the 2000-06 period to the *Global Environment Facility* (GEF).[21] Further, some USD 4 million has been allocated to 17 countries to support their *greenhouse gas adaptation and mitigation strategies* under the UNFCCC and the Kyoto Protocol. Greece is currently further intensifying its support to climate change and adaptation programmes in least developed countries and in regions that, due to their geographical locations, are in severe danger from climate change. To ensure the best possible use of funds, the Greek plan will be implemented in co-ordination with regional organisations, especially with the African Union (EUR 3 million in 2007 and EUR 1 million in 2008), the Caribbean Community and Common Market (EUR 1 million in 2007 and EUR 1 million in 2008) and the Alliance of Small Island States (EUR 1 million in 2007).

Greece's support of the Millennium Development Goals included EUR 11.6 million from 2003 through 2005 for "*Ensuring Environmental Sustainability*" (the total Greek contribution to the MDG was EUR 238.4 million over the three-year period). Additional funding for environment-related support for developing countries is being provided through Greece's contributions to a variety of "sustainable development" initiatives (YPEHODE, 2007).

However, while the overall Greek development assistance has evolved rapidly over the past decade to become better planned, financed, co-ordinated and implemented, the *environmental component has not grown apace* Consideration should be given to establishing an environmental position within Hellenic Aid to help insure the effectiveness of investments in environment and natural resources management, and to assess on a continuing basis the environmental significance of projects carried out in other sectors. It would also seem timely to include YPEHODE as a regular member of the Inter-ministerial Committee for the Co-ordination of International Economic Affairs that approves and oversees the five-year development co-operation programmes. These steps become especially important as Greece attempts to respond to the 2006 recommendations of OECD/DAC, which emphasise the need for Greece to sharpen the focus of its development efforts with respect to both programme and country priorities (OECD, 2006).

3. Regional Issues

3.1 Marine pollution

Because of its shape and the very large number of islands, Greece's maritime waters extend over an area much larger than its land area. Greece has *a vital economic interest in protecting the quality of its coastal waters* and nearshore marine environment, and avoiding adverse effect of water quality degradation on tourism, commercial fisheries and aquaculture, and the recreational sports industry in offshore coastal areas. Consequently, it has put in place a framework of domestic legislation, institutions and programmes to prevent land-based pollution and manage ship-generated waste. Much of this framework is derived from EU legislation. Greece has also assumed obligations to prevent and address marine water pollution under a variety of *regional and global conventions and agreements* that cover nearshore coastal waters as well as territorial seas and beyond.

The state of coastal waters

The situation with respect to *water quality in coastal waters and enclosed gulfs* is overall good (Chapter 3). For instance, for 2007, Greece had *428* "*Blue Flag*"

beaches, awarded by the Foundation for Environmental Education for recreational beaches meeting stringent quality standards. This compares to 369 Blue Flag awards in 2000 and 373 in 2003. Substantial investments in wastewater treatment plants over the review period are reflected in improved water quality in some areas. Much of the Greek coastline (15 000 km long, with 3 000 islands) remains unaffected by major industrial and urban developments.

However, the continuing growth of tourism, industry and urban development in the coastal zone is *placing heavy pressures on water quality* in some nearshore waters and gulfs which are receiving sites for untreated or lightly treated municipal sewage, industrial waste and agricultural runoff (YPEHODE, 2006c) (Chapter 3). Bays near large population centers are experiencing episodes of eutrophication, and in some cases have "dead zones" with respect to aquatic life (Papathanasiou and Zenetos, 2005). In 2006, UNEP and the European Environment Agency reported that the Bay of Elefsis near Athens, with some 1000 industrial plants, including shipyards, iron and steel works and refineries nearby, was heavily polluted by heavy metals and other waste. The coastal water quality of the Saronikos Gulf started to improve following the operation of a new sewage treatment plant in Psytaleia (secondary treatment since 2004, over 95% cleaning capacity). To the north in Thessaloniki, high levels of heavy metals from tanneries and agricultural chemicals have been detected in the coastal waters near Pera and Michaniona. Other important pollution hotspots along the Greek coast occur in Pagasitikos Gulf (Volos), Amvrakikos Gulf (Preveza), Argolikos Gulf (Argos), Patra and Irakleio, and the Lagoon of Messolongi. In Greek ports, and farther offshore, especially in the Aegean Sea, bilge water, sewage and oily discharges from a *growing volume of shipping traffic* between the Mediterranean and the Black Seas are adding to the country's marine water quality challenge. Over 60 000 merchant ships, including 6 000 fuel tankers carrying over 100 million tons of petroleum, pass through the sea each year. And there are some 30 000 pleasure boats, motor yachts, small cruisers and other craft sailing the waters of the Aegean.

The Marine Environment Protection Directorate of the Ministry of Mercantile Marine, Aegean and Island Policy reported that in 2005 there were 249 *pollution incidents in Greek waters* resulting in administrative sanctions and fines. In 119 cases (47%), the waste came from ships while the remainder was land-based. Incidents involving sewage discharges dominated, followed by debris releases (33%) and oily mixtures (20%). Over the period 2000-05, the number of administrative sanctions has averaged 332, with the average fine being EUR 2 658. The number of yearly incidents as far back as 1981 ranged between 505 in 1995 and 145 in 2004, with no clear trend.

Land-based sources

Much of the effort to prevent and address marine pollution has been driven by national legislation concerning water pollution in general. Greece has transposed *the EU legislation relevant to marine pollution* into its national legal system.[22] While ensuring compliance with laws and regulations by the thousands of industrial facilities, ship owners, local communities and individual citizens who contribute to the marine pollution problem remains a challenge, Greece has developed massively its wastewater treatment infrastructure, during the review period, with large financial support from the EU (Chapters 3 and 5). In 2003, via the passage of Law 3199/2003 on Water Protection and the Sustainable Management of the Water Resources, Greece adopted the EU "Water Framework Directive" (WFD). The WFD has since stimulated a rethinking in Greece of its long-term approach to the management of both fresh and marine waters, with a significant restructuring of institutional relationships, programme priorities and investment. In addition, a 2007 Marine Strategy Directive requires member states to assess the environmental status of their waters (based on targets and indicators they must establish), determine the "good environmental status" (based on assigned criteria), and develop a programme of measures to achieve it by 2015.

Recognising spatial planning challenges, in 2006, Greece launched four policy studies with the *goal of establishing spatial plans* with objectives and targets for integrated coastal zone management at the national level and also with respect to industry, renewable energy and tourism. Such spatial planning efforts should also bring important improvements in coastal water quality management in the medium term (Chapter 7).

Greece's international obligations to protect water quality in the marine environment extend to numerous *multilateral agreements*, *e.g.* the Law of the Sea Convention, the Barcelona Convention on Protection of the Mediterranean Sea against Pollution, the London Dumping Convention, and various IMO accords, including the Convention on Control of Harmful Anti-fouling Systems on Ships. Greece has always been deeply involved in activities relating to the 1976 Barcelona Convention (amended in 1995). Greece played an important role in the development of the 1996 Protocol on Land-Based Sources of Pollution. The Co-ordination Unit of the *UNEP Mediterranean Action Programme (MAP)* is located in Athens, with the Greek government providing financial and logistical support. Under a new MAP Strategic Action Programme to Address Pollution from Land-Based Activities (SAP/MED), plans and targets for reducing the impact of pollution from the land by 2025 have been approved by Greece and the other participating states. Greece has also been active in supporting the Programme for the Assessment and Control of Marine Pollution in the Mediterranean Region (MED POL), which serves as the science and technical component of the MAP. However, Greece has not ratified a number of legal instruments under the Barcelona Convention.[23]

Within the framework of the *Euro-Med process* ("Barcelona Process"),[24] Greece has been active and remains engaged in several environmental co-operative projects, including initiatives on marine pollution control for the Mediterranean Sea. In 2005, "Horizon 2020" was launched, with Greece and the other partners agreeing to co-operate to depollute the Mediterranean by 2020, drawing on core EU funding to support the venture. The Union for the Mediterranean (launched in July 2008) builds on the Barcelona process, extends co-operation between the EU countries and Mediterranean countries, and includes the depollution of the Mediterranean as one of its 6 priority action projects. Greece submitted a project proposal (officially incorporated in the framework of the Union) aiming to support a multistakeholder co-operation for the promotion of sustainable development in the Mediterranean with emphasis on water. The ultimate goal is the elaboration of the new Mediterranean Water Strategy, as agreed by the Euro-Med Water Ministers.

Oil Pollution

Given the *large number of oil tankers transiting Greek territorial waters* and docking at Greek port terminals, the threat of small and large oil spills is always present. The flows and routes of oil tankers through the Aegean Sea are changing with the opening in 2005 of the Baku-Tbilisi-Ceyhan pipeline, and with the opening in the near future of the Russian-Bulgarian-Greek oil pipeline from the Bulgarian Black Sea port of Burgas to northeastern Greece.

Greece has a *good record in preventing and responding to marine oil spills*. Over the past 15 years, there have been less than 15 accidents in the Aegean and Ionian Seas. Since 2000 there have been only two large-scale spill incidents: 500 tonnes of fuel oil/diesel oil leaked from a storage facility in Lefkandi, central Greece; 300 tonnes of fuel leaked from a tanker that sank in the Aegean Sea after hitting a reef. The latter contaminated the coastline of the Island of Santorini, and led to a EUR 1.17 million fine for the ship owner. However, of the some 100 000 tons of petroleum that are estimated to end up in Greek waters each year (and 635 000 throughout the Mediterranean Sea), only about half (55 000 tons) are estimated to be the result of accidents. Satellite images of the Aegean over the past four years have shown 579 oil slicks (about 12 a month).

In 2006, Greece played a lead role in the mobilisation of an *international effort to assist Lebanon* deal with a 15 000 tonne oil spill from a power utility damaged during warfare which contaminated 150 km of the coast. Officials and experts of the UNEP, the IMO, the European Commission and the countries in the Mediterranean region, meeting in Athens, agreed on the International Assistance Action Plan to deal with the situation, involving aerial surveys and provision of clean-up equipment and services.

Greece has in place an *impressive array of policies, institutions and technological capabilities* for preventing and responding to marine oil pollution. Under a National Contingency Plan, responsibility for marine pollution response lies with the Marine Environment Protection Directorate (MEPD) of the Ministry of Mercantile Marine, Aegean and Island Policy.[25] Spill cleanup activities are carried out by the relevant authorities with their own equipment and/or private resources contracted directly by the involved ship owner. Shoreline cleanup is normally undertaken by either the municipal authorities or by contractors, or a combination, supplemented by MEPD resources if required. In the case of spills of unknown origin, cleanup is undertaken by the Coast Guard. The Greek contingency plan specifies mechanical recovery as the primary response option. Chemical dispersant use is permitted only in high seas outside enclosed and sensitive sea areas, when weather and sea conditions make mechanical recovery impossible. Eleven Hellenic Coast Guard special ships are in operation with capabilities for containing spills and for spreading absorbing materials.

The issue of the appropriate *sanctions and penalties for oil spill damage* has been controversial in Greece. Greece opposed the approval of the EU legislation to establish criminal sanctions in the case of major pollution incidents.[26] Greece's position has been that the provisions of the EU directive go beyond other existing international commitments, and could prove highly detrimental to commercial shipping competition, representing a potential incentive to "flagging out".

Greece ratified three 1992 *IMO conventions on liability and compensation* for oil pollution damage caused by oil spills from tankers: the Civil Liability Convention, the Fund Convention, and the Supplementary Fund Convention. Under this regime, the ship owner is liable for compensation up to a certain limit for oil spill damage. If this is not sufficient for clean up costs, further compensation is available from the Fund, if the damage occurs in a State which is a member of the Fund.

Greece is a party to a variety of *other international treaties* which address marine oil pollution: the 1972 London Convention on the Prevention of Marine Pollution by Dumping of Waste and Other Matter; the 1990 Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC); the 1976 Barcelona Convention and its Prevention and Emergency Protocol; the 2001 Convention on Civil Liability for Bunker Oil Pollution Damage.

