

SANITATION COUNTRY PROFILE GREECE

Decision-Making

- A. Basic Sanitation
- B. Solid Wastes
- C. Hazardous Wastes
- D. Radioactive Wastes

Programmes and Projects

- A. Basic Sanitation
- B. Solid Wastes
- C. Hazardous Wastes
- D. Radioactive Wastes

Status

- A. Basic Sanitation
- B. Solid Wastes
- C. Hazardous Wastes
- D. Radioactive Wastes

Capacity-Building, Education, Training and Awareness-Raising

- A. Basic Sanitation
- B. Solid Wastes
- C. Hazardous Wastes
- D. Radioactive Wastes

Information

- A. Basic Sanitation
- B. Solid and Hazardous Wastes
- C. Radioactive Wastes

Research and Technologies

- A. Solid and Hazardous Wastes
- B. Radioactive Wastes

Financing

- A. Basic Sanitation
- B. Solid Wastes
- C. Hazardous Wastes
- D. Radioactive Wastes

Cooperation

- A. Basic Sanitation and Solid Wastes
- B. Hazardous Wastes
- C. Radioactive Wastes

Decision-Making: Greece, within the framework of the European Union (EU) policy for waste management, is planning its policy regarding solid waste aiming at the protection of human health and the preservation of natural environment. Specifically, Greece has developed a comprehensive legislative system harmonized with the European legal framework and various actions and measures have already been put in place for the integrated management of waste, based on three principles: waste prevention; recycling and reuse; and improving final disposal and monitoring.

In 1986, Law 1650 for the Environment established a framework of sanctions and liabilities for the protection of the environment. This Law set the waste management issue under the jurisdiction of Local Authorities. In 1990, two Joint Ministerial Decisions: JMD 69269/5387/90 (Official Journal of the Government – OJG 678B/1990) and JMD 73508/5512/90 (OJG 691B/1990) introduced environmental impact assessments for certain projects and activities. Recently, the environmental impact assessment framework in Greece set by Law 1650/1986 has been amended by Law 3010/2002 in order to fully harmonize national legislation with EU Directives 96/61/EC and 97/11/EC. In accordance with this Law, three new Joint Ministerial Decisions (JMDs 15393/2332/2002, 11014/703/104 and 37111/2021/2003) introduce new provisions for categorization of projects, environmental permitting and public participation.

Determination and in-detail specification of the competent bodies for waste management in Greece, i.e. the Local Boards, the Administration of each Prefecture and, in specific cases, the Regional Administration, is provided under JMD 69728/824/96. In 1996, Local Authorities started the elaboration of Prefectural solid waste management schemes, in accordance with JMD 69728/824/96. For the achievement of an integrated approach to the waste management issues and for the homogeneity and delineation of the waste management schemes developed by Local Authorities, JMD 114218/1997 was issued, which sets the framework of technical specifications and general programmes for the management of solid wastes. Together with the latter, JMD 113944/101/97 was also issued for the specification of general guidelines of the solid waste management policy and for setting out the bases for National Planning.

In order to implement the existing legal framework and to develop a sound action plan for waste management on the national level, the 1st ‘National Planning for the Integrated and Alternative Management of Solid Waste’ was elaborated during 1997-1999, so as to ensure the sound use of natural resources, the protection of environmental quality and thus the sustainable development in Greece. The establishment of such an approach was an obligation deriving not only from the Greek Constitution and Law 1650/86 for the “protection of the Environment” but also from the obligations of Greece as a European Union Member State. The National Planning took into account all the existing management schemes on Regional and Prefectural level as well as the works that have already been implemented in the framework of national and European funding. The Planning of a uniform national strategy for waste management was based on the following main principles, as set by JMD 113944/101/97:

- Prevention or minimization of waste production (quantitative minimization) as well as the minimization of the waste content in hazardous substances (qualitative minimization);
- Utilization of waste (recycling and energy recovering);
- Safe final disposal of residues;
- Proximity of disposal sites to the sites/sources of waste generation;
- Rehabilitation of disposal sites so that they could easily be incorporated, after the termination of their use, into the surrounding natural environment;
- The “polluter pays” principle.

The subsequent JMD 14312/1302/2000 (OJG 723B/2000) provided an explicit determination and interpretation of JMD 113944/1016/97 and outlined the National Waste Management Strategy (for both solid and hazardous wastes), which constituted the National Waste Management Planning.

In 2002, YPEHODE initiated the update of the National Planning, with the aim to:

- Review the Prefectural Schemes according to the Regional Schemes that were elaborated for promoting integrated solid waste management plans at regional level and the clustering of programmes;
- Elaborate integrated solid waste management systems for the 13 Administrative Regions of Greece;
- Control the operation of non-engineered dump sites and take action for their gradual elimination;
- Develop modern sanitary landfills, covering the whole country until the end of 2008.

During 2001-2003, YPEHODE has focused in the transposition of the community legislation on the waste management, into the national legal system. Based on the recent institutional framework and the review process of the 1st National Planning, YPEHODE issued in 2003 JMD 50910/2727/2003 (OJG 1909/2003), on measures and terms for solid waste management, comprising of the following basic axes:

- Adaptation and approval of the National Solid Waste Management Planning so as to incorporate the major principles, goals, policies and actions for the rational management of urban wastes, according to the community legal framework and arising national obligations;
- Establishment of the Regional Solid Waste Management Schemes as the executive action plans in the area of solid waste management, with specifications and goals in consistency with those of the National Planning.

In the future, the Hellenic national legislation will continue to be harmonized with the EU Regulations and Directives on waste management, sharing the ambition for a significant cut in the amount of the generated wastes, through new waste prevention initiatives, better use of resources, and through encouraging a shift to more sustainable consumption patterns. Specific EU targets include the reduction of the quantity of wastes going to 'final disposal' by 20% from 2000 to 2010, and by 50% by 2050, with special emphasis on cutting hazardous waste. In this context, Greece has been actively involved with the other EU member-states, in the preparation of the EU Directive 2002/96/EC on waste electrical and electronic equipment (adopted on 27 January 2003) and continues today its contribution in the preparation of;

- The proposal for a Regulation of the European Parliament and of the Council on shipments of waste;
- The proposal for a Directive of the European Parliament and of the Council on the management of waste from the extractive industries;
- The proposal for a Council Directive (Euratom) on the management of spent nuclear fuel and radioactive waste.

