

**SECTORAL PLANS  
&  
NATIONAL ACTION PLAN**

**Country GREECE**

**Athens, 2005**

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## 1. INTRODUCTION

The report presents the Sectoral Plans (SP) and the National Action Plan (NAP) for Greece, based on the sectors referred to the SAP.

The legal framework in Greece is well developed and covers all aspects of pollution sources (Urban Wastewater, Industrial Wastewater, Solid wastes etc.) in terms of the required necessary infrastructure (e.g. wastewater treatment plants, solid wastes sanitary landfills), emission limit values (organics, heavy metals, etc) and water quality issues (specific water quality objectives). This framework coincides to the obligations that derive by the European Union Legislation and which practically meet most, if not all, of the key issues as raised by the SAP.

Table 1 presents the sectors referred to the NAP and the targets as identified by the national and European Union legislation.

**Table 1:** Sectors and targets

Sector	SAP targets	European Union obligations and current national programmes
1. Sewage management BOD, SS, TN	90% reduction by 2005 Connection of all coastal cities with population more than 100,000 by 2005 to sewerage networks and WWTP.	All cities with population greater than 15.000 served by sewerage networks and WWTP by 2000 (for sensitive areas the deadline was 1998). For agglomerations with population between 2,000 and 15,000 the deadline is the end of 2005.
2. Urban solid wastes	Collection and disposal systems by 2005 for all agglomerations with population greater than 100,000 Promotion of reduction and recycling	50% recover/usage from which 25% is related to recycling of the package wastes by 2005 Closure of uncontrolled dumping sites and restoration by 2008
3. Air pollution	Measure for the promotion of activities that will result to the control of air pollution	Requirement for review of Environmental permits
4. Pollution caused by Hg, Cd and Pb	50% reduction - 2010 ELV to be met by 2005 0.05 mg/l Hg 0.20 mg/l Cd	ELV to be met by 2003 0.05 mg/l Hg 0.20 mg/l Cd Elimination of Hg, Cd by 2020
5. Organohalogenes	Reduction and control of emissions by 2005	WQO and ELV specified by national legislation. ELV into force since 2003
6. Wastewater and solid waste from industrial installations BOD, TSS, N	50% reduction by 2005	Requirement for review of Environmental permits
7. Lubricating oil, hazardous chemicals and obsolete chemicals stockpiles	20% reduction of generation 50% safely disposed	National programme for the control of hazardous wastes is under preparation.
8. Updating and adopting of national regulations on sewage discharges to the sea and rivers	Legal framework has been established for the protection of the aquatic environment.	
9. Establishment of authorisation systems	Legal framework has been established for the procedures that have to be followed.	
10. Phasing out of the use of the nine pesticides	50% reduction – 2005 elimination - 2010	Implementation of relevant Directives resulted ban of these substances
11. Prohibition of the manufacture, trade and new uses of PCBs	50% reduction – 2005 elimination - 2010	Implementation of relevant Directives resulted ban of these substances

For the case of Greece the SP and the NAP are closely connected for several sectors. For half of the sectors there are strategic (management) plans that are adopted and implemented on a national basis and for which analytical information is presented in

the next section (section 2). It should be noted that in most of these cases, the national plan is related to monitoring programmes that are implemented at the whole territory and aim to the protection of water (surface and coastal) and air quality.

For the remaining of the sectors, respective plans on a river basin district level are presented (section 3). The synthesis of the information is presented in section 4 and supplemented by additional issues which all together compose the National Action Plan.

## **2. IDENTIFICATION OF SECTORS**

### **2.1 Sector 1: Sewage management**

The implementation of the European Union Directive 91/271/EEC regarding urban wastewater treatment and disposal in Greece has contributed the last decade to the improvement of the coastal environment, since more than 85% of the coastal cities with population equivalent greater than 10.000 are currently served by sewerage networks and respective wastewater treatment plants. The respective population served by wastewater treatment plants reaches 93% of the total population in these coastal cities. It should be noted that in only one case a coastal agglomeration with population equivalent greater than 120.000 is not served by a wastewater treatment plant, a project, however which is one of the immediate priorities.

The required, from the Directive level of treatment is secondary biological for the removal of organic carbon; however, nitrogen removal is also practiced in most cases in Greece, in order to avoid operational problems. Consequently, the **sectoral plan** for sewage management and treatment has been adequately dealt with and only certain cases need further investigation and assessment in order to be included in the NAP.

It should be noted that according to the obligations set by the EC Directive 91/271, further to the reference for areas with population equivalent (p.e.) greater than 10.000, an additional obligation refers to areas with p.e. between 2.000 and 10.000 that must provide for wastewater treatment by the end of the year 2005. Consequently it is expected that the situation, with respect to urban wastewater discharges to coastal areas will be even further improved the following years.

### **2.2 Sector 2: Urban solid wastes**

Since the mid 1980s, the Greek waste regime has undergone major changes instigated mainly by the Directives and structural funds of the European Commission. According to the National Strategic Plan for the Management of Solid Wastes (Ministerial Decree 50910/2727/2003) about 91.2% of the solid wastes produced in Greece are disposed to sanitary landfills (51.2%) or not properly organised and operated landfills (40.2%), while the remaining percentage is directed towards material recycling or composting. The management of urban solid wastes is one of the sectors, which the next years will concentrate increased attention on a local and national level, and it is expected to improve the current situation. The **sectoral plan** follows the provisions of the National management plan for urban solid wastes.

Regarding the uncontrolled dumping sites, according to the provisions of the new management plan, solid waste disposal at these sites is banned, while these areas have to be restored according to appropriate permits by 2008. The Ministry of Environment in Greece is making a significant effort in order to comply with the European Commission legislation, and as a result new sanitary landfills are programmed through the national planning. More specifically, the target with respect to urban solid wastes is to complete the collection and transport system of the country by 2008 and to achieve the goals set by the EC Directive 99/31/EC regarding the organic fraction of the solid wastes.

Recycling is one action that is included in the new strategic plan, following the provisions of the packaging Directive 94/62/EC. The main target is related to 50% recover/usage from which 25% is related to recycling of the package wastes, by the end of 2005.

### **2.3 Sector 3: Air pollution**

Air pollution is a typical characteristic of urbanisation. Continuous increase of circulation of automobiles in city centres contributes more than 80% of NO<sub>x</sub> emissions, while emissions from industrial and domestic sector contribute 15.8% and 2.6% respectively. Air pollution in Greece originates mainly from the excessive use of cars in the cities, rather than intensive industrial activity. The main actions which are included in the national programme for the reduction of pollution are based on the provisions of the European Union legislation (99/13/EC, 99/32/EC, 98/70/EC and 96/62/EC Directives) and specifically the management and evaluation system on the atmospheric pollution, the establishment of pollution control projects on a prefecture and local level, the development of a national plan for the reduction of VOCs, the control of the fuel quality. The **sectoral plan** is related to specific operational actions mainly related to the protection of the atmospheric environment of major cities in Greece. Furthermore, relevant national projects are related to upgrade and expansion of the national network for the monitoring of air pollution and the graphical representation of the results.