3.2 Maritime transport

The sector

The *Greek-owned merchant fleet* is one of the largest in the world, and shipping is one of the most productive and dynamic sectors of the Greek economy. In 2007, the

Greek-owned fleet (operating with a Greek flag or not) numbered 3 699 ships with a tonnage capacity of over 218 million dead weight tons (dtw). This represented 8.5% of the world fleet, and 16.5% of total world tonnage. The Greek-owned fleet flying the Greek flag (for ships of 300 gross tonnage and above) numbered 1 158, with a tonnage capacity of 55.4 million dwt. This placed the Greek-flagged merchant fleet third in the world (behind Panama and Liberia on a dwt basis), comprising more than 50% of the total EU commercial fleet. As the result of new constructions, the average age of Greek-owned vessels tends to decrease (14.3 years in 2006).

Maritime transport makes a *substantial contribution to the Greek economy*. Net revenue from sea transportation accounts for 4.23% of GDP, and foreign exchange inflows from the shipping industry amounted to some USD 15 billion in 2006, an increase of 75% since 2000. The industry also provides direct employment for 30 000 Greek seafarers, with some 150 000 land-based workers serving the maritime enterprises and associated industries.

The *Greek shipping industry* is well-organised and influential, both domestically and internationally, commensurate with its economic importance. The Hellenic Chamber of Shipping, the world's largest association of ship owners, is the industry's official advisor to the government on all shipping matters. It works with the Ministry of Mercantile Marine, Aegean and Island Policy, representing the views of an array of Greek ship owners unions.

The Greek Government and the Greek shipping industry have demonstrated a *strong commitment to attaining a high quality of worldwide shipping*. This includes both the safety of the seamen and the prevention of water pollution from port operations and accidents at sea. As early as 1982, Greek ship owners set up a non governmental organisation, the *Hellenic Marine Environment Protection Association*, to protect the seas from ship-generated pollution through information, training and public education. Significantly, Greek-flagged vessels have been included in the "White List" of the IMO for five straight years, indicating full compliance with the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers.

Institutional arrangements

The Government's focal point for maritime transport is the *Ministry of Mercantile Marine, Aegean and Island Policy* and the associated *Hellenic Coast Guard*, which is responsible for the organisation, improvement and development of shipping (including protection of human life and property, search and rescue, safety of navigation, and protection of the marine environment). Four out of the 27 directorates in the Ministry deal solely with the safety of navigation and marine environmental protection.[27]

The Ministry of Mercantile Marine, Aegean and Island Policy administers seven *Regional Offices*, 50 *Port Authorities*, and a system of *Merchant Marine Academies* established in Greece to supply the industry with skilled, qualified seafarers. The Academies stress in both theoretical and practical training the essentiality of maritime safety and sound environmental management, in part because of the large economic costs associated with accidents at sea. Some 1 500 students attended the academies during the 2004-05 academic year.

Greece also has a unique system of *maritime attaches assigned to Greek embassies and consulates* in major port cities around the world. Their mission, beyond assisting Greek seafarers abroad, is to perform inspections of Greek-flagged vessels to ensure their compliance with national and international legislation related to safety of navigation and protection of the marine environment.

International co-operation

At the multilateral level, Greece has been a supporter of the *International Maritime Organisation (IMO)* which it recognises as the international body with exclusive competence on matters related to the safety of navigation and protection of the marine environment. Greece is a contracting party to most of the IMO's extensive list of conventions and protocols, including the International Convention for the Prevention of Pollution from Ships (MARPOL) 1973/78, the 1974 Convention on Safety of Life at Sea, and the 1976 Convention on Limitation of Liability for Maritime Claims (LLMC). In 2005, Greece contributed 4.71% of the IMO budget based on the tonnage of member state fleets. Greece is among the very few maritime countries that have not ratified the 1969 Convention on Intervention on the High Seas, in case of oil pollution casualties, nor its 1973 Protocol concerning substances other than oil.

Overall, Greece has exhibited a strong *commitment to sound environmental management in the maritime transport sector*. During the 1999-2007 period, both the Government's and the shipping industry's capabilities to protect life and property at sea, and to reduce the risk of marine pollution, have been strengthened through expanded training, contingency planning and investment in new technologies for monitoring, surveillance and pollution control. Greece's maritime industry has shown less enthusiasm for the ongoing effort by the IMO, the European Commission and the International Labor Organisation to develop the convention on the recycling and dismantling of end-of-life vessels.

A *continuing challenge facing the maritime industry*, however, is the ease with which its ship owners can spread their activities to other parts of the world (through different registries, headquarters and company holdings), selecting countries that facilitate increasing profits while minimising running and maintenance costs,

including environmental and safety compliance. In the case of Greece, of the 3 699 Greek-owned ships in 2007, more than half carried flags of other countries (*e.g.* Panama, 583 ships; Liberia, 361; Bahamas, 298; Marshal Islands, 281; Isle of Man, 63), placing them outside direct environment and safety Greek regulations. Greece is pursuing its efforts within the IMO framework to achieve international standards applicable to all ships regardless of their flags.

3.3 Marine fisheries

The sector

In Greece, only the population of a small region in the northwestern portion of the mainland is more than 80 km from the sea. Historically, many local communities are dependent on the harvest of the seas for employment and for food. On a national scale, however, *marine fisheries and associated industries* represent a relatively small percentage of the country's economic production. Fishery products in 2005 represented 0.2% of GDP; and just over 39 000 people were employed in the marine fisheries sector.

The Greek *fishing fleet* is large and characterised by a preponderance of small-scale coastal vessels. Of the some 18 000 total units, 17 000 are smaller than 12 meters. While Greek ships constitute 20% of the EU Community fleet, they account for just 5% of the tonnage and 8% of the power. Most are older vessels: 71% are more than 20 years old with one-half of the vessels more than 25 years of age. As with virtually all EU25 countries, the size of the fleet has been decreasing since 2002 as the result of the EU's Common Fisheries Policy which is seeking to achieve sustainable fisheries in the waters of member states in the face of heavy pressures on diminishing fish stocks. For example, in 1998 Greece's fishing fleet numbered over 20 000 vessels.

Fisheries in Greek waters are multispecies targeting demersal and pelagic fish stocks. The demersal species (hake, red mullet, shrimp) are caught mainly by trawlers, while small pelagics (sardines, anchovy, Mediterranean horse mackerel) are taken by purse seiners. Among the highly migratory species (tuna and tuna-like species), the main commercially valuable species are bluefin tuna, swordfish and albacore. One-half of the domestic fisheries production consists of small pelagics. Well over 90% of the *Greek catch* comes from the Mediterranean (73 220 tonnes live weight (tlw) in 2004), with just under 2000 tlw taken from the Eastern Central Atlantic Region, and some 3 000 tlw from Greece's inland waters. Greece has access to fishing rights in Senegal, Guinea Conakry and Guinea Bissau through the EU's Third Country Agreements. Overall catch fell from 132 381 tlw in 1990 to 75 217 tlw

in 2004. A similar trend is observed across the EU25 countries (EC-Eurostat, 2005). Despite its fishing legacy and commitment, Greece has been running a national deficit of fish products.

A rapidly growing *marine (and freshwater) aquaculture* industry has been able to compensate for the fall in capture fisheries. Although Greece has had a long tradition of aquaculture activities, the industry was energised after 1985 by EU fisheries policy and financial support, increased demand for fresh fish products, improved technology for fish culture and decreasing catches from marine capture fisheries. Between 1990 and 2004, Greece's aquaculture production rose tenfold, from 9 523 tlw to 96 752 twl. In 2006, aquaculture accounted for close to 60% of total production of all fish products (sea bass and gilt head bream being the most important species, followed by shellfish). All farming of fish and shellfish operations in Greece requires approval by an array of ministries, an Environmental Impact Assessment that is submitted to YPEHODE, and a license from a Regional Fisheries Authority. A system of limited entry for new applicants is in place to control production and to support the overall policy objective of achieving a balance between environmental and health concerns, and economic benefits (OECD, 2008). One important benefit of the mariculture effort has been the new employment and income generated in previously uninhabited island areas normally excluded from commercial activities.

Fisheries management

Greece's overall fisheries policy is based on *sustainable management objectives* which emphasise rational exploitation of fisheries resources and the protection of vulnerable areas and species that are overexploited. In support of these objectives, Greece has been an active participant in fisheries-related activities of the Food and Agriculture Organization, and has ratified a variety of multilateral conventions and agreements that address fisheries management issues. Greece ratified the 1982 *Law of the Sea Convention* (LOS) in 1995.

Greece's legal framework for fisheries management is heavily influenced by, and linked to, the EU's *Common Fisheries Policy (CFP)* which establishes catch quotas for EU member states for each type of fish, and supports the fishing industry by various market interventions.[28] Besides the Community law, there is a variety of *Greek national measures* aimed at regulating the fishing effort, backed by technical regulations. These address minimum landing size of commercial species, mesh size regulations, closed areas and seasons, minimum depths and distances from shore for fishing, and penalties for infringements. Particular attention has been given in recent years to the environmental aspects of the aquaculture industry, both to ensure the quality of the product and to maintain high water standards in the coastal waters.

The *Ministry of Rural Development and Food*, General Directorate for Fisheries, is responsible for exercising fisheries policy at the national level. This involves implementing the rules of the EU CFP by issuing regulatory measures for fisheries in Greek territorial waters, and developing and managing the aquaculture sector. The *Ministry of Mercantile Marine, Aegean and Island Policy*'s Directorate of Port Police, along with local port offices and the Fisheries Divisions of Prefectures, implements the provisions of the fishing legislation (community and national) and, in the case of infringements, imposes administrative penalties (fines, temporary withdrawal of vessels and licenses). Responsibility for the inspection of the market for fisheries products is vested in the *Ministry of Commerce*. Participation of the fishing industry stakeholders in the design, examination and introduction of new fisheries legislation is arranged through a *Fisheries Council* that also includes representatives of the central administration and research institutions.

Greece has done a *good job overall* in pursuing its fisheries management objectives. EU directives and regulations within the framework of the CFP have been transposed rapidly into Greek law. Catches of large pelagics, including bluefin tuna, are well monitored as they are the only species being captured by Greek fishermen which have fallen under CFP quotas. Inspection and enforcement efforts have been stepped up in recent years, supported by heavier penalties for infractions: 1 518 infringements and EUR 794 959 in administrative penalties paid for 2005.

There is however room for improvement. *Priorities for Greece should include*: tight government oversight and management of the rapidly expanding aquaculture industry to control water pollution, protect food safety and avoid incursions into wildlife habitats and other sensitive areas; strengthening inspection and monitoring programmes (*e.g.* through better collection of landings data and electronic recording of catch declarations); extending bilateral and regional co-operation to achieve sustainable fisheries in the Mediterranean region.

3.4 Transboundary water management

Greece has a special interest and major challenge with respect to transboundary water management. Four *transboundary rivers* are of particular importance to Greece: the Axios River that rises in the FYROM; the Nestos and Strimonas Rivers originating in Bulgaria, and the Evros that rises in Bulgaria and then forms the boundary between Greece and Turkeys as it flows south into the Aegean Sea. In total, these four rivers provide approximately one-fourth of the total mean surface runoff of Greece's mainland rivers. In addition, Greece is the upstream riparian on one major river, the Aoos which flows into Albania. As the downstream riparian on four of its major rivers, the quantity and quality of the water that supports large segments of

Greek agriculture, industry and urban populations are highly dependent upon actions and conditions in the upstream states of Bulgaria, the FYROM, and Turkey.

Further, until Bulgaria joined the EU in 2007, none of these neighbouring countries has had to assume the same obligations as Greece under EU directives and regulations, which call for co-operation and action by European countries to avoid and mitigate conflicts over transboundary water resources. Notable among them is the EU Water Framework Directive (2000/60) which seeks to promote integrated river basin planning and management throughout Europe.[29] *Co-operation among the riparians* has been reasonably good over the past decade, especially on flood control issues; however, it needs further improvement, in line with the requirements of the Directive 2007/60/EC on the assessment and management of flood risks. A number of institutional arrangements, agreements and programmes are in place to address transboundary water issues, including joint monitoring and early warning systems, river basin characterisation, water quality assessment and transfer of experience. However, integrated management plans do not exist for any of the watersheds that cross national boundaries, and disputes over water flows and quality issues arise from time to time.