A. Basic Sanitation: The existing legal framework for the wastewater management includes the following provisions:

- JMD 5673/400/1997 (OJG 192B/1997) for the collection, treatment and discharge of urban waste water and treatment of residual sludge (transposition of the EU Urban Waste Water Treatment Directive 91/271/EEC);
- JMD 80568/4225/1991 (OJG 641B/1991) that defines the measures, terms and limitations for the use of sludge in the agriculture (harmonization with the EU Directive 86/278/EEC);
- JMD 3418/2002 that defines the measures and terms for harbour installations delivering wastes produced in ships and shipments residues.

B. Solid Wastes: The management of non-hazardous wastes falls under the provisions of JMD 69728/824/96 on "Measures and conditions for solid waste management". This JMD defines the relevant withdrawal procedures for the end-of-life vehicles, which constitute the 0.6-0.8% of the total number of vehicles in use. The following legislative framework for solid wastes determines the general lines on which the municipal solid waste management policy is based, the framework of technical specifications and programmes for their management, as well as certain provisions concerning their disposal sites or their reuse:

- JMD 31784/954/1990 (OJG 251B/1990) for packaging materials;
- JMD 82805/2224/1993 (OJG 699B/1993) for the incineration of municipal solid wastes;

- JMD 58751/2370/1993 (OJG 264B/1993) and JMD 76802/1033/1996 (OJG 596B/1996) for incineration plants;
- JMD 113944/1016/97, for defining and specifying the main policy guidelines for the National Waste Management Planning;
- JMD 114218/1016/97 on “Elaboration of a specifications framework and of the general programmes for the management of solid wastes”;
- JMD 14312/1302/2000 (OJG 723B/2000), for providing an explicit interpretation of JMD 113944/1016/97 and for setting out the National Waste Management Strategy (for both solid and hazardous wastes), which constitutes the National Waste Management Planning;
- Law 2939/2001 (OJG 179A/2001), for “Packages and the Alternative Management of Packaging and other Materials – Establishment of the National Organization for Alternative Management of Packaging and other Materials (NOAMPOM)”. This law (harmonization with the EU Directive 94/62/EEC), constitutes the general legal framework for the alternative management of packaging waste, with priorities on the prevention, reuse, recycling and energy recovery without polluting;
- JMD 29407/3508/2002 (OJG 1572B/2002) on measures and terms for sanitary disposal (harmonization with the EU Directive 99/31/EC);
- JMD 50910/2727/2003 (OJG 1909/2003) providing measures and terms for solid waste management – National and Regional Planning Management, in complete compliance with the European Waste Framework Directive 91/156/EEC.

The transboundary transportation of non-hazardous wastes is based on the European Regulation 259/93/EEC. The competent authority for control and monitoring of these transportations is YPEHODE.

C. Hazardous Wastes: JMD 72751/3054/1985 on toxic and dangerous wastes, issued in compliance with EU Directive 78/319/EEC, provided measures for the prevention of such wastes, their recycling and reuse. National legislation provides for the planning and management of toxic and dangerous waste, procedures for the transport of dangerous wastes, special permits for the disposal and storage of dangerous wastes, and measures for building facilities for toxic residues at ports. Activities producing dangerous wastes and facilities for disposal of dangerous wastes require an environmental impact assessment and special permit.

JMD 19396/1546/97 (harmonization with the EU Directive 91/689/EEC on ‘Hazardous Waste’) provides for the necessary measures and conditions for hazardous waste management, including volume reduction, waste utilization, recovery of useful materials, recycling and remediation of polluted sites and promotion of clean technologies. It classifies the hazardous wastes and lists the appropriate management practices. The management of infectious waste falls under the provisions of the same JMD. The National Planning for hazardous waste management, according to this JMD, is determined by YPEHODE in cooperation with the competent Ministries. The adopted principles include: reduction of risk for the environment and public health; the ‘polluter pays’ principle; and the producer’s obligation to keep detailed records and provide them to the competent Local Authorities. JMD 14312/1302/2000 (OJG 723B/2000) provides an explicit determination and interpretation of JMD 113944/1016/97 and constitutes the National Waste Management Planning (for both solid and hazardous wastes).

The existing legal framework for used mineral oils management has incorporated the EU legislation into the national legal system. Specifically, JMD 98012/2001/96 on measures and conditions for the management of used mineral oils (harmonization with the EU Directive 75/439/EEC), provides for the elaboration of a National Planning Scheme for the management of used mineral oils, under the responsibility of YPEHODE, in cooperation with other competent Ministries and after consultation with the Central Union of Municipalities and Communities of Greece and the Union of Prefectural Authorities of Greece.

The management and disposal of accumulators and batteries is regulated legally by JMD 73537/1438/95 (OJG 781B/1995), which specifies the general requirements for planning and programme implementation

for the safe and environmentally sound management of used batteries and accumulators (harmonization with the Directive 91/157/EEC).

Certain categories of particularly hazardous wastes, such as polychlorinated biphenyls (PCBs), polychlorinated terphenyls (PCTs), pesticides etc, are exported to EU countries for final disposal, in accordance with the EU Regulation 259/93/EEC, while considerable amounts of inorganic hazardous wastes, such as ashes and silts from metallurgic processes are being exported for recovery of contained metals. According to the Decision of the Hellenic Chemicals Committee 1310/86, the supply-purchase of devices containing PCBs has been banned in Greece. JMD 7589/723/2000 (OJG 514B/2000) specifies measures and terms for the management of PCBs and PCTs (harmonisation with the EU Directive 96/59/EC). Pursuant to the latter, JMD 18083/1098/2003 (OJG 606? /2003), was recently issued, with provisions for general guidelines regarding the reporting, collection and disposal (retraction) of the devices and wastes containing PCBs. It specifically specifies the basic requirements for the registration, labelling and the respective required management action of the devices and material containing PCBs, depending on the volume and the PCBs content in liquid devices.