### **2.4 Sector 4: Pollution caused by Hg, Cd and Pb**

According to the legislation in force (EC Directives 82/176/EEC and 83/513/EEC, Ministerial Act 144/1987 and Ministerial Decree 18186/271/88) the effluent concentrations of Hg and Cd from the industrial sector must follow specific emission limit values, while national legislation is also referring to desired water quality objectives. Furthermore, regarding the presence of Pb in the aquatic environment Ministerial Act 50388/2704/2003 specifies the water quality objectives to be met.

From the Budget Baseline analysis for Greece, there are no records for Hg, Cd and Pb emissions from the industries. The industrial effluent discharges from the industrial estates (Patras, Thessaloniki, Irakleio) to the sea, must follow the provisions of respective Prefecture Decrees. These limit values are in accordance or sometimes stricter than the national legislation and thus pollution caused by Hg, Cd and Pb is limited. It should be noted, however that in order to preserve the water quality status, these substances have to be monitored. Thus, the specific plan is presented on **national level** rather than on administrative level.

### **2.5 Sector 5: Organohalogenes**

The national monitoring programme that was conducted during the period 1998-1999 focused on the determination of organic substances, such as are volatile and semivolatile organic compounds, organochlorine insecticides, organophosphorus, nitrogen sulfur, insecticides, herbicides and organotin compounds in surface water bodies in Greece. The general conclusion was that occurrence of organohalogen compounds, although not at high concentrations is mainly attributed to the application of specific types of herbicide and pesticides in the cultivated land, whereas the transboundary effect in the rivers, according to the available information was not significant. The Ministerial Decree 50388/2704/2003 specifies emission limit

values for most of these substances derived from the industrial activity and the actions and projected works needed in order to control and reduce pollution from specific substances, which are structured on a **national level** basis. These projects include implementation of monitoring programmes, establishment of a database for those activities which are related to the emission of these substances, application of codes of good agricultural practices, implementation of specific programmes of measures when applicable, evaluation of the water quality.

## **2.6 Sector 6: Wastewater and solid waste from industrial installations**

According to the working document 245/5, the sectoral plan, and consequently the NAP, can be based on the document referring to BOD reduction from the industrial activity. The plan is based on the information obtained from the budget baseline analysis which allows for the identification of those industries which do not perform any kind of wastewater treatment. These industries (accounting to 34% of the total number of industries examined, corresponding to about 15% of the total organic load produced) are obliged to renew their licences on the basis of new environmental permits and this will result to the construction of wastewater treatment facilities the following years, in order to meet the specified emission limit values. Consequently the **sectoral plan** is directly related to the current situation and the expected improvement during the revision of the environmental permits of the industries, which currently do not perform any kind of wastewater treatment. Regarding the industries that belong to the sectors included in the 91/271/EEC Directive (i.e. conventional pollutants, production of load corresponding to more than 4,000 p.e.), they all provide for wastewater treatment.

## **2.7 Sector 7: Lubricating oil, hazardous chemicals and obsolete chemicals stockpiles**

With respect to the production and disposal of hazardous wastes the current situation in Greece is characterised by the low production of such wastes and the gradual reduction of these quantities. In Greece there are few industries in sectors such as metallurgy, petroleum refinery, fertilisers and chemical products with increased production. These units produce about 90% of the total amount of hazardous wastes in Greece (Ministerial Decree 14312/1302/2000).

The gradual reduction of hazardous wastes is mainly attributed to the fact that medium and large sized industries producing these wastes either decreased their production or ceased their activity during the last decade. The new national programme on the management of hazardous wastes will be issued probably by mid 2005 and will refer to specific actions that have to be adopted on **national level**.

## **2.8 Sector 8: Updating and adopting of national regulations on sewage discharges to the sea and rivers**

As already mentioned, the current legal framework in Greece with respect to urban wastewater treatment and disposal, follows the provisions of the relevant EC Directive (91/271/EC) which is being implemented at a satisfactory level in Greece. Greece made a great effort to meet the obligations of the Directive and as a result of this effort most coastal cities are served by wastewater treatment plants providing for nitrogen and phosphorus removal. Regarding industrial emissions, these are



specified at **national level** through respective law in force (Ministerial Act 50388/2704/2003, Perfectural Decrees and specific environmental permits).

### **2.9 Sector 9: Establishment of a system of previous authorization by competent national authorities for works which cause physical alterations on the natural state of the coastline or the degradation of coastal habitats**

The national legal framework regarding the authorisation of all categories of projects specifies the required procedures that must be followed for the approval and issue of relevant environmental permits. These involve the submission and approval of Environmental Impact Assessment Studies, by the competent authorities, which is followed by the publication of the relevant obligatory environmental permits. The specific procedure covers the requirements of the **national plan**.

### **2.10 Sector 10: Phasing out of the use of the nine pesticides, except for those for which WHO recommendations related to the safeguarding of human life suggest otherwise**

The chlorinated insecticides are grouped in List I of the 76/464/EEC Directive and therefore their use is banned in Greece. The production of DDT, Aldrin, Dieldrin, Endrin and Heptachlor is banned in Greece since 1972, whereas the use of gamma-HCH is under restriction and the use of hexachlorobenzene is banned since 1974. Greek legislation (Common Ministerial Decree 55648/2210/1991, Ministerial Act 50388/2704/2003) specifies emission values for DDT, aldrin, dieldrin, endrin, hexachlorobenzene and heptachlor, which must be followed by the industries discharging such substances. The **national plan** is practically related to monitoring in order to ensure the limited presence of these substances in the environment.