Greece also shares several *large lakes* with neighbouring states, in particular Mikri Prespa Lake and Megali Prespa Lake which also border Albania and the FYROM, and Doirani Lake between Greece and the FYROM. These lakes, along with the deltas created by the outflow of the aforementioned transboundary rivers into the Aegean Sea, are important sites for wildlife and tourism.

Greece *ratified three UNECE conventions* which promote co-operation on transboundary water issues: the Convention on Transboundary Effects of Industrial Accidents; the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (including its Protocol on Civil Liability and Compensation for Damage); and the Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention). Greece has ratified the latter but not its 2003 Protocol on Strategic Environmental Assessment.

Since 2003, Greece also participates in the "*Petersberg-Athens Declaration Process*" together with the Government of Germany, the Global Environment Facility and the World Bank. The Process aims to promote and facilitate capacity building for water decision-makers of south-east European countries, towards implementation of the integrated water resource management principles, at national and transboundary levels.

Evros (Maritsa)

The 480 km Evros River (Meric in Turkey and Maritsa in Bulgaria), the longest river in the Balkans, has a long history of severe flooding. *Water quality* has become a

recent concern due to increasing concentrations of agricultural, industrial and urban waste as the river flows from Bulgaria and Turkey into northeastern Greece. A *bilateral agreement between Greece and Bulgaria* on joint management of water flows and on exchange of hydrological and technical data extends back to 1964; and a 1971 Agreement established a Greek-Bulgarian Committee to address electricity generation issues and other uses of the Evros waters. Periodic meetings of experts and technical co-operation on flood control and water quality monitoring have taken place over the past decade. Discussions have been proceeding on the development of a real-time early warning system for flood events.

A 2001 environmental Memorandum of Understanding provides a possible mechanism for *co-operation with Turkey* on Evros water management. To date, however, Greece-Turkey technical consultations (*e.g.* on control of organic pollution) have been limited, usually restricted to non-governmental experts, and largely inconclusive. Tripartite meetings have been sponsored by UNESCO's Man and the Biosphere Programme to consider the establishment of a Transboundary Biosphere Reserve along the Evros Delta which is shared by Greece and Turkey and collects fresh water from Bulgaria.

Axios (Vardar)

The Axios River is the longest in the FYROM (389 km, with 87 km in Greek territory). It is a *major source of irrigation water* for the fertile plain of Thessaloniki, and nourishes a rich delta (and Ramsar site) before discharging into the Bay of Thermaikos and the Aegean Sea. Pollution from urban wastewater and industry (*e.g.* tanneries, lead factories) in the FYROM has been increasing. In recent years the flow rate into Greece has been reduced due to new retention reservoirs and irrigation works in the upstream country.

No co-operative agreement for water sharing exists, but the two riparians have been discussing the creation of a Joint Commission for river basin management that would take into account the latest developments in international law and European legislation on transboundary issues. The EU has promoted joint management of the Axios through its Cross-Border Co-operation Programme for FYROM/Greece, with funding since 1997 for automated pollution monitoring and infrastructure development. Under an OECD/DAC project (2001-02), YPEHODE was assisted with "Transboundary Co-operation and Management of the Axios River".

Nestos (Mesta) and Strymonas (Struma)

Co-operation with Bulgaria on management of the Nestos River (230 km, with 130 km in Greece) and the Strymonas River (290 km, with 118 km in Greece) dates

back to a 1964 agreement under which the countries are bound, *inter alia*, not to cause significant damage to each other arising from the construction and operation of projects and installations on their transboundary rivers, as well as to exchange hydrological and technical data. The focus has been largely on flow control, with Greece needing assured volumes for irrigation and the operation of hydroelectric plants. In 1991, a Joint Greece-Bulgaria Committee of Experts prepared a proposal to the EU for the monitoring and control of water quality on the Nestos and Strymonas (as well as the Evros). The two riparians subsequently agreed in 1995 on a sharing of Nestos water flows, with Greece guaranteed that 29% would reach its border. Water monitoring stations were later installed on both sides of the border, with the EU providing funds to help Bulgaria to install equipment and to build a secondary treatment plant for municipal wastewater. Greece provided technical assistance to help harmonise co-operation on measuring stations.

While *water quality* in the two rivers has historically been rated as moderate to good, Greece has expressed concern about growing deterioration, particularly of the Nestos, from industrial and agricultural activities in Bulgaria, and has been pressing for a new agreement to deal with this. Greece is also concerned about Bulgaria's *growing withdrawals of Nestos River water* to meet its own requirements for agricultural, industrial and urban development. The resulting reduced flows to the south have prompted Greek objections. Since a large part of the Nestos watershed in Greece is a designated NATURA 2000 site, all planning and decision-making on water management should be carried out according to relevant national and EU legislation. Bulgaria's recent entry to the EU may facilitate preparation of much-needed integrated management plans for both the Nestos and Strymonas watersheds.

Aoos (Vjosa)

An agreement between Greece and Albania on management of the northward-flowing Aoos River was concluded in 2003 and entered into force in 2005. Based on a Greek initiative, the agreement established a *Permanent Greek-Albanian Commission on transboundary water issues* and provided for specific tasks to be undertaken, including the definition of joint water quality objectives and criteria, the proposal of appropriate measures, and the organisation of national networks for water quality monitoring.

Transboundary Lakes

In 2000, the Prime Ministers of the riparian states of Greece, Albania and the FYROM adopted the "Declaration on the Creation of Prespa Park and the Environmental Protection and Sustainable Development of the *Prespa Lakes* and their Surroundings", thereby establishing the *first transboundary protected area in South-Eastern Europe*. The

Declaration created a 10-member Prespa Park Co-ordination Committee (PPCC) with representatives from government, local communities and NGOs from each of the countries, as well as a representative of the international Ramsar/MedWet (Mediterranean Wetlands) system. The PPCC is responsible for guiding measures, activities and projects carried out in the Prespa region. A Management Body for the Greek area of the Prespa basin was established by law in 2002. The Prespa region is expected to be declared a National Park in early 2009.

In 2001, Greek and FYROM officials, meeting under the auspices of the Ramsar Agreement and the MedWet programme, agreed to co-operate to protect transboundary *Lake Doirani* from the heavy pressures this uniquely rich and heretofore pristine water body was experiencing. In 2002, the FYROM opened a new aquaduct-based system to refill Lake Doirani which had been losing water, and appealed to the Greek Government to take corrective action to prevent Greek farmers from overexploiting water resource. A project implemented within the framework of OECD's Development Assistance Committee aims at identifying restoration measures for Lake Doirani as well as strengthening co-operation between Greece and the FYROM for its long-term management.

3.5 Transboundary air pollution

Transboundary air pollution has not been a priority concern for Greece. Greece follows, however, *its international obligations* to monitor, report on and mitigate transboundary air pollution under UNECE conventions and protocols, and also as a member state of the European Union.

In 1983 Greece ratified the 1979 *UNECE Convention on Long Range Transboundary Air Pollution (LRTAP)*, and in 1988 acceded to its Protocol on a Co-operative Programme for Monitoring and Evaluation of Long-range Transmission of Air Pollution in Europe (EMEP). It has also been a party to LRTAP protocols on both sulfur and nitrogen oxides (Oslo and Sofia Protocols), and has signed but not yet ratified associated protocols on volatile organic compounds, heavy metals and persistent organic pollutants (POPs) as well as the 1999 Gothenburg Protocol on acidification, eutrophication and ground-level ozone (although ratification of all of these instruments appears to be imminent). Each of the LRTAP protocols (with the exception of the EMEP agreement) sets out specific quantitative pollution reduction targets.

While Greece has met its obligations under the 1994 Sulfur Protocol, it has been consistently judged by the Convention's Implementation Committee as being non-compliant with the NO_x Protocol (*i.e.* failing to ensure that its NO_x emissions do not exceed 1987 levels: 285 kt). Under both the *Gothenburg Protocol* and the *EU*

National Emissions Ceilings Directive, Greece had already met its 2010 target (344 kt) in 2006, given its reported emissions of 315 kt. However, Greek emission of SO_2 and VOC remains above their 2010 targets (523 kt/year and 262 kt/year) (Chapter 2). The full operation of two desulphurisation units at the power plant of Megalopolis, which is the main SO_2 emitter, is expected to significantly lower the overall emissions.

Greece has not been a major contributor to the *work of the LRTAP Convention* overall, but has participated in some of the technical and scientific studies (*e.g.* International Cooperative Programmes on Vegetation and on Forests), and

Table 8.3 **SO_x and NO_x deposition,**[a] 2005 and 2006

(100 tonnes)

Greece as	SO_x				NO_x			
	receiver		emitter		receiver		emitter	
	2005	2006	2005	2006	2005	2006	2005	2006
Albania	7	5	124	141	4	3	32	29
Bosnia-Herzegova	22	17	8	5	2	2	4	3
Bulgaria	320	414	89	66	47	55	38	31
FYROM	33	38	62	71	6	5	25	21
Italy	20	9	36	29	31	30	15	21
Poland	15	12	8	3	8	10	3	2
Romania	46	59	60	43	17	19	24	18
Russian Federation	15	10	61	59	15	18	19	18
Spain	7	5	1	0	6	6	0	1
Serbia	25	37	30	39	9	4	14	13
Turkey	39	37	135	86	21	24	47	37
Ukraine	38	47	61	52	24	14	21	20
Subtotal	587[b]	690[b]	675[c]	594[c]	190[b]	190[b]	242[c]	214[c]
Mediterranean Sea	95	88	806	933	94	89	315	332
North Africa	10	7	61	56	1	1	68	78
Greece	463[d]	556[d]	463[d]	556[d]	119[d]	104[d]	119[d]	104[d]

a) Only Emissions to and from selected countries are shown.
b) Quantity deposited in Greece as a result of emissions in other countries.
c) Quantity deposited in other countries as the result of Greek emissions.
d) Quantity deposited in Greece as a result of emissions in Greece.
Source: UNECE, EMEP.

continues to provide financial support for the EMEP programme. It also missed its last 5-year deadline for providing data to the Convention Secretariat, but intends to provide it for the next report of the parties.

Consequent to SO_x and NO_x emissions, the major percusors of acid rain, air pollutants cross Greek international boundaries (Table 8.3). On balance, Greece is a *net exporter* of these two pollutants to many of the other listed countries, including Albania, FYROM, Italy and Turkey. On the other hand, Greece is a *net importer* of significant levels of SO_x from Bulgaria. Overall, some 70% of the SO_x produced in Greece and 20% of the NO_x are carried by air currents out of Greece, depositing in other countries and (especially) the Mediterranean Sea (EMEP, 2008).

Notes

1. General Directorate for International Development Co-operation of the Ministry of Foreign Affairs.
2. Footnote by Turkey: "The information in this document with reference to 'Cyprus' relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognizes the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of United Nations, Turkey shall preserve its position concerning the 'Cyprus' issue".

   Footnote by all the European Union member States of the OECD and the European Commission: "The Republic of Cyprus is recognized by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus".
3. See previous footnote.
4. See previous footnote.
5. *E.g.* the EU regulation on genetically modified organisms and the directive on geological carbon capture and storage.
6. Recent projects have involved studies of food chains in the Aegean Sea, the effects of trawling on the environment and productivity of fishing grounds, and a review of environmental projects in the Caspian Sea. The National Technical University of Athens hosted a meeting in January 2007 on "Recent developments on contaminated land in Greece" in support of a long-range CCMS pilot study of contaminated lands.
7. *I.e.* biodiversity, climate change, international waters, ozone depletion, land degradation/ desertification and persistent organic pollutants.
8. The "climate and energy package" calls for: *i)* renewable sources to account for 20% of EU final energy consumption by 2020; *ii)* a 20% reduction of overall energy consumption by 2020; *iii)* renewable fuels to constitute 10% of transport fuel consumption by 2020.
9. YPEHODE's ministerial memorandum "Structure and operation of the national greenhouse gases inventory system, roles and responsibilities".
10. The First National Climate Change Programme was adopted in 1995.
11. Ten EU members are using, or plan to use, these mechanisms to help achieve their Kyoto and EU targets.
12. This concern was raised by the IEA 2006 Energy Review of Greece.
13. EU Regulation 2037/2000 required removal of all halon systems in merchant fleets by the end of 2003, a phase-out that Greece has not yet completed.
14. The Regulation replaces earlier (1984) EU legislation on trade in endangered species, in part to erect stricter controls at the Community's external borders, given the abolition of internal border controls.
15. Under EU Directive 96/59, all PCB-containing devices are to be destroyed by 2010, except for those with low PCB content and which should be destroyed at the end of their life.