The application field of Law 2939/2001 (harmonization with the EU Directive 94/62/EEC) on “Packages and the Alternative Management of Packaging and other Materials” extends to packaging wastes, end-of-life vehicles, waste batteries and accumulators, catalysts, used tyres, waste from electrical and electronic equipment, oils and waste oils and demolition and construction waste. For the above waste streams, the following Presidential Decrees have either been issued or are under publication:

- Alternative management of oil wastes –Programme for their alternative management (Presidential Decree 82 / OJG 64A/02-03-2004);
- Used batteries and accumulators (Presidential Decree 115 / OJG 80A/05-03-2004);
- Vehicle tyres (Presidential Decree 109 / OJG 75A/05-03-2004);
- Used electric and electronic equipment (Presidential Decree 117 / OJG 82A/05-03-2004);
- End-of-life road vehicles (Presidential Decree 116 / OJG 81A/05-03-2004);
- Excavation, construction and demolition wastes (Presidential Decree under publication).

The Law obligates the economic actors (producers, importers) to organize or participate in collective (or individual) systems of alternative waste management (i.e. return, collection, transportation and recovery systems) in order to achieve specific quantitative targets. Pursuant to Law 2939/2001, the Ministerial Decisions 106453/2003 (OJG 391B/2003) and 105857/2003 (OJG 391B/2003) approved the operation of two nationwide systems for the collective alternative management of packaging wastes.

The national legislative framework that is applied for the transboundary transportation of hazardous wastes is based on Law 2203/94 (OJG 58A/1994) – issued for the ratification of the Basel Convention on the transboundary movements of hazardous waste and their disposal; the EU Regulation 259/93/EEC on the monitoring and control of waste transportation inside the European Community as well as during their import or export – and JMD 19396/1546/97 on “Measures and conditions for the management of hazardous wastes”. The competent authority is YPEHODE, but the Prefectures also play an important role especially for the issuing of waste management permits.

D. Radioactive Wastes: The Greek Atomic Energy Commission (GAEC) was first established in 1958 as the authority responsible for planning, application and supervision of radiation protection measures, and as the competent authority for Nuclear Energy & Technology and Radiation Protection. GAEC was re-established in 1987 as an independent Civil Service under the Minister of Development, and is the competent authority for Nuclear Energy & Technology and Radiation Protection.

The main responsibilities of GAEC in the field of radiation protection are the introduction of regulations and the monitoring of their implementation, as well as the introduction and implementation of radiation protection measures. The main functions of GAEC related to ionizing radiation, are:

- Licensing (for import, export, transport, storage, use, disposal of radioactive and fissionable materials and radiation producing equipment, applications for research and training, non-medical applications).
- Safety Evaluation and Inspections
- Personnel Dosimetry Service
- Monitoring of Environmental Radioactivity
- Emergency Planning and Response
- Secondary Standard Dosimetry
- Education and Training in Radiation Protection.

The Institute of Nuclear Technology and Radiation (INTR) of the National Centre for Scientific Research 'Demokritos' was founded in 1987, following the gradual merging of the Divisions of Nuclear Technology, Radiation Protection and Environmental Radioactivity Monitoring of the former Nuclear Research Centre 'Demokritos'. Its research activities started in the late 50ies and since the establishment of GAEC as an independent body, the regulatory and licensing activities have been gradually transferred from INTR to GAEC. The principal objective of the Institute is to maintain a certain level of know-how on nuclear technology by research and development on selected topics. Particular emphasis is placed on radiation protection through the activities of the laboratories of Health Physics & Environmental Hygiene, Environmental Radioactivity, Environmental Research, Radioactive Waste Management and Systems Reliability and Industrial Safety. The Institute is scientific advisor to the Greek Government on matters of Nuclear Technology and Radiation Protection, it provides scientific and operational support for the radioactive waste management of the government and it also participates in the National Emergency Plan in case of a Major Radiological Accident.

In 2001, JMD 1014/2001 on "Radiation Protection Regulations" entered into force, incorporating the relevant EU Directives and the IAEA Basic Safety Standards into the national legal system. This JMD provides specific requirements and demands for radiation protection and includes, inter alia, regulations for the disposal and management of radioactive wastes, as well for the transfer of radioactive materials.

Programmes and Projects: The Operational Environmental Programme (OEP) of Greece aims at resolving one of the major environmental problems of Greece, namely the management (collection, treatment, and disposal) of solid and hazardous wastes. The Programme promotes the required actions for the implementation of the new directive for landfills, and gives considerable weight to the cleaning of coastal areas and swimming sites. Specific actions under the Programme include: development of an integrated National programme for waste management and restoration of abandoned landfill sites and construction of new landfills. Also it aims at the development of extended recycling programmes; construction of composting plants; implementation of innovative techniques for the collection, treatment, and disposal of wastes; elaboration of studies on the implementation of the packaging directive; and coastal zone cleaning with emphasis on tourist sites.

A. Basic Sanitation: Wastewater processing thresholds are being established in a large number of coastal towns. OEP 2000-2006 is promoting, under Measures 1.1, 1.2, 1.3 and 6.2, the development of a National Management Scheme for urban and industrial wastewater, the construction of tertiary treatment facilities in sensitive regions and the implementation of innovative and adjusted technologies for the treatment of urban and industrial wastewater in selected areas.

The number of population served by wastewater treatment plants in 1997 was 5953000 (55% of the Greek population). The goals set by JMD 5673/400/97 include the construction of sewerage network for all set-

tlements with equivalent population >2000 inhabitants and the treatment of municipal wastewater before disposal to any aquatic receiver.

All the laboratories of the General Chemical State Laboratory (GCSL) are involved in the systematic monitoring of drinking, surface and ground water regarding toxic and other dangerous undesirable substances; foodstuffs regarding contaminants; seawater oil spill identification; and dangerous and industrial wastes regarding their disposal at the environment.

B. Solid Wastes: The municipal solid wastes management in Greece presents different features compared to that of most EU countries. The quantity of waste continues to be somehow lower than in other European countries, reflecting a less intense consumption pattern. Their composition is also different, having as principal characteristics the high content in fermentative materials and the relatively low content in packaging materials. These positive characteristics are counter-balanced by certain delays in the waste management sector. The high number of open dumping sites (reduced to 1260 today) constitutes the most negative element, while the percentages of useful material recovery are also low. With regard to the final disposal data, 40% of the disposed waste is dumped in non-engineered sites, whereas 51% is disposed in sanitary landfills.

Dealing with the solid waste management issue, the main policy orientations are the following:

- The rapid implementation of the National Waste Management Planning, emphasizing on the construction and operation of new sanitary landfills, upgrading of the existing ones so as to ensure their safe discharge, restoration of old landfills, recycling programmes, equipment, coastal zone cleaning programmes, and construction of sites for the disposal and treatment of agricultural products, hazardous wastes, and hospital wastes;
- The maximization of material recovery through the extension of collection systems at the source in all the big municipalities of the country, in addition to the construction of modern plants for mechanical separation.