### **2.11 Sector 11: Prohibition of the manufacture, trade and new uses of PCBs**

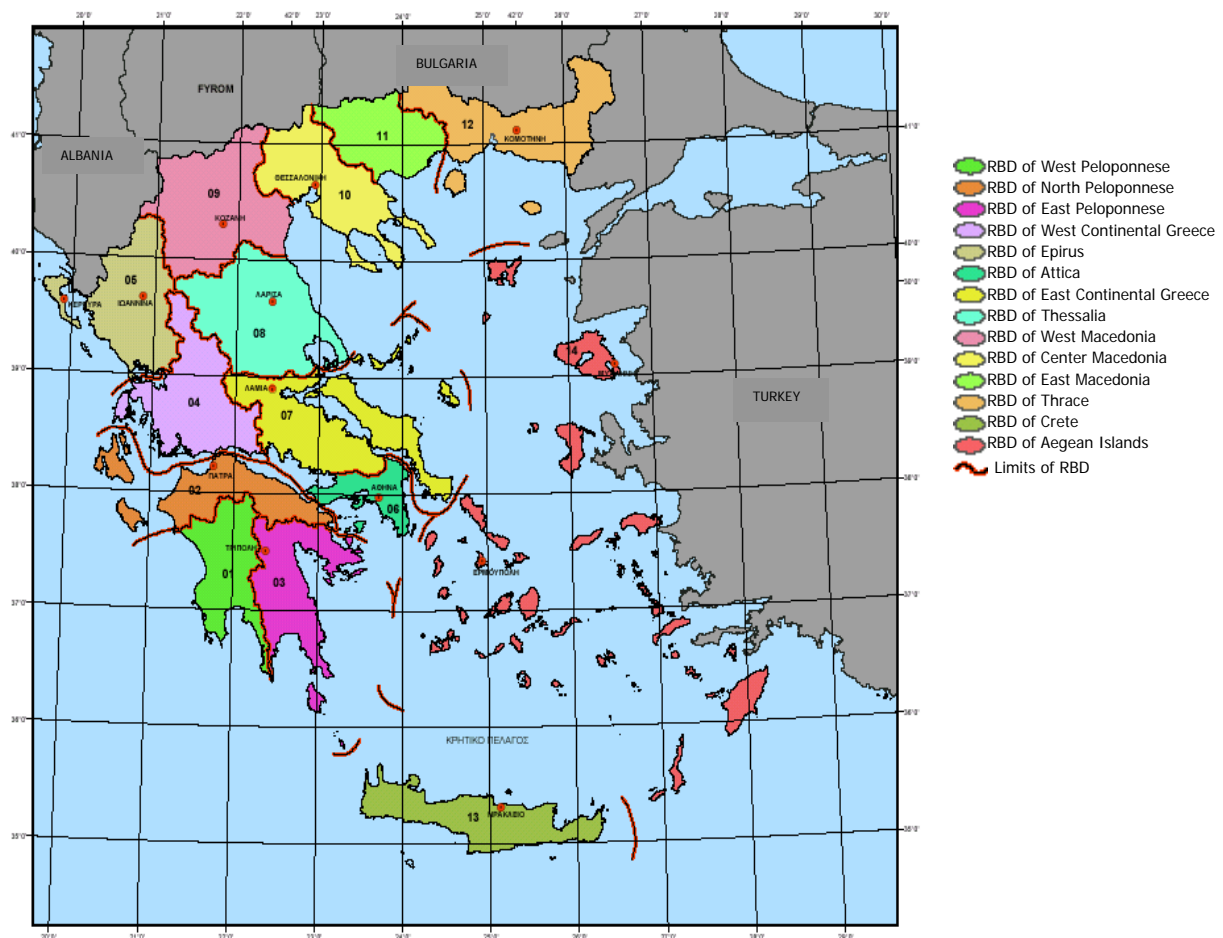
With respect to PCBs, the national legislation prohibits the supply of such substances since 1986. In the year 1991, the estimated amounts of PCBs in Greece were up to 1400 tonnes, whereas the same year also commenced the transportation of PCBs abroad. The majority of PCBs belong to the Public Corporation of Electricity that is also responsible for their management according to the provisions of the Ministerial Decrees 27751/3054/85 and 19396/1546/97. During the period of 1991-1998, about 800 tonnes of PCBs were transported abroad in order to be finally disposed. The National Planning for the management of PCBs is based on the European Legislation (Directive 96/59/EC) timetable, according to which by the year 2010 all devices containing PCBs must be eliminated, with the exception of those that contain PCBs at concentrations between 50-500 ppm and that are at perfect condition. In these cases the devices must be eliminated at the end of their lifetime. The new **national strategic plan** on the management of hazardous wastes is expected to include specific information, related to relevant actions.

### 3. SOURCES AND QUANTITIES OF POLLUTANTS AT ADMINISTRATIVE REGION LEVEL

The information regarding the nature and problems caused by land-based activities in Greece will be provided on the basis of River Basin Districts (RBD). In Greece today there are 14 River Basin Districts, namely:

1. RBD of West Peloponnese
2. RBD of North Peloponnese
3. RBD of East Peloponnese
4. RBD of West Continental Greece
5. RBD of Epirus
6. RBD of Attica
7. RBD of East Continental Greece
8. RBD of Thessalia
9. RBD of West Macedonia
10. RBD of Central Macedonia
11. RBD of East Macedonia
12. RBD of Thrace
13. RBD of Crete
14. RBD of Aegean Islands

These regions are presented in different colours in Map 1.



**Map 1: River Basin Districts of Greece**

### 3.1 RBD-01: West Peloponnese

#### 3.1.1 Sector 1: Sewage management

The wastewater treatment plants that operate today at the RBD of West Peloponnese serve the two largest cities (Kalamata and Pyrgos) with total load corresponding to a population of 115.000. The treatment provided includes biological carbon and nitrogen removal.

<b>RBD 01</b>		
<b>Coastal Area</b>	<b>P.E.</b>	<b>WWTP</b>
KALAMATA	80,000	Yes
PYRGOS	35,000	Yes

#### 3.1.2 Sector 2: Urban solid wastes

The area of Kalamata is served by a composting plant, thus a significant amount of solid wastes is safely disposed off.

#### 3.1.3 Sector 3: Air Pollution

From the data of the budget baseline analysis, the produced loads related to emissions to air from industrial activity are presented in the following table.

<b>RBD 01-WEST PELOPONNESE</b>		
	BB2003 (total load discharged) (kg/y)	Load that has to be reduced by 2010 by 50% (kg/y)
<b>VOC</b>	426,213	384,293
<b>SO2</b>	182,264,215	180,441,573
<b>NOx</b>	6,261,836	6,230,527
<b>CO2</b>	5,874,695,702	4,598,019,202

The reduction of air pollution from the industrial activity is directly related to the enforcement of current legislation which has to be adopted by the industries during the renewal of their environmental permits. Consequently, actions will be taken from those industries which do not comply with the environmental law.

#### 3.1.4 Sector 6: Wastewater and solid waste from industrial installations

The following table presents the loads for BOD, N, P and suspended solids discharged from industrial establishments, according to the BB analysis.

<b>RBD 01 WEST PELOPONNESE</b>			
	<b>BB 2003 kg/year</b>	<b>Expected BAT kg/year</b>	<b>Load that has to be reduced by 50% by the year 2010 kg/year</b>
BOD5	97,109	12,095	85,014
TSS	374,853	43,570	331,283
Total - N	11,871	4,748	7,122
Total - P	1,978	395	1,583

Although the loads are relatively low (corresponding to less than 4000 p.e.) the expected reduction in the following years, in the cases where no treatment is performed can be achieved through the adoption of proper environmental permits and enforcement of specific emission limits, depending on the type of industrial sector.

### 3.2 RBD-02: North Peloponnese

#### 3.2.1 Sector 1: Sewage management

In RBD-02 eight medium and large sized wastewater treatment plants (including the WWTP serving the city of Patras) are today in full operation offering biological carbon and nitrogen removal serving a total population of about 320,000 p.e., thus resulting to significant decrease of the total load produced.

<b>RBD 02</b>		
<b>Coastal Area</b>	<b>P.E.</b>	<b>WWTP</b>
PATRAS	180,000	Yes
AIGIO	27,000	Yes
KIATO	23,000	Yes
AMALIADA	20,500	Yes
XYLOKASTRO	20,000	Yes
ARGOSTOLI	18,000	Yes
KATO ACHAIA	16,000	Yes
ZAKYNTHOS	15,300	Yes

#### 3.2.2 Sector 2: Urban solid wastes

In RBD-02 there are three sanitary landfills in operation (Patras, Kiato, Zakynthos), whereas the landfill of Zakynthos is being upgraded. A new sanitary landfill is under construction in Xylokastro. The total population that will be served upon completion of the two projects is 310,000.