16. Regulation (EC) 1013/2006 on shipments of waste as amended in 2007 and in 2008. The WSR is supplemented by Regulation EC/1418/2007 as amended by Regulation (EC) 740/2008 regarding shipments of "green-listed" non-hazardous waste to non-OECD countries.

17. Shipbreaking is a profitable undertaking since about 95% of the material, scrap steel and equipment, can be reused. With 700 large vessels needing to be scrapped annually, not including military vessels, profits are estimated to exceed EUR 12 billion. In India, shipbreaking is reported to account for 250 000 jobs.

18. In the year 2008, 22 of the 30 OECD member countries were member of DAC.

19. Afghanistan, Albania, Armenia, Azerbaijan, Herzegovina, Egypt, Eritrea, Ethiopia, FYROM, Georgia, Iraq, Jordan, Lebanon, Moldavia, Palestine Administered Areas, Serbia-Montenegro, South Africa, Sri Lanka, Sudan, Syria and Turkey.

20. An exemple is provided by an OECD review of the environmental information systems of Bulgaria, funded by Greece, and its use as the basis of an international seminar on "Environmental information systems in south-east Europe and Black Sea countries" (Athens, December 2001).

21. The GEF was established in 1991 to assist developing countries and economies in transition in implementing key international environmental conventions, *i.e.* biodiversity, climate change, international waters, ozone depletion, land degradation/desertification and persistent organic pollutants.

22. Including Directives on Integrated Pollution Prevention and Control, Nitrates, Urban Waste Water Treatment, Shellfish Waters, Dangerous Substances, Bathing Waters, and Port Reception Facilities for Ship-Generated Waste and Cargo Residues in Ports.

23. Protocols on Dumping from Ships, Aircrafts, or Incineration at Sea (Barcelona, 1995), on Specially Protected Areas and Biological Diversity (Monaco, 1996), on Pollution from Exploitation of Continental Shelf and the Seabed and its Subsoil (Madrid, 1994), on Pollution by Transboundary Movements of Hazardous Waste and their Disposal (Izmir, 1996).

24. Partnership launched in 1995 between the European Union and 12 countries of the Mediterranean Sea to address political, economic, social and other challenges in the Mediterranean region.

25. For small spills, the response is co-oordinated locally by one of the 50 Port Authorities. For larger spills, Fifteen Regional Marine Pollution Combating Stations are located in major ports to assist local Port Authorities. For major spills, the response is co-ordinated by the MEPD.

26. Directive 2005/35/EC on ship-source pollution and on the introduction of penalties for infringements, and Council Framework Decision 2005/667/JHA to strengthen the criminal-law framework for the enforcement of the law against ship-source pollution. The Council Decision establishes prison terms for up to 10 years and fines of up to EUR 1.5 million.

27. The Safety of Navigation Directorate works to harmonise Greek legislation with international standards, conducts maritime search and rescue operations, and co-ordinates the inspection of foreign-flag ships calling at Greek ports. The Safety and Security Management of Ships and Ports Directorate applies new security standards and requirements for ships and port facilities based on amendments to the IMO Safety of Life at Sea Convention (SOLAS 974) codes. It also authorises other institutions to perform inspection and certification of ships and shipping companies. The Ships Inspection Directorate, with branches covering all Greek ports, ensures proper enforcement of international and national regulations related to maritime safety. The Marine Environment Protection Directorate is the Ministry's focal point for protection of the

marine environment and response to marine pollution incidents (*e.g.* updating the legal framework for marine environmental protection). It works with key international organisations on preventing and managing marine pollution.

28. For example by: regulating the quality, grading, packaging and labelling of fish and fish products; encouraging the establishment of producer organisations to protect fishermen from sudden market volatility; establishing minimum fish prices and financing the buying up of unsold fish; and setting rules for trade with non-EU countries.
29. Central to the Water Framework Directive is the requirement for states to encourage involvement of all interested parties in the planning and execution of policies and programmes to address sustainable use, water quality, flood and drought impacts, and registration of habitats and species.

Selected Sources

The government documents, OECD documents and other documents used as sources for this chapter include the following. Also see list of Websites at the end of this report.

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REFERENCES

I.A Selected environmental data

I.B Selected economic data

I.C Selected social data

II.A Selected multilateral agreements (worldwide)

II.B Selected multilateral agreements (regional)

III. Abbreviations

IV. Physical context

V. Selected environmental Websites

I.A: SELECTED ENVIRONMENTAL DATA (1)

		CAN	MEX	USA	JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK
LAND												
Total area (1000 km^2)		9985	1964	9632	378	99	7741	268	84	31	79	43
Major protected areas (% of territorial area)	*2*	6.7	8.6	19.5	8.0	3.8	13.0	19.5	28.0	3.3	15.8	2.0
Nitrogenous fertiliser use (t/km^2 of agricultural land)		2.5	1.1	2.6	9.2	18.8	0.2	1.8	3.2	10.6	6.8	7.4
Pesticide use (t/km^2 of agricultural land)		0.06	0.04	0.07	1.16	1.27	-	0.03	0.10	0.50	0.11	0.12
Livestock densities (head of sheep eq./km^2 of agr. land)		174	217	168	706	1324	62	573	489	1635	267	869
FOREST												
Forest area (% of land area)		34.1	33.0	33.1	68.2	63.5	21.3	31.0	46.8	22.1	34.3	11.8
Use of forest resources (harvest/growth)		0.4	0.2	0.6	0.4	0.1	0.6	..	0.7	0.9	0.7	0.7
Tropical wood imports (USD/cap.)	*3*	1.6	0.2	2.1	10.7	6.1	4.0	3.4	0.4	24.2	0.3	3.8
THREATENED SPECIES												
Mammals (% of species known)		20.3	31.8	16.8	23.3	11.4	23.8	18.0	22.0	35.9	20.0	22.0
Birds (% of species known)		9.8	16.2	11.7	13.1	6.3	13.0	21.0	27.7	24.9	50.0	16.3
Fish (% of species known)		29.6	27.6	31.7	36.0	8.9	1.0	10.0	50.6	23.4	41.5	15.8
WATER												
Water withdrawal (% of gross annual availability)		1.5	16.4	19.2	19.7	40.3	4.8	1.2	4.5	32.4	12.1	4.2
Public waste water treatment (% of population served)		72	36	71	69	83	..	80	89	55	74	88
Fish catches (% of world catches)		1.2	1.4	5.2	4.5	1.8	0.2	0.6	-	-	-	1.0
AIR												
Emissions of sulphur oxides (kg/cap.)		63.9	25.8	44.8	5.9	8.5	123.2	20.3	3.2	13.8	21.4	4.0
(kg/1000 USD GDP)	*4*	2.1	2.9	1.2	0.2	0.4	4.2	0.9	0.1	0.5	1.2	0.1
% change (1990-2005)		-34	-3	-37	-24	-50	58	54	-64	-60	-88	-88
Emissions of nitrogen oxides (kg/cap.)		73.6	13.9	57.3	15.0	27.1	77.7	39.3	27.3	25.5	27.2	34.3
(kg/1000 USD GDP)	*4*	2.4	1.6	1.5	0.6	1.4	2.7	1.7	0.9	0.9	1.5	1.1
% change (1990-2005)		-1	14	-26	-6	50	25	58	7	-26	-63	-32
Emissions of carbon dioxide (t./cap.)	*5*	17.0	3.7	19.6	9.5	9.3	18.5	8.4	9.4	10.7	11.6	8.8
(t./1000 USD GDP)	*4*	0.55	0.40	0.53	0.35	0.47	0.63	0.37	0.31	0.38	0.64	0.29
% change (1990-2005)		28	33	20	15	98	45	63	34	3	-23	-6
WASTE GENERATED												
Industrial waste (kg/1000 USD GDP)	*4, 6*	..	..	..	40	40	20	10	..	50	30	10
Municipal waste (kg/cap.)	*7*	420	340	760	410	370	690	400	590	470	300	740
Nuclear waste (t./Mtoe of TPES)	*8*	6.2	0.1	1.0	1.5	3.2	-	-	-	2.0	1.7	-

.. not available. - nil or negligible.

1) Data refer to the latest available year. They include provisional figures and Secretariat estimates.
Partial totals are underlined. Varying definitions can limit comparability across countries.

2) IUCN management categories I-VI and protected areas without IUCN category assignment; national classifications may differ.

3) Total imports of cork and wood from non-OECD tropical countries.

4) GDP at 2000 prices and purchasing power parities.

Source: OECD Environmental Data Compendium.

OECD EPR / SECOND CYCLE

FIN	FRA	DEU	**GRC**	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	SLO	ESP	SWE	CHE	TUR	UKD*	OECD*
338	552	357	**132**	93	103	70	301	3	42	324	313	92	49	505	450	41	784	244	35096
8.2	11.8	55.7	**2.8**	8.9	5.6	0.5	12.5	17.0	15.6	4.6	28.1	4.9	25.2	7.7	9.2	28.7	3.9	18.3	12.4
7.0	7.5	10.5	**2.7**	5.8	0.6	8.1	4.2	-	13.4	10.0	6.3	2.3	4.6	3.3	5.1	3.6	3.3	5.9	2.2
0.07	0.24	0.19	**0.12**	0.17	-	0.07	0.55	-	0.55	0.07	0.10	0.44	0.15	0.14	0.07	0.09	0.04	*0.15*	*0.07*
334	485	635	**227**	169	54	1165	388	948	1859	862	342	413	241	312	378	772	233	*599*	188
73.9	28.3	31.8	**29.1**	22.1	0.5	9.7	33.9	33.9	10.8	30.8	30.0	41.3	40.1	35.9	67.1	30.5	13.2	11.8	31.0
0.7	0.6	0.5	**0.6**	0.5	-	0.7	0.5	0.5	0.6	0.5	0.6	0.8	0.5	0.5	0.7	0.8	0.5	0.6	0.6
1.4	6.8	1.8	**2.7**	0.1	2.8	11.2	7.2	-	15.6	3.6	0.3	17.6	0.1	6.2	2.2	0.6	0.5	2.7	4.0
10.8	19.0	37.9	**37.8**	37.8	-	1.8	40.7	51.6	18.6	13.7	13.5	26.2	21.7	13.3	18.3	32.9	14.3	*15.8*	..
13.3	19.2	27.3	**1.9**	14.5	44.0	5.4	18.4	23.1	21.6	16.1	7.8	38.1	14.0	26.9	17.5	36.4	3.7	*16.2*	..
11.8	36.1	68.2	**26.2**	43.2	-	23.1	35.1	27.9	22.1	9.4	21.0	62.9	24.1	51.4	10.9	38.9	11.1	*11.1*	..
2.1	18.2	18.9	**12.1**	4.8	0.1	2.3	44.0	3.3	11.5	0.6	18.3	12.0	0.9	34.3	1.5	4.7	19.1	*18.1*	*11.5*
81	80	93	**65**	60	57	70	69	95	99	77	61	65	56	92	86	97	42	*97*	*71*
0.1	0.6	0.3	**0.1**	-	1.7	0.3	0.3	-	0.5	2.6	0.2	0.2	-	0.9	0.3	-	0.5	0.7	25.3
16.0	7.6	6.8	**48.0**	12.8	27.5	14.1	7.1	6.2	3.8	5.2	33.2	20.7	16.5	28.9	4.4	2.3	26.9	11.7	25.7
0.5	0.3	0.3	**2.1**	0.8	0.8	0.4	0.3	0.1	0.1	0.1	2.7	1.1	1.2	1.3	0.1	0.1	3.4	0.4	1.0
-66	-65	-90	**14**	-87	12	-67	-77	-80	-67	-54	-61	-31	-84	-42	-63	-59	28	-81	-45
36.6	19.8	17.5	**28.3**	20.1	94.0	28.1	19.0	29.9	21.1	42.6	21.3	24.6	18.1	35.1	22.7	11.5	15.0	27.0	32.2
1.2	0.7	0.7	**1.2**	1.3	2.8	0.8	0.7	0.5	0.7	1.1	1.7	1.3	1.3	1.5	0.8	0.4	1.9	1.0	1.2
-35	-34	-50	**13**	-15	1	-4	-43	-39	-38	-7	-49	4	-55	22	-35	-47	66	-45	-22
10.6	6.4	9.9	**8.6**	5.7	7.5	10.6	7.7	24.6	11.2	8.0	7.8	6.0	7.1	7.9	5.6	6.0	3.0	8.8	11.1
0.36	0.23	0.38	**0.39**	0.37	0.22	0.31	0.30	0.42	0.38	0.20	0.62	0.32	0.52	0.34	0.19	0.19	0.39	0.31	0.43
1	9	-16	**36**	-18	16	42	14	8	16	29	-15	59	-33	65	-4	9	70	-5	16
110	50	20	**..**	30	10	40	20	30	40	20	120	50	130	30	110	-	30	30	50
490	520	570	**440**	470	530	800	550	700	620	800	260	470	280	600	500	700	430	590	560
1.9	4.2	1.2	**-**	1.7	-	-	-	-	0.1	-	-	-	3.0	1.2	4.1	1.9	-	1.0	1.5

UKD: pesticides and threatened species: Great Britain; water withdrawal and public waste water treatment plants: England and Wales.