For the implementation of the National Waste Management Planning, funds of approximately 322.8 million € were invested up to 1999, at Regional and Prefectural level and for the two larger urban cities of Greece, namely Athens and Thessaloniki. These funds derived from both national and community funds (Cohesion Fund, Structural Funds etc.). Early studies estimated that for the implementation of the National Planning for the period 2000-2006 funds of around 1.115 billion € would be required. The goals of the National Waste Management Planning, as well as the specific actions and measures to be taken include:

- The termination of any non-engineered landfill sites / uncontrolled land filling as well as the launching of projects for their quick rehabilitation;
- The establishment of innovative, modern and integrated plants for the final disposal of municipal solid waste, coupled with material recovery facilities and sanitary landfill sites;
- The promotion of Waste Transfer Station networks for the environmentally and economically sound transportation of municipal solid waste;
- The promotion of programmes for waste separation at the source;
- The creation of separate sites for the exclusive disposal of toxic waste;
- The promotion of an integrated communication strategy that will supplement and assist the addressing of the problem of municipal solid waste management;
- The continuous and scientifically based information and awareness raising of the citizens, which consists a highly essential requirement for the effective implementation of any planning scheme.

The Greek coastline of 16000 km receives all kinds of waste. For the protection and cleaning of coasts, a number of programs, co-funded by national and EU funds are implemented by YPEHODE, in cooperation with Local Authorities.

The implementation of integrated recycling programmes is one of the main strategic aims of YPEHODE. A paper recycling programme (segregation at source) is being implemented in the Athens region since 1994, in which 52 municipalities and communities participate today, encompassing a population of 2 million inhabitants. In the area of Thessaloniki a similar programme involves 18 municipalities and 55 communities of a total population 1 million inhabitants. The new recycle-at-the-source programme, as specified according to Law 2939/2001, sets out the following quantitative goals to be implemented by the end of 2005: Utilisation of 50-65% per weight of the package wastes; recycle of 25-45% per weight of the package wastes; and recycle of at least 15% per package material. For the implementation of these goals by 2005, new material recovery facilities and composting facilities are constructed in various municipalities all over the country.

YPEHODE has promoted and funded through the OEP several other projects on recycling, such as:

- Elaboration of public awareness programs in the framework of environmental education, since 1989. During this time more than 2500 schools have participated in these projects;
- Construction of Material Recovery Facilities using hand-sorting methods in the island of Zakynthos, the Region of Attica (Maroussi, and Ano Liosia) and the cities of Larissa and Patra.

Within the framework of the municipal solid waste management policy implementation, a large number of Sanitary Landfills are under construction, some of the works at the bidding phase or at the phase of approval of environmental terms. The main goal is the gradual phasing out of the non-engineered and uncontrolled dumping sites until the end of 2007. Today, 12 projects have been completed for the restoration of non-engineered disposal sites, as well as 5 projects for the rehabilitation of large-capacity disposal sites that served big urban centres (Schisto, Ano Liosia, Thessaloniki, Irakleio and Serres). Already approved and under construction/implementation are the following projects:

- Construction of 5 new Waste Transfer Stations in the Region of Attica;
- Construction of Material Recovery Facilities using both mechanical separation and hand-sorting methods in several municipalities of the country (East Attica, Thessaloniki, Patra, Chania);
- Rehabilitation of 5 central non-engineered dumping sites (in East and West Samos, Thessaloniki, Ileia and West Kerkyra);
- Programmes for the separation of materials at the source in many municipalities that correspond for the 30% of the total Greek population.

C. Hazardous Wastes: The main source of hazardous wastes is the industry. YPEHODE, through national and community funds, has assigned the reform of the existing legislation on hazardous wastes, as well as the elaboration of the 'National Management Planning' and of the 'Technical Management Specifications' for hazardous wastes.

During 1999-2001, a national inventory programme was elaborated on a representative sample of approximately 1000 industrial units. The inventory covered all forms of wastes (air emissions, effluents and solid wastes), including the hazardous wastes produced from these industries.

Pursuant to Law 2939/2001, the Ministerial Decision 106453/2003 (OJG 391B/2003) approved the operation of a nationwide system for the collective alternative management of packaging wastes, covering a wide range of packaging materials. Furthermore, the Ministerial Decision 105857/2003 (OJG 391B/2003) approved the operation of a system for the collective alternative management of the packaging of lubricants. Both programmes are operating since March 2003.

The highest percentage of polychlorinated biphenyls (PCBs) in Greece, as well as their containing devices, is under the property of the Public Power Corporation S.A. (PPC S.A.), which has designed and is currently implementing a programme for the gradual retraction of the possessed PCB devices.

D. Radioactive Wastes: Several programmes and projects on radioactive waste management are currently under implementation, inter alia:

- A programme for the construction of a radioactive waste management facility in the National Centre for Scientific Research 'Demokritos', under the management of the Greek Atomic Energy Commission (GAEC) and with a budget of 150000 €
- A programme for the collection of all spent and disused sources imported into the country before 1990. These sources are collected at the National Centre for Scientific Research 'Demokritos', waiting exportation for refurbishment to a country with the appropriate relevant infrastructure. This project is managed by GAEC and funded with 1.3 million €
- A project is being financed by the National Bank of Greece for restoring the area of a closed fertilizers' facility from NORM (naturally occurring radioactive materials) waste concentrations (e.g. uranium and radium). The budget of the radiation protection project, under the management of GAEC, is 200000 €, whereas the total budget is 1 million €

Since 1991, GAEC approves the waste management practices of medical and research radioisotopes laboratories through licensing procedures. Furthermore, GAEC has been involved with the Athens Olympic Games 2004 preparations, within the framework of its competencies, and in particular:

- Participates in the Plan for Encountering Radiological-Biological-Chemical-Nuclear Threat, which is organized by the Olympic Games Security Directorate;
- Monitors the project for upgrading the natural protection of the main radiological facilities in the country, so as to hinder any sabotage with potential radiological impacts, in cooperation with IAEA and the US Department of Energy;
- Monitors the project for the enforcement of the country's gates (airports, ports, borders) with contemporary detectors of radioactive materials, so as to avoid the illegal import of radioactive or nuclear material, in cooperation with IAEA and the US Department of Energy.