#### 3.2.3 Sector 3: Air Pollution

From the data of the budget baseline analysis, the produced loads related to emissions to air are presented in the following table.

<b>RBD 02 NORTH PELOPONNESE</b>		
	BB2003 (total load discharged) (kg/y)	Load that has to be reduced by 2010 by 50% (kg/y)
<b>VOC</b>	800,166	797,890
<b>SO2</b>	2,014,881	1,994,732
<b>NOx</b>	2,763,974	2,750,154
<b>CO2</b>	1,231,218,793	1,218,906,605

The reduction of air pollution from the industrial activity is directly related to the enforcement of current legislation which has to be adopted by the industries during the renewal of their environmental permits. Consequently, actions will be taken from those industries which do not comply with the environmental law.

### 3.2.4 Sector 6: Wastewater and solid waste from industrial installations

The industrial estate of Patras is located outside the city of Patras, and consists of about 120 industries. The industrial wastewater produced is about 10,000 m<sup>3</sup>/d and is biologically treated before discharge to the Patraikos gulf. Emission standards for the industrial discharges have been established at local level (Prefecture Decrees E2/10006/6-5-1988 and E20/137/2-7-2001).

The following table presents the loads for BOD, N, P and suspended solids discharged from industrial establishments, according to the BB analysis.

<b>RBD 02 NORTH PELOPONNESE</b>			
	<b>BB 2003 kg/year</b>	<b>Expected BAT kg/year</b>	<b>Load that has to be reduced by 50% by the year 2010 kg/year</b>
BOD5	102,020	72,048	29,972
TSS	300,978	131,418	169,560
Total - N	15,556	5,472	10,085
Total - P	1,523	305	1,219

The necessary reduction in the following years, in the cases where no treatment is performed can be achieved through the adoption of proper environmental permits and enforcement of specific emission limits, depending on the type of industrial sector.

### 3.3 RBD-03: East Peloponnese

#### 3.3.1 Sector 1: Sewage management

The two larger agglomerations along the coast of East Peloponnese (Argolikos Gulf), which accommodate an important number of seasonal population are both served by wastewater treatment plants which are today in full operation offering biological carbon and nitrogen removal.

<b>RBD 03</b>		
<b>Coastal Area</b>	<b>P.E.</b>	<b>WWTP</b>
ARGOS-NAFPLIO	120,000	Yes
TOLO	16,000	Yes

#### 3.3.2 Sector 2: Urban solid wastes

In RBD-03 there is no reference on existing sanitary landfills and thus respective installations must be projected. Since the three areas (Argos, Nafplio, Tolo) are close one sanitary landfill could serve the wider area.

#### Proposed Actions

<b>ID</b>	<b>Proposed Projects</b>	<b>Sector</b>	<b>RBD</b>
3.1	Sanitary Landfill of Argos-Nafplio-Tolo	02	03

### 3.3.3 Sector 3: Air Pollution

From the data of the budget baseline analysis, the produced loads related to emissions to air are presented in the following table.

<b>RBD 03 EAST PELOPONNESE</b>		
	BB2003 (total load discharged) (kg/y)	Load that has to be reduced by 2010 by 50% (kg/y)
<b>VOC</b>	332,153	287,665
<b>SO2</b>	1,869,826	1,851,128
<b>NOx</b>	195,428	194,451
<b>CO2</b>	41,359,864	40,946,265

The reduction of air pollution from the industrial activity is directly related to the enforcement of current legislation which has to be adopted by the industries during the renewal of their environmental permits. Consequently, actions will be taken from those industries which do not comply with the environmental law.

### 3.3.4 Sector 6: Wastewater and solid waste from industrial installations

The following table presents the loads for BOD, N, P and suspended solids discharged from industrial establishments, according to the BB analysis.

<b>RBD 03 EAST PELOPONNESE</b>			
	<b>BB 2003 kg/year</b>	<b>Expected BAT kg/year</b>	<b>Load that has to be reduced by 50% by the year 2010 kg/year</b>
BOD5	1,005,484	150,639	854,845
TSS	873,401	174,609	698,792

The necessary reduction in the following years, in the cases where no treatment is performed can be achieved through the adoption of proper environmental permits and enforcement of specific emission limits, depending on the type of industrial sector.

## 3.4 RBD-04: West Continental Greece

### 3.4.1 Sector 1: Sewage management

In RBD-04 there are three agglomerations close to the coast, with a total population of 44,000. The WWTPs of Nafpaktos, Messologi and Lefkada are designed to provide for biological nitrogen removal and consequently a part of the load attributed to urban sewage is treated prior to discharge at the coastal areas of RBD-04. It should be noted that the treatment plants of Messologi and Lefkada also remove phosphorus through biological and/or chemical process.

<b>RBD 04</b>		
<b>Coastal Area</b>	<b>P.E.</b>	<b>WWTP</b>
NAFPAKTOS	20,000	Yes
MESSOLOGI	14,000	Yes
LEFKADA	10,000	Yes

### 3.4.2 Sector 2: Urban solid wastes

Currently, there are five sanitary landfills serving different areas in West Continental Greece (Kefallonia, Lefkada, Messologi, Aigeira, West Achaia county) and two which are at the bidding stage (Nafpaktos, Kefallonia-upgrade). Upon the completion of these projects a total of 225000 population will be served by organized sanitary landfills.

### 3.4.3 Sector 3: Air Pollution

From the data of the budget baseline analysis, the produced loads related to emissions to air are presented in the following table.

<b>RBD 04- WEST CONTINENTAL GREECE</b>		
	BB2003 (total load discharged) (kg/y)	Load that has to be reduced by 2010 by 50%
<b>VOC</b>	157,581	151,606
<b>SO2</b>	336,339	332,976
<b>NOx</b>	36,519	36,336
<b>CO2</b>	7,336,391	7,263,027

The reduction of air pollution from the industrial activity is directly related to the enforcement of current legislation which has to be adopted by the industries during the renewal of their environmental permits. Consequently, actions will be taken from those industries which do not comply with the environmental law.

### 3.4.4 Sector 6: Wastewater and solid waste from industrial installations

All industries registered and located at the RBD-04 do not discharge their wastewater to the coastal areas.

## 3.5 RBD-05: Epirus

### 3.5.1 Sector 1: Sewage management

In RBD-05 there are four agglomerations (Kerkyra, Igoumenitsa, Lefkimi, Preveza) closer to the coast, each with population greater than 15,000 and with a total population of 133,000. Wastewater treatment of domestic sewage is provided for all areas, thus minimising the pollution of coastal areas in Epirus.