5) CO_2 from energy use only; sectoral approach; international marine and aviation bunkers are excluded.
6) Waste from manufacturing industries.
7) CAN, NZL: household waste only.
8) Waste from spent fuel arising in nuclear power plants, in tonnes of heavy metal, per million tonnes of oil equivalent of total primary energy supply.

I.B: SELECTED ECONOMIC DATA (1)

		CAN	MEX	USA	JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK
GROSS DOMESTIC PRODUCT												
GDP, 2006 (billion USD at 2000 prices and PPPs)		1017	1028	11319	3537	1008	611	96	255	304	195	170
% change (1990-2006)		55.4	60.9	59.1	23.3	136.7	68.4	62.4	42.6	37.6	31.5	43.0
per capita, 2006 (1000 USD/cap.)		31.2	9.8	37.8	27.7	20.9	29.5	23.0	30.8	28.9	19.1	31.3
Exports, 2006 (% of GDP)		36.3	31.9	11.1	16.1	43.2	20.9	29.3	56.3	87.5	76.3	52.0
INDUSTRY	*2*											
Value added in industry (% of GDP)		32	27	23	31	43	26	25	32	27	40	27
Industrial production: % change (1990-2005)		46.7	51.3	55.9	3.2	210.9	30.5	29.5	70.1	21.0	11.8	38.3
AGRICULTURE												
Value added in agriculture (% of GDP)	*3*	3	4	2	1	4	4	7	2	1	4	3
Agricultural production: % change (1990-2006)		28.4	52.1	24.7	-9.2	19.7	12.5	46.3	-1.4	21.2	..	1.4
Livestock population, 2006 (million head of sheep eq.)		106	234	696	36	25	275	99	16	23	11	22
ENERGY												
Total supply, 2006 (Mtoe)		270	177	2321	528	217	122	18	34	61	46	21
% change (1990-2006)		28.8	44.2	20.5	18.8	131.9	39.7	27.5	36.6	22.7	-6.0	16.8
Energy intensity, 2006 (toe/1000 USD GDP)		0.27	0.17	0.21	0.15	0.21	0.20	0.18	0.13	0.20	0.24	0.12
% change (1990-2006)		-17.1	-10.3	-24.3	-3.7	-2.1	-17.1	-21.5	-4.2	-10.9	-28.5	-18.3
Structure of energy supply, 2006 (%)	*4*											
Solid fuels		10.1	4.9	23.8	21.3	24.3	43.9	11.9	12.0	8.0	44.2	25.4
Oil		35.1	56.8	40.4	45.6	43.2	31.6	39.4	42.8	40.7	20.9	38.4
Gas		29.3	27.4	21.6	14.7	13.3	19.1	18.7	22.2	25.0	16.1	21.1
Nuclear		9.4	1.6	9.2	15.0	17.9	-	-	-	20.2	14.5	-
Hydro, etc.		16.0	9.4	5.0	3.4	1.3	5.3	29.9	23.1	6.1	4.4	15.1
ROAD TRANSPORT	*5*											
Road traffic volumes per capita, 2004 (1000 veh.-km/cap.)		9.8	0.7	16.2	6.5	3.2	9.8	12.2	9.3	9.0	4.6	7.8
Road vehicle stock, 2005 (10 000 vehicles)		1883	2205	24119	7404	1540	1348	271	502	559	439	245
% change (1990-2005)		13.8	129.3	27.8	31.1	353.5	37.9	47.0	36.0	31.2	69.4	29.5
per capita (veh./100 inh.)		58	21	81	58	32	66	66	61	53	43	45

.. not available. - nil or negligible.

1) Data may include provisional figures and Secretariat estimates. Partial totals are underlined.

2) Value added: includes mining and quarrying, manufacturing, gas, electricity and water and construction; production: excludes construction.

Source: OECD Environmental Data Compendium.

OECD EPR / SECOND CYCLE

FIN	FRA	DEU	**GRC**	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	SLO	ESP	SWE	CHE	TUR	UKD	OECD
161	1743	2225	**257**	162	11	151	1556	28	494	188	505	198	79	1036	282	245	603	1760	31225
44.5	34.9	30.1	**62.5**	38.6	64.7	174.6	23.5	108.2	49.4	65.0	79.2	40.2	46.5	60.7	42.1	22.2	86.3	47.7	48.7
30.5	28.4	27.0	**23.0**	16.1	34.6	35.6	26.4	60.5	30.2	40.4	13.3	18.7	14.7	23.5	31.1	32.7	8.3	29.1	26.6
44.5	26.9	45.1	**18.6**	77.8	32.2	79.8	27.9	166.4	73.2	46.6	40.3	31.1	85.7	26.0	51.3	52.5	28.2	28.4	26.0
32	25	30	**23**	31	27	42	29	20	26	38	30	29	32	30	28	27	31	26	29
75.6	18.2	16.9	**19.5**	92.2	..	312.8	10.5	57.6	20.8	35.5	113.0	15.1	19.5	27.0	55.3	27.6	78.3	8.6	34.6
4	3	1	**7**	4	9	3	3	1	3	2	3	4	5	3	2	1	12	1	3
-8.4	-4.2	-6.3	**14.5**	-23.0	12.1	7.0	5.3	22	-7.2	-7.8	-24.3	-2.6	..	16.3	-15.7	-6.9	24.9	-5.0	..
8	144	108	**19**	10	1	49	57	1	36	9	54	15	5	90	12	12	96	102	2373
37	273	349	**31**	28	4	15	184	5	80	26	98	25	19	145	51	28	94	231	5537
30.4	19.8	-2.0	**40.0**	-3.4	100.1	49.8	24.4	33.0	19.4	21.8	-2.2	47.5	-12.4	58.5	7.9	13.7	77.6	8.9	22.5
0.23	0.16	0.16	**0.12**	0.17	0.41	0.10	0.12	0.17	0.16	0.14	0.19	0.13	0.24	0.14	0.18	0.12	0.16	0.13	0.18
-9.8	-11.2	-24.6	**-13.9**	-30.3	21.5	-45.5	0.7	-36.1	-20.1	-26.2	-45.4	5.2	-40.2	-1.4	-24.1	-6.9	-4.7	-26.3	-17.7
20.2	4.7	23.5	**27.3**	11.4	1.8	15.7	9.2	2.5	9.9	2.7	57.9	13.3	23.6	12.3	5.3	0.6	28.1	17.9	20.6
29.0	32.6	35.3	**58.0**	28.3	22.9	55.3	45.0	67.7	41.4	34.2	23.9	54.8	18.1	48.9	28.9	46.4	33.3	36.4	39.9
10.6	14.2	22.7	**8.9**	42.5	-	26.2	38.4	28.0	43.8	18.2	12.5	14.6	28.5	21.4	1.7	9.7	27.6	35.2	21.9
16.4	42.2	12.5	**-**	13.1	-	-	-	-	1.2	-	-	-	25.2	10.8	34.6	26.0	-	8.5	11.1
23.7	6.2	6.0	**5.8**	4.8	75.3	2.7	7.4	1.8	3.8	44.9	5.6	17.3	4.6	6.5	29.4	17.4	11.0	2.0	6.6
9.7	8.6	7.1	**8.7**	2.3	10.2	9.5	8.9	8.9	8.0	7.8	3.9	7.4	2.7	4.8	8.2	8.0	0.8	8.2	8.4
282	3617	4803	**552**	333	21	198	3894	34	806	252	1472	552	150	2516	463	419	843	3217	64939
26.2	27.1	28.8	**118.7**	49.4	59.8	108.5	30.2	68.0	40.7	29.9	126.8	151.3	44.4	74.2	17.9	28.9	257.1	35.0	38.7
54	59	58	**50**	33	72	48	66	73	49	55	39	52	28	58	51	56	12	53	56

3) Agriculture, forestry, hunting, fishery, etc.

4) Breakdown excludes electricity trade.

5) Refers to motor vehicles with four or more wheels, except for Italy, which include three-wheeled goods vehicles.

I.C: SELECTED SOCIAL DATA (1)

		CAN	MEX	USA	JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK
POPULATION												
Total population, 2006 (100 000 inh.)		326	1049	2994	1278	483	207	42	83	105	103	54
% change (1990-2006)		17.9	24.9	19.9	3.5	12.7	21.3	24.4	7.3	5.8	-1.1	5.7
Population density, 2006 (inh./km^2)		3.3	53.4	31.1	338.1	486.6	2.7	15.6	98.7	345.3	130.0	126.1
Ageing index, 2006 (over 64/under 15)		76.4	17.4	61.3	152.6	51.0	68.6	58.6	106.0	100.5	97.0	81.8
HEALTH												
Women life expectancy at birth, 2005 (years)		82.6	77.9	80.4	85.5	81.9	83.3	81.7	82.2	81.6	79.1	80.2
Infant mortality, 2005 (deaths /1 000 live births)		5.3	18.8	6.8	2.8	5.3	5.0	5.1	4.2	3.7	3.4	4.4
Expenditure, 2005 (% of GDP)		9.8	6.4	15.3	8.0	6.0	9.5	9.0	10.2	10.3	7.2	9.1
INCOME AND POVERTY												
GDP per capita, 2006 (1000 USD/cap.)		31.2	9.8	37.8	27.7	20.9	29.5	23.0	30.8	28.9	19.1	31.3
Poverty (% pop. < 50% median income)		10.3	20.3	17.0	15.3	..	11.2	10.4	9.3	7.8	4.4	4.3
Inequality (Gini levels)	*2*	30.1	48.0	35.7	31.4	..	30.5	33.7	26.0	26.0	25.0	24.0
Minimum to median wages, 2000	*3*	42.5	21.1	36.4	32.7	25.2	57.7	46.3	x	49.2	32.3	x
EMPLOYMENT												
Unemployment rate, 2006 (% of civilian labour force)	*4*	6.3	3.2	4.6	4.1	3.5	4.8	3.8	4.7	8.2	7.1	3.9
Labour force participation rate, 2006 (% 15-64 years)		79.4	64.4	75.2	79.5	69.1	77.2	80.3	79.1	67.8	71.1	81.7
Employment in agriculture, 2006 (%)	*5*	2.6	14.1	1.5	4.3	7.7	3.5	7.1	5.5	2.0	3.8	3.0
EDUCATION												
Education, 2006 (% 25-64 years)	*6*	85.6	32.4	87.8	84.0	76.7	66.7	69.4	80.3	66.9	90.3	81.6
Expenditure, 2005 (% of GDP)	*7*	6.2	6.5	7.1	4.9	7.2	5.8	6.7	5.5	6.0	4.6	7.4
OFFICIAL DEVELOPMENT ASSISTANCE	*8*											
ODA, 2007 (% of GNI)		0.28	..	0.16	0.17	..	0.30	0.27	0.49	0.43	..	0.81
ODA, 2007 (USD/cap.)		119	..	72	60	..	118	75	216	184	..	470

.. not available. - nil or negligible. x not applicable.

1) Data may include provisional figures and Secretariat estimates. Partial totals are underlined.

2) Ranging from 0 (equal) to 100 (inequal) income distribution; figures relate to total disposable income (including all incomes, taxes and benefits) for the entire population.