Status: Greece encompasses more than 3500 islands, has particular geomorphology (rough horizontal relief) and intense tourism development. These characteristics create a complex waste management problem, linked to the creation of numerous non-engineered landfill sites. Thus, priority has been given to the abatement of such 'uncontrolled' landfills and to the establishment of soundly designed and wholly engineered/integrated sanitary landfill sites. Having achieved to a great extent these first two goals, Greece is now proceeding to the Planning of an integrated infrastructure for the effective management of solid waste, through the establishment of improved waste collection systems, the effective transportation and temporary storage of waste, the establishment of material recovery facilities and the introduction of new recycling systems and techniques.

A. Basic Sanitation: Untreated sewage, industrial effluents and agricultural activities have been the main sources of marine pollution. During recent years, the situation has been substantially improved due to the establishment and the operation of urban sewage treatment plants in almost all-coastal cities and of industrial treatment plants. New wastewater treatment plants (56) are currently under construction. These units are designed to serve a population equivalent of 1524800 inhabitants. Another 22 are already planned to serve a population of 400000 inhabitants. The sludge production from these plants is estimated to be 25000 and 21000 tons respectively.

Up to now, sludge is disposed in landfills, in the premises of treatment plants and a small percentage is used in agriculture. Research projects for sludge utilization in certain cultivations are underway. The main goal of the National Planning regarding sludge is its utilization. For this purpose, a Composting Unit combined with mechanical separation has been constructed and operates in Kalamata city, with an annual capacity of 3650 tons. The same method, at industrial scale, is applied at the Mechanical Separation and Composting Unit of Attica (Ano Liosia) for the treatment of the organic fraction of municipal solid

wastes, with an annual capacity of 495000 tons of mixed municipal wastes and 110000 tons of sludge deriving from the wastewater treatment plant of Psytalia (Attica).

B. Solid Wastes: In Greece, land disposal is the predominant method for municipal waste management. From the total amount of municipal solid wastes, approximately 8% is recycled at the source and the remaining 92% is disposed of without prior treatment in Sanitary Landfills or in non-engineered dumping sites. With regard to the final disposal data 40% of the amount of disposed waste is dumped in non-engineered sites, whereas the rest 51% is disposed in sanitary landfills. Organized collection and transportation of municipal waste is applied for the 85% per weight of the generated waste, while the rest 15% corresponds to low-populated rural and mountainous areas.

The first-level Local Authorities, i.e. Municipalities, are responsible for the collection, the temporary storage, and the treatment/recycling/reuse as well as for the final disposal of the municipal solid wastes. For the improvement of the transportation and final disposal of waste, 15 Waste Transfer Stations, covering 23.4% of the generated municipal wastes, have been constructed up today, as well as 5 Material Recovery Facilities and 1 Mechanical Separation and Composting Facility. Several uncontrolled dumping sites have been reclaimed and 43 Sanitary Landfills have been constructed, serving 55 % of the Greek population (35 already in operation today). 19 Sanitary Landfills are in the implementation phase today, estimated to serve another 19% of the Greek population combined with the expansion of 3 existing facilities (in Larissa, in the island of Kefallonia and in West Attica). Proposals for the construction of 32 new Sanitary Landfills have been submitted and some of them have already been approved for co-funding from national funds and the Cohesion Fund II, in the Administrative Regions of South Aegean, Crete and Thessaly. The implementation of the proposed facilities could serve an additional 21% of the Greek population.

Today, the quantity of the municipal solid wastes generated at national level is approximately 4.6 million tons (mainly from domestic and partly from commercial activities), increased by 50% in comparison to the quantity levels in 1990. Despite the rapid increase of the municipal solid waste quantity in Greece, this quantity is still significantly below the average EU quantity. The Region of Attica contributes to 39% of the annual municipal waste production at national level, followed by the Region of Central Macedonia (16%) and the County of Thessaloniki (9%). The average qualitative content of the produced municipal solid wastes is calculated to be 47% fermentable, 20% paper, 8.5% plastic, 4.5% metal, 4.5% glass and 15.5% other wastes. The high percentage of biodegradable wastes impedes the application of incineration and mechanical sorting methods.

The quantity of recyclable materials is estimated to be 1.5 million tons, corresponding to 37.5% per weight of the municipal solid wastes. The percentage of plastic material recycled is estimated to be 5%, 0.5-1% of which comes from domestic households. Packaging material corresponds to approximately 21% of the annual produced quantity of municipal solid wastes, or, in absolute terms, around 974500 tons.

The recycling of packaging in Greece for the years 2000-2001 is presented in the following table:

	2000			2001		
	Produced packaging waste (tn)	Recycled packaging waste (tn)	%	Produced packaging waste (tn)	Recycled packaging waste (tn)	%
Paper & cardboard	356000	240000	67.4	374000	253000	67.6
Plastics	260000	8000	3.1	270000	8000	3.0
Glass	180000	43000	23.9	180000	44000	24.4

Aluminum	15500	5100	32.9	15500	5300	34.2
Other metals	78000	5000	6.4	90000	5000	5.6
Wood	45000	10000	22.2	45000	10000	22.2
Total	934500	311100	33.3	974500	325300	33.4

Beaches are cleaned by special machinery acquired by municipalities in coastal areas.

C. Hazardous Wastes: Hazardous waste management options include storage in safe and well-controlled sites, recycling and treatment with stabilisation, while a small percent is transferred abroad for recycling or final disposal. The quantity of hazardous wastes produced in 1998 was 280000 tons (about 33% lower than in 1988). In Greece there is a small number of industries (approximately 20) with high production rates, which mainly deal with the production of chemicals, fertilizers, crude oil refining etc. These industrial units are responsible for the production of 90% per weight of the total hazardous waste quantities in Greece. There is also a large number of small- and medium-size industries that produce hazardous wastes in small quantities. Shipyards also produce hazardous wastes (1000 tons in 1998).