<b>RBD 05</b>		
<b>Coastal Area</b>	<b>P.E.</b>	<b>WWTP</b>
KERKYRA	60,000	Yes
IGOUMENITSA	30,000	Yes
PREVEZA	25,000	Yes
LEFKIMMI	18,000	Yes

### 3.5.2 Sector 2: Urban solid wastes

Currently, there are two sanitary landfills serving the island of Kerkyra (88,000 inhabitants) and one which is under construction (Preveza: 67,127 inhabitants). The cities of Igoumenitsa and Atra have both sanitary landfills which

however are currently out of operation. The two landfills must restart their operation or be upgraded in necessary, in order to preserve the environment.

#### Proposed Projects

<b>ID</b>	<b>Proposed Projects</b>	<b>Sector</b>	<b>RBD</b>
5.1	Sanitary Landfill of Igoumenitsa	02	05
5.2	Sanitary Landfill of Arta	02	05

#### *3.5.3 Sector 3: Air Pollution*

From the data of the budget baseline analysis, the produced loads related to emissions to air are presented in the following table.

<b>RBD 05-EPIRUS</b>		
	BB2003 (total load discharged) (kg/y)	Load that has to be reduced by 2010 by 50%
<b>VOC</b>	150,185	134,635
<b>SO2</b>	316,184	313,022
<b>NOx</b>	54,133	53,862
<b>CO2</b>	30,384,413	30,080,569

The reduction of air pollution from the industrial activity is directly related to the enforcement of current legislation which has to be adopted by the industries during the renewal of their environmental permits. Consequently, actions will be taken from those industries which do not comply with the environmental law.

#### *3.5.4 Sector 6: Wastewater and solid waste from industrial installations*

The following table presents the loads for BOD, N, P and suspended solids discharged from industrial establishments, according to the BB analysis.

<b>RBD 05 EPIRUS</b>			
	<b>BB 2003 kg/year</b>	<b>Expected BAT kg/year</b>	<b>Load that has to be reduced by 50% by the year 2010 kg/year</b>
BOD5	180,170.57	24,416.10	155,754.47
TSS	30,105.55	30,105.55	0.00
Total - N	37,195.83	7,439.20	29,756.63
Total - P	4,402.27	1,955.04	2,447.23

Although the loads are relatively low (corresponding to about 7000 p.e.) the expected reduction in the following years, in the cases where no treatment is performed can be achieved through the adoption of proper environmental permits and enforcement of specific emission limits, depending on the type of industrial sector.



### 3.6 RBD-06: Attica

#### 3.6.1 Sector 1: Sewage management

##### Current situation

In RBD-06 there are 12 agglomerations closer to the coast, each with population greater than 15,000 and with maximum population equivalent 4.4 million. This population includes the inhabitants of Athens, the capital of Greece (about to 3.5 million) who are served by the wastewater treatment plants of Psyttalia and Metamorphosi. The operation of the biological treatment at the wastewater treatment plant in Psyttalia started at the beginning of the summer 2004 and is estimated to contribute to 60-70% reduction of the total load produced in the RBD of Attica. This significant reduction was expected, since 80% of the total load is attributed to municipal wastewater (Ministry of Development, 2003). The wastewater treatment plant of Metamorphosis operates as a typical biological carbon with partial nitrogen removal. Both WWTPs discharge their effluent to the Saronicos Gulf.

<b>RBD 06</b>		
<b>Coastal Area</b>	<b>P.E.</b>	<b>WWTP</b>
ATHENS (PSYTTALIA WWTP)	3,500,000	Yes
METAMORPHOSI	540,000	Yes
ELEFSINA	120,000	No
KORINTHOS-LOUTRAKI	45,000	Yes
ARTEMIDA	44,000	No
MEGARA	40,000	Yes
NEA MAKRI	29,500	No
RAFINA	19,000	No
MARKOPOULO	17,000	Yes
KOROPI	16,000	No
POROS	15,000	Yes
LAVRIO	15,000	Yes

##### Estimated untreated load discharged

Although the WWTPs of Psyttalia and Metamorfofi serve most of the population in the Attica RBD, there are two coastal areas that lack sewage treatment: the coastal area of Elefsina Gulf at West Attica and the coastal agglomerations at East Attica where many inhabitants of Athens have their holiday residences (N. Makri, Artemida, Rafina, etc). The total organic load produced from these areas is estimated to be about 4,700 tonnes per year, corresponding to approximately 3,300 tonnes BOD per year discharged (upon the assumption of about 30% of the load is removed in the septic tanks).

##### Proposed Projects

The construction of wastewater treatment plants that will serve the areas is very important for the protection of the aquatic environment and public health. It should be noted that the three wastewater treatment plants that will serve respective areas noted in the following table, have been proposed by the Water and Sewerage

Corporation of Athens. However, individual wastewater treatment plants that will serve the respective areas may be proposed.

<b>ID</b>	<b>Proposed Projects</b>	<b>Sector</b>	<b>RBD</b>
6.1	WWTP of Elefsina (Thriasio Pedio)	01	06
6.2	WWTP of East Attica (N. Makri)	01	06
6.3	WWTP of East Attica (Artemida, Rafina, Koropi etc)	01	06

### *3.6.2 Sector 2: Urban solid wastes*

Urban solid wastes management in the region of Attica is directly related to the operation of the existing landfill, serving the inhabitants of Athens. The construction of a new modern sanitary landfill is under evaluation by the Ministry of Environment, Planning and Public Works in order to select the most appropriate area. Furthermore, the completion of the composting plant is one of the priorities of the Ministry.

#### Proposed Projects

<b>ID</b>	<b>Proposed Projects</b>	<b>Sector</b>	<b>RBD</b>
6.5	Municipal Waste Sanitary Landfill of Attica	02	06
6.6	Completion of Composting Unit in Attica	02	06

### *3.6.3 Sector 3: Air Pollution*

From the data of the budget baseline analysis, the produced loads related to emissions to air are presented in the following table.

	<b>RBD 06-ATTICA</b>	
	BB2003 (total load discharged) (kg/y)	Load that has to be reduced by 2010 by 50%
<b>VOC</b>	9,485,656	8,487,324
<b>SO2</b>	60,198,000	59,596,020
<b>NOx</b>	17,630,661	16,057,843
<b>CO2</b>	5,992,553,175	5,991,919,269

The reduction of air pollution from the industrial activity is directly related to the enforcement of current legislation which has to be adopted by the industries during the renewal of their environmental permits. Consequently, actions will be taken from those industries which do not comply with the environmental law.

### *3.6.4 Sector 6: Wastewater and solid waste from industrial installations*

The Psyttalia wastewater treatment plant receives pre-treated industrial wastewater from about 140 industries legally connected to the sewerage system. For this purpose a sewage ordinance regulates emission standards (Presidential Decree 6/1986), with main objective to prevent inhibition of the operation of the Psyttalia wastewater treatment plant and control the industrial discharges to the Inner Saronicos gulf. Significant industrial activity is developed at the West Attica and specifically the areas of Elefsina and Aspropyrgos. Individual industries operate at the area, while in most cases the wastewater produced is discharged untreated to the coastal area of Elefsina Gulf. The Water and Sewage Corporation of Athens (EYDAP) has programmed the construction of a new wastewater treatment plant (see sector 1

project ID 6.1), which will receive both domestic and industrial sewage, and is expected to significantly improve the current situation.