3) Minimum wage as a percentage of median earnings including overtime pay and bonuses.

Source: OECD.

OECD EPR / SECOND CYCLE

FIN	FRA	DEU	**GRC**	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	SLO	ESP	SWE	CHE	TUR	UKD	OECD
53	614	824	**111**	101	3	42	589	5	163	47	381	106	54	441	91	75	730	606	11758
5.6	8.2	3.8	**10.5**	-2.9	19.2	20.8	3.9	22.1	9.3	9.9	0.3	7.2	1.8	13.4	6.1	11.5	29.9	5.9	12.7
15.6	111.2	230.7	**84.5**	108.3	3.0	60.2	195.6	181.1	393.6	14.4	121.9	114.9	110.0	87.2	20.2	181.3	93.1	248.7	33.5
94.7	89.5	144.5	**129.6**	103.6	53.9	54.4	138.3	77.3	79.0	75.5	83.4	111.5	72.3	115.0	101.2	101.4	21.3	90.2	73.5
82.3	83.8	81.8	**81.7**	76.9	83.1	81.8	83.2	82.3	81.6	82.5	79.4	81.4	77.9	83.9	82.8	83.9	74.0	81.1	..
3.0	3.6	3.9	**3.8**	6.2	2.3	4.0	4.7	2.6	4.9	3.1	6.4	3.5	7.2	4.1	2.4	4.2	22.6	5.1	..
7.5	11.1	10.7	**10.1**	8.1	9.3	7.5	9.0	7.4	9.2	8.7	6.2	10.2	7.1	8.3	9.1	11.3	7.6	8.3	..
30.5	28.4	27.0	**23.0**	16.1	34.6	35.6	26.4	60.5	30.2	40.4	13.3	18.7	14.7	23.5	31.1	32.7	8.3	29.1	26.6
6.4	7.0	9.8	**13.5**	8.2	..	15.4	12.9	5.5	6.0	6.3	9.8	13.7	..	11.5	5.3	6.7	15.9	11.4	10.2
25.0	28.0	28.0	**33.0**	27.0	35.0	32.0	33.0	26.0	27.0	25.0	31.0	38.0	33.0	31.0	23.0	26.7	45.0	34.0	30.7
x	60.8	x	**51.3**	37.2	x	55.8	x	48.9	47.1	x	35.5	38.2	..	31.8	x	x	..	41.7	..
7.7	9.2	9.8	**8.9**	7.4	2.9	4.4	6.8	4.7	3.9	3.5	13.8	7.7	13.3	8.5	7.0	4.1	9.7	5.3	6.1
75.2	68.8	77.7	**65.4**	60.7	85.7	73.5	63.2	67.5	79.1	79.7	62.9	78.1	68.7	72.4	78.7	87.6	52.5	76.4	71.8
4.7	3.4	2.3	**12.0**	4.9	6.3	5.7	4.3	1.3	3.0	3.3	15.8	11.8	4.4	4.8	2.0	3.7	27.3	1.3	5.5
79.6	67.4	83.2	**58.7**	78.1	63.3	66.2	51.3	65.5	72.4	78.9	52.7	27.6	86.5	49.8	84.1	85.0	28.3	69.1	68.5
6.0	6.0	5.1	**4.2**	5.6	8.0	4.6	4.7	3.7	5.0	5.7	5.9	5.7	4.4	4.6	6.4	6.2	4.1	6.2	5.8
0.40	0.39	0.37	**0.16**	..	..	0.54	0.19	0.90	0.81	0.95	..	0.19	..	0.41	0.93	0.37	..	0.36	0.28
184	161	149	**45**	..	..	274	66	766	379	791	..	38	..	128	474	223	..	163	62

4) Standardised unemployment rates; MEX, ISL, TUR: commonly used definitions.

5) Civil employment in agriculture, forestry and fishing.

6) Upper secondary or higher education; OECD: average of rates.

7) Public and private expenditure on educational institutions; OECD: average of rates.

8) Official Development Assistance by Member countries of the OECD Development Assistance Committee.

II.A: SELECTED MULTILATERAL AGREEMENTS (WORLDWIDE)

Y = in force S = signed R = ratified D = denounced

			CAN	MEX	USA
1946	Washington	Conv. - Regulation of whaling	Y D	R	R
1956	Washington	Protocol	Y D	R	R
1949	Geneva	Conv. - Road traffic	Y R		R
1957	Brussels	Conv. - Limitation of the liability of owners of sea-going ships	Y S		
1979	Brussels	Protocol	Y		
1958	Geneva	Conv. - Fishing and conservation of the living resources of the high seas	Y S	R	R
1959	Washington	Treaty - Antarctic	Y R		R
1991	Madrid	Protocol to the Antarctic treaty (environmental protection)	Y R		R
1960	Geneva	Conv. - Protection of workers against ionising radiations (ILO 115)	Y	R	
1962	Brussels	Conv. - Liability of operators of nuclear ships			
1963	Vienna	Conv. - Civil liability for nuclear damage	Y	R	
1988	Vienna	Joint protocol relating to the application of the Vienna Convention and the Paris Convention	Y		
1997	Vienna	Protocol to amend the Vienna convention	Y		
1963	Moscow	Treaty - Banning nuclear weapon tests in the atmosphere, in outer space and under water	Y R	R	R
1964	Copenhagen	Conv. - International council for the exploration of the sea	Y R		R
1970	Copenhagen	Protocol	Y R		R
1969	Brussels	Conv. - Intervention on the high seas in cases of oil pollution casualties (INTERVENTION)	Y	R	R
1973	London	Protocol (pollution by substances other than oil)	Y	R	R
1969	Brussels	Conv. - Civil liability for oil pollution damage (CLC)	Y D	D	S
1976	London	Protocol	Y R	R	
1992	London	Protocol	Y R	R	
1970	Bern	Conv. - Transport of goods by rail (CIM)	Y		
1971	Brussels	Conv. - International fund for compensation for oil pollution damage (FUND)	D	D	S
1976	London	Protocol	Y R	R	
1992	London	Protocol (replaces the 1971 Convention)	Y R	R	
2000	London	Amendment to protocol (limits of compensation)	Y R	R	
2003	London	Protocol (supplementary fund)	Y		
1971	Brussels	Conv. - Civil liability in maritime carriage of nuclear material	Y		
1971	London, Moscow, Washington	Conv. - Prohib. emplacement of nuclear and mass destruct. weapons on sea-bed, ocean floor and subsoil	Y R	R	R
1971	Ramsar	Conv. - Wetlands of international importance especially as waterfowl habitat	Y R	R	R
1982	Paris	Protocol	Y R	R	R
1987	Regina	Regina amendment	Y R	R	
1971	Geneva	Conv. - Protection against hazards of poisoning arising from benzene (ILO 136)	Y		
1972	London, Mexico, Moscow, Washington	Conv. - Prevention of marine pollution by dumping of wastes and other matter (LC)	Y R	R	R
1996	London	Protocol to the Conv. - Prevention of marine poll. by dumping of wastes and other matter	Y R	R	S
2006	London	Amendment to Annex I of Prot (storage of CO2)	Y R	R	S
1972	Geneva	Conv. - Protection of new varieties of plants (revised)	Y R	R	R

OECD EPR / SECOND CYCLE

Y = in force S = signed R = ratified D = denounced

JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK	FIN	FRA	DEU	**GRC**	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	SVK	ESP	SWE	CHE	TUR	UKD	EU
R	R	R	R	R	R	R	R	R	R	R	**R**	R	R	R	R	R	R	R		R	R	R	R	R		R	
R	R	R	R	R	R	R	R	R	R	R	**R**	R	R	R	R	R	R	R		R	R	R	R	R		R	
R	R	R	R	R	R	R	R	R	R		**R**	R	R	R	R	R	R	R	R	R	R	R	R	S	R	R	
D		D			D		D	D	D	D			R		S		D	D	R	R		R	D	R		D	
		R			R			S		S						R			R	R		R		R		D	
		R	S		R		R	R	R				S	S			R				R		R		R		R	
R	R	R	R	R	R	R	R	R	R	R	**R**	R			R		R	R	R		R	R	R	R	R	S	
R	R	R	R	S	R	R	S	R	R	R	**R**	S			R		R	R	R		S	R	R	S		R	
R					R	R	R	R	R	R	**R**	R			R		R	R	R	R	R	R	R	R	R	R	
	S				S					S				S			R			R							
						R						R							R		R	S				S	
					S	R	R	R	S	R	**R**	R			R		R	R	R	S	R	S	R	S	R	S	
						S						S			S				S								
R	R	R	R	R	R	R	R	R		R	**R**	R	R	R	R	R	R	R	R	S	R	R	R	R	R	R	
					R		R	R	R	R			R	R			R	R	R	R		R	R			R	
					R		R	R	R	R			R	R			R	R	R	R		R	R			R	
R	S	R	R		R		R	R	R	R	**S**		R	R	R		R	R	R	R		R	R	R		R	
		R	S		R		R	R	R	R				R	R		R	R	R	R		R	R	R		R	
D	D	D	D		D		D	D	D	D	**D**		D	D	D	D	D	D	D	D		D	D	D		D	
R	R	R			R		R	R	R	R	**R**		R	D	R	R	R	R	R	R		R	R	R		D	
R	R	R	R		R		R	R	R	R	**R**	R	R	R	R	R	R	R	R	R		R	R	R	R	R	
				R	R	R	R	R	R	R	**R**	R		R	R	R	R	R	R	R	R	R	R	R	R	R	
D	D	D	D		D		D	D	D	D	**D**		D	D	D		D	D	D	D		D	D	D		D	
R		R			R		R	R	R	R	**R**		R	D	R		R	R	R	R		R	R			D	
R	R	R	R		R		R	R	R	R	**R**	R	R	R	R	R	R	R	R	R		R	R	R	R	R	
R	R	R	R		R		R	R	R	R	**R**		R	R	R	R	R	R	R	R		R	R	R	R	R	
R					R		R	R	R	R	**R**	R		R	R		R	R		R		R	R			R	
					R		R	R	R	R					R		R	R		S		R	R			S	
R	R	R	R	R	R	R	R	R		R	**R**	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
R	R	R	R	R	R	R	R	R	R	R	**R**	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
R	R	R	R	R		R	R	R	R	R	**R**	R	R	R		R	R	R	R				R	R	R	R	
						R		R	R	R	**R**	R			R						R	R		R			
R	R	R	R		R		R	R	R	R	**R**	R	R	R	R	R	R	R	R	R		R	R	R		R	
		R	R		R		R		R	R			R	R	R	R	S	R				R	R	R		R	
		R	R		R		R		R	R			R	R	R	R	S	R				R	R	R		R	
R	R	R	R	R	R	R	R	R	R	R		R	R	R	R		R	R	R	R	R	R	R	R	R	R	R

II.A: SELECTED MULTILATERAL AGREEMENTS (WORLDWIDE)