For the polychlorinated biphenyls (PCBs), the only option is safe storage after authorization by the competent Prefectural Authorities and export to countries with specialized treatment facilities, following the requirements and specifications of the EU Directive 259/93 for the transboundary transportation of hazardous wastes. The highest percentage of PCBs in Greece, as well as their containing devices, is under the property of the Public Power Corporation (PPC S.A.). In order to ensure the continuous monitoring of the PCBs quantities and that of their containers, all holders, users and handlers of PCBs and containing devices are obligated under JMD 72751/3054/85 to keep detailed records regarding their quantitative and qualitative characteristics as well as their management practices. These records are forwarded in the Environmental Departments of the competent Prefecture and to YPEHODE. The future goals on PCBs and PCBs containing devices derive from EU Directive 96/59. Specifically, under this Directive, by year 2010, all PCBs containing devices should be destroyed, except for devices with low PCB content which are in excellent operational condition and which should be destroyed after their end of life.

The quantity of generated waste oils and lubricants is 85000 tons, from which 30000 tons are regenerated. The used accumulators are 36000 tons, from which 23500 tons are recycled. The quantity of wastes from electric and electronic equipment is estimated to be around 170000 tons. The annual quantity of end-of-life vehicles is about 35000 tons, 75% of which is recycled. Finally, the annual quantity of old tyres is 50000 tons, 14% of which is recycled and 3% is recovered in the form of fuel for the cement industry.

The quantity of infectious waste produced at national level is estimated to be 14000 tones per annum, 53% of which is produced in the Region of Attica and 14% in the area of Thessaloniki. The collection and management of these wastes presents a major problem since only 37% of hospitals have the necessary furnaces for the incineration of infectious waste. Consequently, the management in many cases is performed outside the hospital area. In Attica there is a pyrolytic incinerator operating under the Association of Communities and Municipalities of Attica. It has a capacity of 0.5 tons/day but still cannot cover Attica's needs. To address this problem, the plan "Management of infectious waste from hospitals" has been put together, aiming at the integrated sustainable management of these wastes. This will be done through the treatment of the infectious waste by sterilization, thermal treatment and other methods that destroy micro-organisms. Furthermore, the plan provides for the establishment and operation of the "Infectious and Hospital Waste Treatment Centres" for further waste management outside the hospitals. In this framework, a Thermal Treatment Incineration Unit is being constructed in Attica, with a capacity of 30 tons/day, destined to cover the future needs of the region. A similar plan has already been approved for Thessaloniki. These two centres will cover 75% per weight of the annually nationwide produced infectious waste.

The national policy for the transboundary transportation of hazardous waste is considered effective, since no accidents have ever occurred in Greece during hazardous wastes transboundary transportations. This is due to the implementation of a strict legislative framework (see Decision-making) that provides for the implementation of monitoring and controls in the whole hazardous waste management network as well the keeping of relevant records for the transports

D. Radioactive Wastes: No nuclear power plants exist in Greece. Spent fuel management is therefore relevant only in connection with the operation of the 5MW open-pool research reactor GRR-1 of the National Centre for Scientific Research 'Demokritos'. The policy and practice applied for the management of the research reactor spent fuel is the temporary storage of the fuel elements in storage facilities after irradiation, awaiting transfer to USA by May 2009, according to an agreement with the US Department of Energy.

Radioactive wastes in Greece originate from medicine, research and industrial activities. The management of radioactive wastes is carried out at the site of origin. The national policy for the radioactive waste produced in research and medical applications is the decay storage and discharge. Since 1990, according to Greek legislation, an import license for a radioactive sealed source is only granted by the regulatory authority (Greek Atomic Energy Commission), upon the condition that the foreign supplier certifies to take back the source when it is disused.

Capacity-Building, Education, Training and Awareness-Raising: Since 1993, YPEHODE has worked extensively on the acquisition of the necessary knowledge of environmental affairs. A team of experts was created in order to help citizens understand this difficult subject. Dozens of EMs executives travelled around Greece to spread information on how to protect the Environment and diminish pollution, focusing most of their efforts on the youth and students. Funds were made available to school units, classrooms or groups of teachers and students, in order to set up and complete environmental programmes: recycling programmes, programmes that protect Greece's natural wealth, programmes for the creation of awareness among students and general public, programmes that transcend the school's premises or even the country's borders. This led to the founding of more than 200 "registered" non-governmental Environmental and Ecological Organizations in Greece, whose members are often either teachers or former students who had the chance to participate in one of the Environmental Education programmes during their schooling years.

During the WSSD (Johannesburg, August-September 2002), a TYPE II initiative was launched called MEDIES (Mediterranean Education Initiative for Environment and Sustainability), with emphasis on water and waste, led by the Hellenic Government, UNESCO, UNEP/MAP and MIO-ECSDE. This initiative/partnership facilitates the educational community and students, through the successful application of innovative Educational Programmes in countries around the Mediterranean basin. These Programmes are based on cross-cutting themes such as water and wastes and in this framework:

- The education package on household wastes, entitled "Wastes in our lives" has been produced.
- MEDIES interactive webpage was launched at the beginning of 2003 and it is already fully operational serving as an interactive point of sharing information on issues relevant to Education for Environment and Sustainability.
- Regional and national Educational Seminars, Conferences and other meetings are being organised for capacity building and assisting the educators' work.

A. Basic Sanitation: The Ministry of National Education and Religious Affairs organizes, finances and supports every school year a big variety of environmental projects in all classes of primary and secondary schools. During the school period 2002-2003, 5700 projects were executed by 11000 teachers and 157000 pupils. A considerable number of these projects deal with different aspects of sanitation.

B. Solid Wastes: Schools in Greece are involved in recycling programmes. Encouragement is given to initiatives by local government organizations of specific autonomous geographic units (for example islands) to collaborate in the collection, disposal, and recycling of waste. The “curriculum” of the school projects is diverse. However the most common and most developed programmes and projects are related either to “management of natural resources” or to critical environmental issues, such as water pollution, water management, recycle of materials, etc.

C. Hazardous Wastes: A plethora of workshops, seminars and presentations are organized, as well as publications and information leaflets are produced by the state competent bodies, for the information and awareness raising of the public and all interested parties on alternative waste management issues. Moreover, a prerequisite for the approval of the alternative waste management systems is the implementation of a coherent public information and awareness raising program, addressed to citizens and all economic actors involved. The Office for Alternative Management of Packaging and Other Materials (OAMPOM) that was established in 2002 in YPEHODE for collecting data and managing the operating systems for packaging and other materials in Greece is responsible for the implementation monitoring of this program. The web site of OAMPOM is currently under construction.

D. Radioactive Wastes: The Greek Atomic Energy Commission (GAEC) is responsible for the education and training of workers in the field of ionizing radiation, and of qualified experts and advisors in the field of radiation protection. Furthermore, GAEC organizes seminars and workshops addressed to the scientific and technical personnel of medical, industrial, research and other ionizing radiation laboratories.