The following table presents the loads for BOD, N, P and suspended solids discharged from industrial establishments, according to the BB analysis.

<b>RBD 06 ATTICA</b>			
	<b>BB 2003 kg/year</b>	<b>Expected BAT kg/year</b>	<b>Load that has to be reduced by 50% by the year 2010 kg/year</b>
BOD5	3,584,598.48	367,087.30	3,217,511.18
TSS	8,829,545.37	1,322,181.70	7,507,363.67
Total - N	176,211.43	37,244.00	138,967.43
Total - P	35,241.08	12,647.00	22,594.08

The necessary reduction in the following years, in the cases where no treatment is performed can be achieved through the adoption of proper environmental permits and enforcement of specific emission limits, depending on the type of industrial sector.

### **3.7 RBD-07: East Continental Greece**

#### *3.7.1 Sector 1: Sewage management*

In RBD-07 there are two agglomerations close to the coast, each with a population greater than 15,000 and with a total population of 121,000 (Chalkida, Lamia) that provide biological treatment, minimising the load discharged to the Evoikos gulf and the Maliakos Gulf respectively.

<b>RBD 07</b>		
<b>Coastal Area</b>	<b>P.E.</b>	<b>WWTP</b>
LAMIA	65,000	Yes
CHALKIDA	56,000	Yes

#### *3.7.2 Sector 2: Urban solid wastes*

In East Continental Greece there is one sanitary landfill which serves the wider area of Lamia and two landfills which are currently under construction (North Evoia and Chalkida). Upon completion of all projected works, a total population of 236,103 will be served by sanitary landfills.

#### *3.7.3 Sector 3: Air Pollution*

From the data of the budget baseline analysis, the produced loads related to emissions to air are presented in the following table.

<b>RBD 07-EAST CONTINENTAL GREECE</b>	
BB2003 (total load discharged) (kg/y)	Load that has to be reduced by 2010 by 50%

<b>VOC</b>	2,913,334	2,544,102
<b>SO2</b>	52,815,838	52,287,680
<b>NOx</b>	16,665,227	16,581,901
<b>CO2</b>	4,509,193,791	4,464,101,853

The reduction of air pollution from the industrial activity is directly related to the enforcement of current legislation which has to be adopted by the industries during the renewal of their environmental permits. Consequently, actions will be taken from those industries which do not comply with the environmental law.

### 3.7.4 Sector 6: Wastewater and solid waste from industrial installations

The following table presents the loads for BOD, N, P and suspended solids discharged from industrial establishments, according to the BB analysis.

<b>RBD 07 EAST CONTINENTAL GREECE</b>			
	<b>BB 2003 kg/year</b>	<b>Expected BAT kg/year</b>	<b>Load that has to be reduced by 50% by the year 2010 kg/year</b>
BOD5	7,957,652.61	3,542,380.95	4,415,271.66
TSS	8,585,822.67	4,308,291.70	4,277,530.97
Total - N	9,473.08	2,686.40	6,786.68
Total - P	1,425.03	285.00	1,140.03

The necessary reduction in the following years, in the cases where no treatment is performed can be achieved through the adoption of proper environmental permits and enforcement of specific emission limits, depending on the type of industrial sector.

## 3.8 RBD-08: Thessalia

### 3.8.1 Sector 1: Sewage management

In RBD-08 two wastewater treatment plants, serving the coastal cities of Skiathos and Volos are today in full operation offering biological carbon and nitrogen removal for 156.000 p.e.. Consequently, a significant amount of the load attributed to urban sewage is treated prior to discharge at the coastal areas of RBD-08.

<b>RBD 08</b>		
<b>Coastal Area</b>	<b>P.E.</b>	<b>WWTP</b>
VOLOS	135,000	Yes
SKIATHOS	21,000	Yes

### 3.8.2 Sector 2: Urban solid wastes

The larger coastal city of Thessalia (Volos) is served by a sanitary landfill that will soon be upgraded (197,942 inhabitants), whereas for other coastal cities smaller sanitary landfills are under construction (Skopelos-5070 inhabitants, Skiathos-5547

inhabitants, Alonissos-3249 inhabitants). The total population that will be served upon completion of all works is about 212,000.

### 3.8.3 Sector 3: Air Pollution

From the data of the budget baseline analysis, the produced loads related to emissions to air are presented in the following table.

<b>RBD 08- THESSALIA</b>		
	BB2003 (total load discharged) (kg/y)	Load that has to be reduced by 2010 by 50%
<b>VOC</b>	546,136	520,731
<b>SO2</b>	3,974,936	3,935,187
<b>NOx</b>	8,680,821	8,637,417
<b>CO2</b>	3,192,235,820	3,160,313,462

The reduction of air pollution from the industrial activity is directly related to the enforcement of current legislation which has to be adopted by the industries during the renewal of their environmental permits. Consequently, actions will be taken from those industries which do not comply with the environmental law.

### 3.8.4 Sector 6: Wastewater and solid waste from industrial installations

Reduced industrial activity

The following table presents the loads for BOD, N, P and suspended solids discharged from industrial establishments, according to the BB analysis.

<b>RBD 08 THESSALIA</b>			
	<b>BB 2003 kg/year</b>	<b>Expected BAT kg/year</b>	<b>Load that has to be reduced by 50% by the year 2010 kg/year</b>
BOD5	386,727.96	183,600.00	203,127.96
TSS	1,185,262.56	702,393.10	482,869.46
Total - N	57,070.64	15,558.40	41,512.24
Total - P	7,228.94	2,674.24	4,554.70

The necessary reduction in the following years, in the cases where no treatment is performed can be achieved through the adoption of proper environmental permits and enforcement of specific emission limits, depending on the type of industrial sector.

## 3.9 RBD-09: West Macedonia

### 3.9.1 Sector 1: Sewage management

In RBD-09 there are two agglomerations close to the coast (Katerini and Litochoro), with a total population of 150,000. The wastewater treatment plant of Katerini is

being upgraded (bidding stage), while the plant in Litochoro adequately treats the domestic wastewater prior to discharge.

<b>RBD 09</b>		
<b>Coastal Area</b>	<b>P.E.</b>	<b>WWTP</b>
KATERINI	80,000	Yes
LITOCHORO	70,000	Yes

### 3.9.2 Sector 2: Urban solid wastes

The coastal city Katerini (76,660 inhabitants served) is served by a sanitary landfill, whereas the respective site in Litochoro (33,858) is out of operation.

#### Proposed Projects

<b>ID</b>	<b>Proposed Projects</b>	<b>Sector</b>	<b>RBD</b>
9.1	Sanitary Landfill of Litochoro	02	09

### 3.9.3 Sector 3: Air Pollution

From the data of the budget baseline analysis, the produced loads related to emissions to air are presented in the following table.