Y = in force S = signed R = ratified D = denounced

			CAN		MEX	USA
1978	Geneva	Amendments	Y	R	R	R
1991	Geneva	Amendments	Y			R
1972	Geneva	Conv. - Safe container (CSC)	Y	R	R	R
1972	London, Moscow, Washington	Conv. - International liability for damage caused by space objects	Y	R	R	R
1972	Paris	Conv. - Protection of the world cultural and natural heritage	Y	R	R	R
1973	Washington	Conv. - International trade in endangered species of wild fauna and flora (CITES)	Y	R	R	R
1974	Geneva	Conv. - Prev. and control of occup. hazards caused by carcinog. subst. and agents (ILO 139)	Y			
1976	London	Conv. - Limitation of liability for maritime claims (LLMC)	Y		R	
1996	London	Amendment to convention	Y	S		
1977	Geneva	Conv. - Protection of workers against occupational hazards in the working environment due to air pollution, noise and vibration (ILO 148)	Y			
1978	London	Protocol - Prevention of pollution from ships (MARPOL PROT)	Y	R	R	R
1978	London	Annex III	Y	R		R
1978	London	Annex IV	Y			
1978	London	Annex V	Y		R	R
1997	London	Annex VI	Y			S
1979	Bonn	Conv. - Conservation of migratory species of wild animals	Y			
1991	London	Agreem. - Conservation of bats in Europe	Y			
1992	New York	Agreem. - Conservation of small cetaceans of the Baltic and the North Seas (ASCOBANS)	Y			
1996	Monaco	Agreem. - Conservation of cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area	Y			
1996	The Hague	Agreem. - Conservation of African-Eurasian migratory waterbirds	Y			
2001	Canberra	Agreem. - Conservation of albatrosses and petrels (ACAP)	Y			
1982	Montego Bay	Conv. - Law of the sea	Y	R	R	
1994	New York	Agreem. - relating to the implementation of part XI of the convention	Y	R	R	S
1995	New York	Agreem. - Implementation of the provisions of the convention relating to the conservation and management of straddling fish stocks and highly migratory fish stocks	Y	R		R
1983	Geneva	Agreem. - Tropical timber	Y	R		R
1994	New York	Revised agreem. - Tropical timber	Y	R	R	R
2006	Geneva	Revised agreem. - Tropical timber			S	R
1985	Vienna	Conv. - Protection of the ozone layer	Y	R	R	R
1987	Montreal	Protocol (substances that deplete the ozone layer)	Y	R	R	R
1990	London	Amendment to protocol	Y	R	R	R
1992	Copenhagen	Amendment to protocol	Y	R	R	R
1997	Montreal	Amendment to protocol	Y	R	R	R
1999	Beijing	Amendment to protocol	Y	R	R	R
1986	Vienna	Conv. - Early notification of a nuclear accident	Y	R	R	R
1986	Vienna	Conv. - Assistance in the case of a nuclear accident or radiological emergency	Y	R	R	R
1989	Basel	Conv. - Control of transboundary movements of hazardous wastes and their disposal	Y	R	R	S

OECD EPR / SECOND CYCLE

Y = in force S = signed R = ratified D = denounced

JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK	FIN	FRA	DEU	**GRC**	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	SVK	ESP	SWE	CHE	TUR	UKD	EU
R	R	R	R	R		R	R	R	R	R		R	R	R	R		R	R	R	R	R	R	R	R	R	R	R
R	R	R		R		R	R	R		R		R	R				R		R			R	R	R	R	R	R
R	R	R	R	R	R	R	R	R	R	R	**R**	R	R		R	R	R	R	R	R	R	R	R	R	S	R	
R	R	R	R	R	R	R	R	R	R	R	**R**	R	S	R	R	R	R	R	R		R	R	R	R	R	R	
R	R	R	R	R	R	S	R	R	R	R	**R**	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
R	R	R	R	R	R	R	R	R	R	R	**R**	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
R					R	R	R	R	R	R		R	R	R	R			R		R	R		R	R			
R		R	R		R		R	R	R	R	**R**			R		R	R	D	R			R	R	R	R	R	
R		R					R	R	R	R						R	S	R				R	R			R	
					R	R	R	R	R	R		R			R			R	R	R	R	R	R			R	
R	R	R	R	R	R	R	R	R	R	R	**R**	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
R	R	R	R	R	R	R	R	R	R	R	**R**	R	R	R	R	R	R	R	R	R	R	R	R	R		R	
R	R	R		R	R	R	R	R	R	R	**R**	R			R	R	R	R	R	R	R	R	R	R		R	
R	R	R	R	R	R	R	R	R	R	R	**R**	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
R	R	R			R		R	R	R	R	**R**				R	R	R	R	R			R	R			R	
		R	R	R	R	R	R	R	R	R	**R**	R		R	R	R	R	R	R	R	R	R	R	R		R	R
				R	R	R	R	R	R	R		R		R		R	R	R	R	R	R		R			R	
					R		R	R	R	R							R		R				R			R	S
									R		**R**				R					R		R					
					R	R	R	R	R	R	**S**	R		R	R	R	R			R	R	R	R	R		R	R
		R	R						R									R				R				R	
R	R	R	R	R	R	R	R	R	R	R	**R**	R	R	R	R	R	R	R	R	R	R	R	R	S		R	R
R	R	R	R	R	R	R	R	R	R	R	**R**	R	R	R	R	R	R	R	R	R	R	R	R	S		R	R
S	S	R	R	R	R		R	R	R	R	**R**		R	R	R	R	R	R	R	R		R	R			R	R
R	R	R	R	R	R		R	R	R	R	**R**			R	R	R	R	R		R		R	R	R		R	R
R	R	R	R	R	R		R	R	R	R	**R**			R	R	R	R	R		R		R	R	R		R	R
R											**S**							S						S			R
R	R	R	R	R	R	R	R	R	R	R	**R**	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
R	R	R	R	R	R	R	R	R	R	R	**R**	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
R	R	R	R	R	R	R	R	R	R	R	**R**	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
R	R	R	R	R	R	R	R	R	R	R	**R**	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
R	R	R	R	R	R	R	R	R	R	R	**R**	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
R	R	R	R	R	R	R	R	R	R	R	**R**	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
R	R	R	R	R	R	R	R	R	R	R	**R**	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
R	R	R	R	R	R	R	S	R	R	R	**R**	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
R	R	R	R	R	R	R	R	R	R	R	**R**	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R

II.A: SELECTED MULTILATERAL AGREEMENTS (WORLDWIDE)

Y = in force S = signed R = ratified D = denounced

			CAN	MEX	USA
1995	Geneva	Amendment			
1999	Basel	Prot. - Liability and compensation for damage			
1989	London	Conv. - Salvage	Y R	R	R
1990	Geneva	Conv. - Safety in the use of chemicals at work (ILO 170)	Y	R	
1990	London	Conv. - Oil pollution preparedness, response and co-operation (OPRC)	Y R	R	R
2000	London	Protocol - Pollution incidents by hazardous and noxious substances (OPRC-HNS)	Y		
1992	Rio de Janeiro	Conv. - Biological diversity	Y R	R	S
2000	Montreal	Prot. - Biosafety (Cartagena)	Y S	R	
1992	New York	Conv. - Framework convention on climate change	Y R	R	R
1997	Kyoto	Protocol	Y R	R	S
1993	Paris	Conv. - Prohibition of the development, production, stockpiling and use of chemical weapons and their destruction	Y R	R	R
1993	Geneva	Conv. - Prevention of major industrial accidents (ILO 174)	Y		
1993		Agreem. - Promote compliance with international conservation and management measures by fishing vessels on the high seas	Y R	R	R
1994	Vienna	Conv. - Nuclear safety	Y R	R	R
1994	Paris	Conv. - Combat desertification in those countries experiencing serious drought and/or desertification, particularly in Africa	Y R	R	R
1996	London	Conv. - Liability and compensation for damage in connection with the carriage of hazardous and noxious substances by sea (HNS)	S		
1997	Vienna	Conv. - Supplementary compensation for nuclear damage			S
1997	Vienna	Conv. - Joint convention on the safety of spent fuel management and on the safety of radioactive waste management	Y R		R
1997	New York	Conv. - Law of the non-navigational uses of international watercourses			
1998	Rotterdam	Conv. - Prior informed consent procedure for hazardous chemicals and pesticides (PIC)	Y R	R	S
2001	London	Conv. - Civil liability for bunker oil pollution damage			
2001	London	Conv. - Control of harmful anti-fouling systems on ships		R	S
2001	Stockholm	Conv. - Persistent organic pollutants	Y R	R	S

Source: IUCN; OECD.

OECD EPR / SECOND CYCLE

Y = in force S = signed R = ratified D = denounced

JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK	FIN	FRA	DEU	**GRC**	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	SVK	ESP	SWE	CHE	TUR	UKD	EU
			R	R	R	R	R	R	R	R		R				R	R	R	R	R	R	R	R	R	R	R	R
							S	S	S			S				S							S	S		S	
		R	R		R		R	R	R	R	**R**		R	R	R		R	R	R			R	R	R		R	
	R														R			R	R				R				
R	R	R	R				R	R	R	R	**R**		R	R	R		R	R	R	R		R	R	R	R	R	
		R					S	S	S	S	**R**						R		R	R		R	R				
R	R	R	R	R	R	R	R	R	R	R	**R**	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
R	R		R	R	R	R	R	R	R	R	**R**	R	S	R	R	R	R	R	R	R	R	R	R	R	R	R	R
R	R	R	R	R	R	R	R	R	R	R	**R**	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
R	R	R	R	R	R	R	R	R	R	R	**R**	R	R	R	R	R	R	R	R	R	R	R	R	R		R	R
R	R	R	R	R	R	R	R	R	R	R	**R**	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
					R												R						R				
R	R	R	R															R						R			R
R	R	R		R	R	R	R	R	R	R	**R**	R	S	R	R	R	R	R	R	R	R	R	R	R	R	R	R
R	R	R	R	R	R	R	R	R	R	R	**R**	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
							S	S		S							S	S					S			S	
		S				S									S												
R	R	R		R	R	R	R	R	R	R	**R**	R	R	R	R	R	R	R	R	R	R	R	R	R		R	
								R		R		R				S	R	R		R			R				
R	R	R	R	R	R	R	R	R	R	R	**R**	R		R	R	R	R	R	R	R	R	R	R	R	S	R	R
										R	**R**				S	R						R	S			R	
R		R					R	S	R		**R**					R		R	R			R	R				
R	R	R	R	R	R	R	R	R	R	R	**R**	R	R	S	S	R	R	R	S	R	R	R	R	R	S	R	R

II.B: SELECTED MULTILATERAL AGREEMENTS (REGIONAL)

Y = in force S = signed R = ratified D = denounced

			CAN	MEX	USA
1946	London	Conv. - Regulation of the meshes of fishing nets and the size limits of fish	Y		
1950	Paris	Conv. - Protection of birds	Y		
1957	Geneva	Agreem. - International carriage of dangerous goods by road (ADR)	Y		
1975	New York	Protocol	Y		
1958	Geneva	Agreem. - Adoption of uniform conditions of approval and reciprocal recognition of approval for motor vehicle equipments and parts	Y		
1960	Paris	Conv. - Third party liability in the field of nuclear energy	Y		
1988	Vienna	Joint protocol relating to the application of the Vienna Convention and the Paris Convention	Y		
1964	London	Conv. - Fisheries	Y		
1968	Strasbourg	Agreem. - Restriction of the use of certain detergents in washing and cleaning products	Y		
1968	Paris	Conv. - Protection of animals during international transport	Y		
1969	London	Conv. - Protection of the archaeological heritage	Y		
1976	Barcelona	Conv. - Protection of the Mediterranean Sea against pollution	Y		
1976	Barcelona	Protocol (dumping from ships and aircraft)	Y		
1995	Barcelona	Protocol (dumping from ships and aircraft or incineration at sea)			
1976	Barcelona	Protocol (pollution by oil and other harmful substances in cases of emergency)	Y		
2002	Valletta	Protocol (preventing pollution from ships and, in cases of emergency, combating pollution)	Y		
1980	Athens	Protocol (pollution from land-based sources)	Y		
1996	Syracuse	Protocol (pollution from land-based sources and activities)			
1982	Geneva	Protocol (specially protected areas)	Y		
1996	Monaco	Protocol (specially protected areas and biological diversity)	Y		
1994	Madrid	Protocol (pollution from exploitation of continental shelf, seabed and subsoil)			
1995	Barcelona	Amendment to convention	Y		
1996	Izmir	Protocol (pollution by transboundary movements of hazardous wastes and their disposal)			
2008	Madrid	Protocol (Integrated Coastal Zone Management for the Mediterranean)			
1976	Monaco	Agreem. - Protection of the waters of the mediterranean coastline (RAMOGE)	Y		
1979	Bern	Conv. - Conservation of European wildlife and natural habitats	Y		
1979	Geneva	Conv. - Long-range transboundary air pollution (CLRTAP)	Y	R	R
1984	Geneva	Protocol (financing of EMEP)	Y	R	R
1985	Helsinki	Protocol (reduction of sulphur emissions or their transboundary fluxes by at least 30%)	Y	R	
1988	Sofia	Protocol (control of emissions of nitrogen oxides or their transboundary fluxes)	Y	R	R
1991	Geneva	Protocol (control of emissions of volatile organic compounds or their transboundary fluxes)	Y	S	S
1994	Oslo	Protocol (further reduction of sulphur emissions)	Y	R	
1998	Aarhus	Protocol (heavy metals)	Y	R	R
1998	Aarhus	Protocol (persistent organic pollutants)	Y	R	R
1999	Gothenburg	Protocol (abate acidification, eutrophication and ground-level ozone)	Y	S	R