In the educational programmes due consideration is given to training on radioactive waste management. The major post-graduate programmes are:

- The Inter-University Course of the Universities of Athens, Ioannina, Thessaloniki, Crete and Thrace and of the National Centre for Scientific Research “Democritus”, operated by GAEC. This is a five semester’s post-graduate course leading to a M.Sc. degree in Medical Radiation Physics.
- The Post-Graduate Educational Course in Radiation Protection and the Safety of Radiation Sources, organized by GAEC and IAEA, in collaboration with major Greek Institutions. This is a Regional Center in Europe and Eastern Mediterranean region, for training scientists from the countries of that region in the field of radiation protection.

Information: An important structural intervention is the establishment of the Environmental Inspectorate of YPEHODE (harmonization with the EU Directive 2001/331/EC) thus providing a new data pool of measurements regarding inspected activities. The National Centre for the Environment and Sustainable Development (EKPAAs) has already produced a number of assessments and reports, such as the National Strategy for Sustainable Development for the Johannesburg Summit and recently a Signals Report based on up to 2000 updated data. The National Environment Information Network has been an important dynamic source of environmental information in Greece.

The MEDIES Network, which is the basis of the Initiative (see also Chapter “Capacity-Building, Education, Training and Awareness-Raising”) consists of individual educators from the Mediterranean, engaged in Education for Environment and Sustainability. The partners-members supply the network with all relevant information regarding the educational and/or environmental issues in their country, and undertake the dissemination of the supplied information and the promotion of education for environment and sustainability in their schools or NGOs.

A. Basic Sanitation: The Programme NDBHMI (National Data Bank of Hydrological and Meteorological Information) provides the required environmental information for the development of the Master Plan and

specific regional management plans for the inland waters in Greece. The Programme is based on a major environmental network and a data base consisting of hydrological and meteorological information at national scale.

B. Solid and Hazardous Wastes: In terms of waste data, registration of the municipal waste production and management has started and is under development. Moreover, two studies are being implemented to update the national planning for the dangerous and non-dangerous wastes. These studies will also produce primary data about quantities and methods of waste management. Another study on the management of solid wastes not deposited to landfills is under way.

A specialized structure has been established since 2002 in YPEHODE, under the title “Office for Alternative Management of Packaging and Other Materials (OAMPOM)”, in order to collect data and manage the operating systems for packaging and other materials in Greece. The objective of OAMPOM is to promote the maximization of recycled materials in compliance with various relevant EU Directives. Up to now several systems have been evaluated and approved (packaging, and-of-life-vehicles, waste tyres, waste oils, batteries). Within this framework, relevant databases will be developed containing information about the current situation for each waste stream (quantities, activities/companies producing relevant materials/waste sources, recycling rates etc). In this context, the following studies will be assigned by OAMPOM in the near future, to ensure a close monitoring and an assessment of the current situation:

- “Inventory of packaging and packaging waste – Establishment of a data Bank”;
- “Inventory of electrical and electronic equipment and their waste – Establishment of a data Bank”;
- “Collection of waste data from construction, demolition and excavation works and their destinations – Establishment of a data Bank”.

The OAMPOM’s web page on the alternative waste management is under construction. Moreover, every year, the alternative management systems submit a report for assessment of the last year activities (including the recycled quantities) as well as for planning the system development and expansion.

C. Radioactive Wastes: The Greek Atomic Energy Commission (GAEC) is the official link to information databases of the International Atomic Energy Agency (IAEA), to the European Commission and the National Competent Authorities of other countries.

Research and Technologies: The General Secretariat for Research and Technology (GSRT) of the Ministry of Development, through the Operational Programme “Competitiveness” (OPCOM) 2000-2006, supports the research activities of both the country’s scientific research institutes and those of its productive industry, focusing on areas that are important for the national economy and for the improvement of the quality of life. Furthermore, it promotes the transfer and dissemination of advanced technologies throughout the country’s productive sector and encourages activities aimed at raising awareness of the general public about research and technology issues. In this context, GSRT has completed a study on “Environmentally Sound Technologies in Greece: Progress of Research and Technology, Economic and Social Impacts”.

A. Solid and Hazardous Wastes: The promotion of schemes such as EMAS (EU Eco-Management and Audit Scheme), ISO 14000, Integrated Product Policy and Integrated Pollution and Prevention Control (EU Directive 96/61/EC incorporated in the national legislation with Law 3010/2002, OJG 91A/2002) in the business sector, assists efforts for waste reduction, reuse and recycling. Such activities are promoted, inter alia, under the Priority Axis 2 “Support and Encouragement of Business Initiatives” of OPCOM 2000-2006:

- Measure 2.5 ‘Technological and Organizational Modernization of Business’ gives special emphasis on the introduction of ecologically friendly production methods and clean technologies in small and

medium size enterprises (SMEs) as well as on covering gaps in infrastructure for the recycling and recovery and utilization of waste products in Greece.

- Measure 2.9 “Support for Business Initiatives in the Environmental Sector” also supports the collaboration among businesses with other bodies for improved management and utilization of industrial wastes or other special material flows (e.g. electronic equipment, vehicle catalysers, used tyres, scrap vehicles hospital waste etc). Under this Measure, particular emphasis is also given on materials’ recovering and recycling, on processing and disposal of hazardous wastes and on supportive actions (e.g. training, registers’ creation, promotion of voluntary agreements) for the adaptation of industry to the new environmental institutional and legislative framework.

For the implementation of these Measures, various actions and research projects are being promoted through public-private partnerships, aiming at exploring innovative approaches and application of advanced technological methods for waste management.

Greece, through the GSRT is participating in the 6th Framework Programme of the Directorate-General for Research of the European Commission with research and applied activities for industry as well as with research and training activities in the field of nuclear energy and nuclear waste management.

B. Radioactive Wastes: New technologies for the management of radioactive waste are developed in the laboratories of the Greek Atomic Energy Commission (GAEC), in collaboration with the National Centre for Scientific Research ‘Demokritos’. In addition, GAEC applies new technologies for the management of radioactive wastes produced from NORM (naturally occurring radioactive materials) industries.