<b>RBD 09-WEST MACEDONIA</b>		
	BB2003 (total load discharged) (kg/y)	Load that has to be reduced by 2010 by 50%
<b>VOC</b>	1,144	1,139
<b>SO2</b>	149,692,858	148,195,929
<b>NOx</b>	30,573,054	30,420,189
<b>CO2</b>	34,342,700,581	33,999,273,575

The reduction of air pollution from the industrial activity is directly related to the enforcement of current legislation which has to be adopted by the industries during the renewal of their environmental permits. Consequently, actions will be taken from those industries which do not comply with the environmental law.

### 3.9.4 Sector 6: Wastewater and solid waste from industrial installations

The following table presents the loads for BOD, N, P and suspended solids discharged from industrial establishments, according to the BB analysis.

<b>RBD 09 WEST MACEDONIA</b>			
	<b>BB 2003 kg/year</b>	<b>Expected BAT kg/year</b>	<b>Load that has to be reduced by 50% by the year 2010 kg/year</b>
BOD5	1,541,625.37	648,990.85	892,634.52
TSS	615,853.43	321,853.20	294,000.23
Total - N	8,348.85	1,669.80	6,679.05
Total - P	1,959.01	535.68	1,423.33

The necessary reduction in the following years, in the cases where no treatment is performed can be achieved through the adoption of proper environmental permits and enforcement of specific emission limits, depending on the type of industrial sector.

### **3.10 RBD-10: Central Macedonia**

#### *3.10.1 Sector 1: Sewage management*

##### Current situation

In RBD-10, where the second largest city of Greece is located (Thessaloniki) there are 4 agglomerations (Thessaloniki, Touristic area of Thessaloniki, Nea Kallikrateia, Kallithea Chalkidikis) with total population of 1.2 million, all served by individual wastewater treatment plants. Thus, a significant amount of the load attributed to urban sewage is treated prior to discharge at the coastal areas of RBD-10.

<b>RBD 10</b>		
<b>Coastal Area</b>	<b>P.E.</b>	<b>WWTP</b>
THESSALONIKI	1,100,000	Yes
THESSALONIKI (Touristic Areas)	87,000	Yes
NEA KALLICRATEIA	30,000	Yes
KALLITHEA CHALKIDIKIS	15,000	Yes

##### Proposed Projects

The completion of the sewage network at the touristic areas of Thessaloniki is one project of priority issue in order to minimise the effect of sewage discharge at West Thermaikos.

<b>ID</b>	<b>Proposed Projects</b>	<b>Sector</b>	<b>RBD</b>
10.1	Completion of sewage network at Thessaloniki Touristic Areas	01	10

#### *3.10.2 Sector 2: Urban solid wastes*

The city of Thessaloniki is currently served by a landfill until the completion of construction of the new sanitary landfill that will serve the wider Thessaloniki area. In addition to the operational sanitary landfill in Kassandra (16126 inhabitants served), there is also a number of new sanitary landfills currently under construction or at the bidding stage (Anthemountas-38,504 inhabitants, Polygyros-13,793 inhabitants) and thus the issue of potential pollution due to uncontrolled solid wastes disposal is not of increased importance.

#### *3.10.3 Sector 3: Air Pollution*

From the data of the budget baseline analysis, the produced loads related to emissions to air are presented in the following table.

<b>RBD 10-CENTRAL MACEDONIA</b>		
	BB2003 (total load discharged) (kg/y)	Load that has to be reduced by 2010 by 50%
<b>VOC</b>	4,056,431	4,040,437
<b>SO2</b>	12,975,959	12,846,199
<b>NOx</b>	4,132,913	4,124,787
<b>CO2</b>	1,552,560,380	1,529,847,880

The reduction of air pollution from the industrial activity is directly related to the enforcement of current legislation which has to be adopted by the industries during the renewal of their environmental permits. Consequently, actions will be taken from those industries which do not comply with the environmental law.

#### *3.10.4 Sector 6: Wastewater and solid waste from industrial installations*

Outside the city of Thessaloniki there is an industrial estate where approximately 600 industries are installed. The industrial wastewater (~7000 m<sup>3</sup>/d) is biologically treated at one wastewater treatment plant, from which the final effluent is discharged to the coastal area of the Thermaikos gulf. The emission standards for the industrial discharges are established at local level (Prefecture Decree 22374/91/11-1-1994).

The following table presents the loads for BOD, N, P and suspended solids discharged from industrial establishments, according to the BB analysis.

<b>RBD 10 CENTRAL MACEDONIA</b>			
	<b>BB 2003 kg/year</b>	<b>Expected BAT kg/year</b>	<b>Load that has to be reduced by 50% by the year 2010 kg/year</b>
BOD5	7,788,856.25	919,773.05	6,869,083.20
TSS	19,128,395.93	3,596,483.70	15,531,912.23
Total - N	155,000.66	32,587.80	122,412.86
Total - P	13,269.52	4,522.84	8,746.68

The necessary reduction in the following years, in the cases where no treatment is performed can be achieved through the adoption of proper environmental permits and enforcement of specific emission limits, depending on the type of industrial sector.

### **3.11 RBD-11: East Macedonia**

#### *3.11.1 Sector 1: Sewage management*

The city of Kavala is the largest agglomeration of RBD-11. The inhabitants (80,000) are served by a wastewater treatment plant, where sewage is biologically treated prior to disposal to the Kavala gulf.



<b>RBD 11</b>		
<b>Coastal Area</b>	<b>P.E.</b>	<b>WWTP</b>
KAVALA	80,000	Yes

### 3.11.2 Sector 2: Urban solid wastes

The city of Kavala (63,774 inhabitants) is served by a sanitary landfill thus, providing for safe disposal of solids wastes in the area.

### 3.11.3 Sector 3: Air Pollution

From the data of the budget baseline analysis, the produced loads related to emissions to air are presented in the following table.

<b>RBD 11-EAST MACEDONIA</b>		
	BB2003 (total load discharged) (kg/y)	Load that has to be reduced by 2010 by 50%
<b>VOC</b>	844,060	830,150
<b>SO2</b>	1,183,744	1,171,907
<b>NOx</b>	902,165	897,654
<b>CO2</b>	225,439,224	223,184,832

The reduction of air pollution from the industrial activity is directly related to the enforcement of current legislation which has to be adopted by the industries during the renewal of their environmental permits. Consequently, actions will be taken from those industries which do not comply with the environmental law.

### 3.11.4 Sector 6: Wastewater and solid waste from industrial installations

The following table presents the loads for BOD, N, P and suspended solids discharged from industrial establishments, according to the BB analysis.

<b>RBD 11 EAST MACEDONIA</b>			
	<b>BB 2003 kg/year</b>	<b>Expected BAT kg/year</b>	<b>Load that has to be reduced by 50% by the year 2010 kg/year</b>
BOD5	2,811,790.27	154,032.40	2,657,757.87
TSS	10,028,204.83	1,029,496.00	8,998,708.83
Total - N	79,916.23	15,983.20	63,933.03
Total - P	203,577.31	40,715.48	162,861.83

The necessary reduction in the following years, in the cases where no treatment is performed can be achieved through the adoption of proper environmental permits and enforcement of specific emission limits, depending on the type of industrial sector.