OECD EPR / SECOND CYCLE

Y = in force S = signed R = ratified D = denounced

JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK	FIN	FRA	DEU	**GRC**	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	SVK	ESP	SWE	CHE	TUR	UKD	EU
					R		R		R	R			R	R			R	R	R	R		R	R			R	
				S	R				S		**S**		R		R	R	R			S		R	R	R	R		
				R	R	R	R	R	R	R	**R**	R		R	R	R	R	R	R	R	R	R	R	R		R	
				R	R		R	R	R	R		R			R	R	R	R	R	R		R	R	R		R	
R	R	R	R	R	R	R	R	R	R	R	**R**	R			R	R	R	R	R	R	R	R	R	R	R	R	R
				S	R		R	R	R	R	**R**				R	S	R	R		R		R	R	S	R	R	
					S	R	R	R	S	R	**R**	R			R		R	R	R	S	R	S	R	S	R	S	
					R		R		R	R				R	R	S	R		R	R		R	R			R	
					R		R		R	R					R	R	R					R		R		R	
				R	R	R	R	R	R	R	**R**		R	R	R	R	R	D		R		R	D	R	R	R	
				R	R		D		D	R	**D**		R		R	R				D		R	D	D		D	
									R		**R**				R							R			R		R
									R		**R**				R							R			R		R
									R						R							R			R		R
									R		**R**				R							R			R		R
									R		**R**				S							S			R		R
									R		**R**				R							R			R		R
									R		**R**				R							R			R		R
									R		**R**				R							R			R		R
									R		**S**				R							R			R		R
											S				S							S					
									R		**R**				R							R			R		R
											S				S							S			R		
									S		**S**				S							S					
									R						R												
				R	R	R	R	R	R	R	**R**	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
				R	R	R	R	R	R	R	**R**	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
				R	R	R	R	R	R	R	**R**	R		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
				R	R	R	R	R	R	R		R			R	R	R	R			R		R	R				
				R	R	R	R	R	R	R	**R**	R		R	R	R	R	R	S		R	R	R	R		R	R	
				R	R	R	R	R	R	R	**S**	R			R	R	R	R		S	R	R	R	R		R	S	
				R	R	R	R	R	R	R	**R**	R		R	R	R	R	R	S		R	R	R	R		R	R	
				R	R	R	R	R	R	R	**S**	R	S	S	S	R	R	R	S	S	R	S	R	R		R	R	
				R	R	R	R	R	R	R	**S**	R	R	S	R	R	R	R	S	S	R	S	R	R		R	R	
				S	R	R	R	R	R	R	**S**	R		S	S	R	R	R	S	R	R	R	R	R		R	R	

II.B: SELECTED MULTILATERAL AGREEMENTS (REGIONAL)

Y = in force S = signed R = ratified D = denounced

			CAN	MEX	USA
1980	Madrid	Conv. - Transfrontier co-operation between territorial communities or authorities	Y		
1995	Strasbourg	Additional protocol	Y		
1998	Strasbourg	Second protocol	Y		
1980	Bern	Conv. - International carriage of dangerous goods by train (COTIF)	Y		
1982	Paris	Memorandum of understanding on port state control	Y	R	
1989	Geneva	Conv. - Civil liab. for damage caused during carriage of dang. goods by road, rail, and inland navig. (CRTD)			
1991	Espoo	Conv. - Environmental impact assessment in a transboundary context	Y	R	S
2001	Sofia	Amendment			
2003	Kiev	Prot.- Strategic environmental assessment			
1992	Helsinki	Conv. - Transboundary effects of industrial accidents	Y	S	S
2003	Kiev	Prot. - Civil liability and compensation for damage caused by the transboundary effects of industrial accidents on transboundary waters			
1992	Helsinki	Conv. - Protection and use of transboundary water courses and international lakes	Y		
1999	London	Prot. - Water and health	Y		
2003	Kiev	Prot. - Civil liability and compensation for damage caused by the transboundary effects of industrial accidents on transboundary waters			
1992	La Valette	European Conv. - Protection of the archaeological heritage (revised)	Y		
1992	Vienna	Agreem. - Forecast, prevention and mitigation of natural and technological disasters			
1993	Lugano	Conv. - Civil liability for damage resulting from activities dangerous to the environment			
1993	Copenhagen	Agreem. - Co-op. in the prevention of marine poll. from oil and other dangerous chemicals	Y		
1994	Lisbon	Treaty - Energy Charter	Y		
1994	Lisbon	Protocol (energy efficiency and related environmental aspects)	Y		
1998	Aarhus	Conv. - Access to env. information and public participation in env. decision-making	Y		
2003	Kiev	Prot. - Pollutant Release and Transfer Registers (PRTR)			
1998	Strasbourg	Conv. - Protection of the environment through criminal law			
2000	Florence	Conv. - European landscape convention	Y		

Source: IUCN; OECD.

OECD EPR / SECOND CYCLE

Y = in force S = signed R = ratified D = denounced

JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK	FIN	FRA	DEU	**GRC**	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	SVK	ESP	SWE	CHE	TUR	UKD	EU
				R	R	R	R	R	R	R		R	S	R	R	R	R	R	R	R	R	R	R	R	R		
				R	S				R	R			S		S	R	R			S	R		R	R			
				R	S				R	R			S			R	R			S	R		R	R		R	
				R	R	R	R	R	R	R	**R**	R		R	R	R	R	R	R	R	R	R	R	R	R	R	
					R		R	R	R	R	**R**		R	R	R		R	R	R	R		R	R			R	
										S																	
				R	R	R	R	R	R	R	**R**	R	S	R	R	R	R	R	R	R	R	R	R	R		R	R
						R				R						R			R				R				
		S			S	R	S	R	S	R	**S**	S		S	S	S	S	R	S	S	S	S	R			S	S
				R	R	R	R	R	R	R	**R**	R			R	R	S	R	R	R	R	R	R	R		R	R
				S	S		S	S			**S**	R				S		S	S	S			S			S	
				R	R	R	R	R	R	R	**R**	R			R	R	R	R	R	R	R	R	R	R		S	R
					R	R	S	R	R	R	**S**	R	S		S	R	S	R	S	R	R	S	S	R		S	
				S	S		S	S			**S**	R				S		S	S	S			S			S	
					S	R	R	R	R	R	**R**	R		R	S	S	R	R	R	R	R	S	R	R	R	R	
				R								R			R				R		R						
								S			**S**		S		S	S	S			S							
							R	R					R					R					R				
R		S		R	R	R	R	R	R	R	**R**	R	S	R	R	R	R	S	R	R	R	R	R	R	R	R	R
R		S		R	R	R	R	R	R	R	**R**	R	S	R	R	R	R	S	R	R	R	R	R	R	R	R	R
				R	R	R	R	R	R	R	**R**	R	S	S	R	R	R	R	R	R	R	R	R	S		R	R
				S	S	S	S	S	S	R	**S**	S		S	S	R	R	S	S	S		S	S	R		S	R
				S	S		S	S	S	S	**S**		S		S	S							S				
					R	R	R	R	R		**S**	R		R	R	R	R	R	R	R	R	R	S	S	R	R	

Reference III
ABBREVIATIONS

CAP	Common Agricultural Policy of the European Union
CFCs	Chlorofluorocarbons
CITES	Convention on International Trade in Endangered Species
CSF	Community Support Framework
EBRD	European Bank for Reconstruction and Development
EIA	Environmental impact assessment
EMAS	Eco-Management Audit Scheme
EMEP	Programme for Monitoring and Evaluation of the long-range transmission of air pollutants in Europe
EMU	European Monetary Union
EOP	Energy Operational Programme
EYDAP	Athens-Piraeus Water and Drainage Utility
FYROM	Former Yugoslav Republic of Macedonia
GDP	Gross domestic product
GNTO	Greek National Tourism Organisation
IUCN	World Conservation Union
JMD	Joint Ministerial Decision
Mtoe	Million tonnes of oil equivalent
LPG	Liquefied petroleum gas
MAP	Mediterranean Action Plan
NCP	National Contingency Plan
NDC	Nominal distillation capacity
NMVOC	Non-methane volatile organic compound
NGO	Non-governmental organisation
ODA	Official development assistance
OEP	Operational Environment Programme
PAC	Pollution abatement and control
PAC	Polyaromatic hydrocarbon
p.e.	Population equivalent
PM_{10}/PM_{25}	Particulate matter less than 10/25 microns in diameter
PPC	Public Power Corporation
REMPEC	Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea

SCI	Sites of Community Importance
SITC	Standard International Trade Classification
SPA	Special Protection Areas
TOEV	Local Land Reclamation Board
TPES	Total primary energy supply
TSP	Total suspended particulates
UNCED	United Nations Conference on Environment and Development
UN-ECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
VAT	Value added tax
WHO	World Health Organisation
WWF	World Wide Fund for Nature
YPEHODE	Ministry of Environment, Physical Planning and Public Works

Reference IV

PHYSICAL CONTEXT

Greece forms the southernmost extension of the Balkan peninsula, in *South-Eastern Europe*. It shares land borders with Albania, the Former Yugoslav Republic of Macedonia (FYROM), Bulgaria and Turkey, and has coasts on the Aegean, Mediterranean and Ionian seas.

The *land area* of Greece totals 128 900 km^2. The mainland accounts for 80% of the land area, with the remaining 20% consisting of around 3 000 islands. Two-thirds of the land is *hilly or mountainous*, with the typical landscape being rugged, steep slopes. Over 40% of the land is over 500 metres in altitude, and many peaks reach more than 2 000 metres. 29% of the land is cultivated, 36% permanent grassland, 29% covered by forests and 6% of other areas (*e.g.* urban).

Greece has an *extensive coastline* of about 15 000 kilometres. About 70% of the coastline is rocky, 25% sandy and 5% wetlands. Ten of the 15 largest urban centres are coastal, and most of these have important *harbours*.

Greece has a *Mediterranean climate*, with mild, wet winters and hot, dry summers. The Hellenides Mountains, extending from north to south, divide the country into a maritime western part and a continental eastern part. Annual precipitation levels on the western flank (1 200 mm) being three times higher than on the eastern flank (400 mm), the west is generally greener and more wooded than the east. Droughts and brush fires sometimes occur in summer, and Greece is also prone to earthquakes. One-third of the *surface water resources* originate in, or are shared with, other countries. The larger Greek rivers (Axios, Nestos, Strimonas and Evros) all originate in neighbouring countries, and two main Greek lakes (Lake Doirani and Lake Prespa) are on borders.

Greek *natural resources* include modest supplies of bauxite, magnesite and petroleum, and plentiful deposits of lignite. Not being a major hydrocarbon producer, Greece imports 100% of its oil supply (76% of its energy supply). Although declining, domestic lignite is still the primary energy source for electricity production, accounting for more than half of total generation. Natural gas, oil-fired and hydroelectric stations provide the rest of supply. The islands depend almost exclusively on heavy fuel oil and diesel oil for power generation.

Reference V
SELECTED ENVIRONMENTAL WEBSITES

Website	Host institution
www.minenv.gr	Ministry of Environment, Physical Planning and Public Works
www.ypan.gr	Ministry of Development
www.mnec.gr	Ministry of Economy and Finance
www.mfa.gr	Ministry of Foreign Affairs
www.minagric.gr	Ministry of Rural Development and Food
www.gnto.gr	Ministry of Tourism
www.ekpaa.gr	National Centre for the Environment and Sustainable Development
www.epper.gr	Operational Program for the Environment
www.hellaskps.gr	Hellas Cofinanced Development Programmes
www.okxe.gr/	Hellenic Mapping and Cadastral Organization
www.statistics.gr	National Statistical Service of Greece
www.edpp.gr	National Environmental Information Network
www.noa.gr	National Observatory of Athens
www.cres.gr	Centre for Renewable Energy Sources
www.synigoros.gr	The Greek Ombudsman
www.ekby.gr	Greek Biotope and Wetland Centre
www.hcmr.gr	Hellenic Centre for Marine Research
www.nagref.gr	National Foundation for Agricultural Research
www.materialflows.net/index.php	SERI

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