Financing: Up today, Greece has invested on waste management the total amount of 542 million € comprising of national funds and various financing schemes (Cohesion Fund, Operational Environmental Programmes, Regional Operational Programmes, etc). In particular, for the elaboration of waste management studies, the construction of sanitary landfills, waste transfer stations and treatment plants, the restoration and rehabilitation of disposal sites and the collection equipment and recycling equipment programmes, approximately 322.8 million € were invested during 1993-1999. In the current funding period (2000-2003), 233 million € have been allocated, including the recently approved and in progress studies and projects. For addressing the remaining needs, YPEHODE has bound from national and community resources, the total amount of 293 million € for additional waste management projects.

With a view to achieving sustainable development, the Operational Environmental Programme of Greece for the period 2000-2006 (OEP 2000-2006), focuses on investments in infrastructure needed to guarantee rational management of environmental resources, for example in the waste management sectors. Among its priorities is the improvement of the quality of life, that encompasses specific action programmes for the protection of the environment, namely in the domains of water, and solid and hazardous wastes.

A. Basic Sanitation: Substantial progress has been made over recent years with the collection and treatment of wastewater. OEP 1994-1999, set up the framework for the design and construction of wastewater treatment systems and sewerage networks. The elaborated projects were co-funded by Greece and community structural funds. The infrastructure development continues with OEP 2000-2006, financially supported also by national and community structural funds. Once projects from OEP 1994-1999 are completed, around 45% of the Greek population will be connected to waste water treatment systems. OEP 2000-2006 (Measure 1.3, of Priority Axis 1) includes programmes on sanitation related infrastructure with a budget of around 38 million €. By 2006, 75% of the Greek population is expected to be connected to wastewater treatment systems.

B. Solid Wastes: OEP 2000-2006 includes projects on solid waste management with an overall budget of approximately 8.5 million € (Measure 2.1, of Priority Axis 2). Other Operational Programmes, such as

OPCOM 2000-2006 also include relative Measures (see Chapters 'Programmes and Projects' and 'Research and Technology') with respective budget lines related to waste management. At Regional level, financial support for waste management is provided by the Regional Operational Programmes, for each Administrative Region of Greece, under the framework of the 3rd Community Support Framework (CSF).

C. Hazardous Wastes: Economic instruments have been instituted by the Law 2601/98, supporting national policies for the reduction and management of hazardous wastes, in the form of subsidies provided to producers who adopt the use of clean technologies and appropriate treatment systems. Funding derives from national aid and, in case of co-funding, from other EU funding frameworks (e.g. RETEX). The new development Law 3220/2004 has a specific provision for the tax exemption of the reserve funds from the alternative waste management systems, so as to be invented on the whole in the following years.

OEP 2000-2006 includes projects on hazardous waste management with an overall budget of approximately 13 million € (Measure 2.2, of Priority Axis 2). OPCOM 2000-2006 provides financial support (national and community structural funds) to SMEs for the elaboration of environmental Plans (recycle and recovery of wastes), with a total budget of 60 million € (Action 2.9.4, Measure 2.9 of Priority Axis 2). Financial support is also provided through OPCOM, for the formation of environmental clusters, with a total budget of 40 million € (Action 2.9.3, Measure 2.9, of Priority axis 2).

D. Radioactive Wastes: The Greek Atomic Energy Commission (GAEC) is currently implementing a programme financed by the Government of Greece, with the scope to return all the old (imported before 1990) radioactive sealed sources to a foreign waste management facility for refurbishment.

The National Bank of Greece finances a project for restoring the area of a closed fertilizers' facility where NORM (naturally occurring radioactive materials) waste concentrations (e.g. uranium and radium) have been detected. The budget of the radiation protection project, under the management of GAEC, is 200000 € whereas the total budget is 1 million €

Cooperation:

A. Basic Sanitation and Solid Wastes: International cooperation related to sanitation and waste management issues is an important concern for Greece. Since 1999 and in the framework of OECD's Development Assistance Committee (DAC), Greece has funded the implementation of several projects on sanitation in partner countries. Through the Bilateral Programme of Development Assistance and Cooperation in the field of Environment and Sustainable Development of YPEHODE, sanitation and waste management related projects funded in 1999 were 3 with a total budget of around 234952 € whereas in 2000 they were 12 of total budget of around 1.45 million €. These projects were implemented through Universities, Research Institutes and NGOs in Greece. The recipient countries were countries from South East Europe, the Mediterranean and East Europe, Caucasus and Central Asia (EECCA). Projects laid emphasis on waste water and solid waste management and capacity building issues. In 2001, the implementation of a project for the construction of a wastewater treatment plant in the city of Strumica in FYROM was initiated.

In the context of the National Bilateral Programme of Development Assistance and Cooperation "Hellenic Aid" for the year 2000-2001, the total budget allocated to the implementation of sanitation and waste management/disposal in partner countries was around 0.24 million USD and 0.47 million USD, correspondingly. For the year 2002 the total budget allocated to the implementation of sanitation and waste management /disposal in partner countries was around 0.195 and 0.13 million USD, correspondingly. The implementation of these aid projects contribute to the Millennium Development Goals (MDGs) and WSSD targets for sustainable development and poverty reduction.

Greece has signed and ratified the Protocol of the Barcelona Convention on the Protection of the Mediterranean Sea against Pollution from Land Based Sources, including its latest amendments of 1996 (Law 3022/2002, OJG 144A/2002). Greece has also signed and ratified a Memorandum of Understanding (MoU) / collaboration Protocol with Turkey (Law 2902/2001, OJG 77A/2001), as well as a MoU with Cyprus (Law 2424/1996, OJG 147A/1996), both covering issues of possible bilateral cooperation on waste disposal and other related issues. Furthermore Greece has signed (but not yet ratified) MoUs with Georgia, FYROM and Albania and an Agreement of Understanding with Bulgaria, all of them covering issues closely related to waste management and disposal.

B. Hazardous Wastes: Greece signed and ratified in 1994 the Basel Convention (1989) on transboundary movements of hazardous waste and their disposal (Law 2203/1994, OJG 58A/1994). It has also signed the Protocol (1996) of the Barcelona Convention on pollution by transboundary movements of hazardous wastes and their disposal.

C. Radioactive Wastes: The transboundary movement of radioactive waste is regulated by the National Radiation Protection Regulation, which incorporates into the national legal system the Council Directive 93/3/EURATOM/1992 on “Supervision and Control of Shipments of Radioactive Waste between Member States and into and out of the Community”.

* * *