### 3.12 RBD-12: Thrace

#### 3.12.1 Sector 1: Sewage management

The cities of Alexandroupoli and Potamia Thasou, two areas with increased seasonal population, are the largest agglomerations of RBD-12. The inhabitants (permanent and seasonal) of Alexandroupoli and Potamia Thasou (total of 90,000 inhabitants) are served by individual wastewater treatment plants that provide appropriate treatment.

<b>RBD 12</b>		
<b>Coastal Area</b>	<b>P.E.</b>	<b>WWTP</b>
ALEXANDROUPOLI	70,000	Yes
POTAMIA THASOS	20,000	Yes

#### 3.12.2 Sector 2: Urban solid wastes

The city of Alexandroupoli is served by a sanitary landfill thus, providing for safe disposal of solids wastes in the area, whereas the island of Thasos is not served by respective facilities.

<b>ID</b>	<b>Proposed Projects</b>	<b>Sector</b>	<b>RBD</b>
12.1	Sanitary Landfill of Thasos	02	12

#### 3.12.3 Sector 3: Air Pollution

From the data of the budget baseline analysis, the produced loads related to emissions to air are presented in the following table.

<b>RBD 12-THRACE</b>		
	BB2003 (total load discharged) (kg/y)	Load that has to be reduced by 2010 by 50%
<b>VOC</b>	78,403	76,394
<b>SO2</b>	3,833,088	3,794,757
<b>NOx</b>	528,780	526,136
<b>CO2</b>	276,195,785	273,433,827

The reduction of air pollution from the industrial activity is directly related to the enforcement of current legislation which has to be adopted by the industries during the renewal of their environmental permits. Consequently, actions will be taken from those industries which do not comply with the environmental law.

#### 3.12.4 Sector 6: Wastewater and solid waste from industrial installations

The following table presents the loads for BOD, N, P and suspended solids discharged from industrial establishments, according to the BB analysis.

<b>RBD 12 THRACE</b>			
	<b>BB 2003 kg/year</b>	<b>Expected BAT kg/year</b>	<b>Load that has to be reduced by 50% by the year 2010 kg/year</b>

BOD5	3,401,791.08	218,494.00	3,183,297.08
TSS	11,401,360.82	1,235,765.20	10,165,595.62
Total - N	2,300.00	460	1,840.00
Total - P	2,875.00	575	2,300.00

The necessary reduction in the following years, in the cases where no treatment is performed can be achieved through the adoption of proper environmental permits and enforcement of specific emission limits, depending on the type of industrial sector.

### 3.13 RBD-13: Crete

#### 3.13.1 Sector 1: Sewage management

##### Current situation

The wastewater treatment plants that operate today in Crete serve all the large cities (Irakleio, Chania, Rethymno, Chersonissos, Ag. Nicolaos, Siteia and Ierapetra), with a total population of about 380,000. The treatment provided offers biological carbon and nitrogen removal. In the RBD there are also the agglomerations of N. Kydonia, and Mallia with total population 45,000 which, do not have wastewater treatment facilities.

<b>RBD 13</b>		
<b>Coastal Area</b>	<b>P.E.</b>	<b>WWTP</b>
IRAKLEIO	164,000	Yes
CHANIA	85,000	Yes
RETHYMNO	50,000	Yes
N. KYDONIA	30,000	No
CHERSONISSOS	30,000	Yes
IERAPETRA	18,000	Yes
AG. NICOLAOS	17,000	Yes
MALLIA	15,000	No
SITEIA	15,000	Yes

##### Estimated untreated load discharged

The total organic load produced from the areas of N. Kydonia and Mallia is estimated to be about 1,000 tonnes per year, corresponding to approximately 700 tonnes BOD per year discharged.

##### Proposed Projects

The construction of wastewater treatment plants that will serve these specific areas will further contribute to the protection of the aquatic environment and public health.

<b>ID</b>	<b>Proposed Projects</b>	<b>Sector</b>	<b>RBD</b>
13.1	WWTP of N. Kydonia	01	13
13.2	WWTP of Mallia	01	13

### 3.13.2 Sector 2: Urban solid wastes

There are many sanitary landfills in operation serving the larger cities of the island of Crete, whereas five more are under construction. Upon completion of the construction of all sites a total population of 650,000 will be served by organised sanitary landfills.

### 3.13.3 Sector 3: Air Pollution

From the data of the budget baseline analysis, the produced loads related to emissions to air are presented in the following table.

<b>RBD 13-CRETE</b>		
	BB2003 (total load discharged) (kg/y)	Load that has to be reduced by 2010 by 50%
<b>VOC</b>	293,394	292,220
<b>SO2</b>	20,648,996	20,442,506
<b>NOx</b>	6,121,475	5,885,626
<b>CO2</b>	1,562,046,223	1,546,425,761

The reduction of air pollution from the industrial activity is directly related to the enforcement of current legislation which has to be adopted by the industries during the renewal of their environmental permits. Consequently, actions will be taken from those industries which do not comply with the environmental law.

### 3.13.4 Sector 6: Wastewater and solid waste from industrial installations

The following table presents the loads for BOD, N, P and suspended solids discharged from industrial establishments, according to the BB analysis.

<b>RBD 13 CRETE</b>			
	<b>BB 2003 kg/year</b>	<b>Expected BAT kg/year</b>	<b>Load that has to be reduced by 50% by the year 2010 kg/year</b>
BOD5	83,592.80	21,318.85	62,273.95
TSS	88,059.07	46,641.60	41,417.47
Total - N	1,886.16	1,032.60	853.56
Total - P	182.96	36.3	146.66

Although the loads are relatively low (corresponding to less than 3000 p.e.) the expected reduction in the following years, in the cases where no treatment is performed can be achieved through the adoption of proper environmental permits and enforcement of specific emission limits, depending on the type of industrial sector.

## 3.14 RBD-14: Aegean Islands

### 3.14.1 Sector 1: Sewage management

#### Current situation

The wastewater treatment plants that operate today in the largest and more popular islands of the Aegean Sea (Rhodes, Kos, Paros, Mytilene, Chios, Mykonos, Naxos, Syros, Santorini) serve a total population of about 350,000. The treatment provided offers biological carbon and nitrogen removal. In the RBD there is also the agglomeration of Kalymnos with total population 20,000 that, is not served by appropriate collection and treatment facilities.

<b>RBD 14</b>		
<b>Coastal Area</b>	<b>P.E.</b>	<b>WWTP</b>
RHODES	120,000	Yes
KOS	33,000	Yes
CHIOS	32,000	Yes
RHODES (Septic sewage)	30,000	Yes
MYTILENE	30,000	Yes
ERMOUPOLI	21,500	Yes
KALYMNOS	20,000	No
THIRA (MESARIA)	20,000	Yes
NAOUSA-PAROS	18,000	Yes
PARIKIA PAROS	17,000	Yes
NAXOS	17,000	Yes
MYKONOS	16,000	Yes

#### Estimated untreated load discharged

The total organic load produced from the area of Kalymnos is estimated to be about 400 tonnes per year, corresponding to approximately 300 tonnes BOD per year discharged.

#### Proposed Projects

The construction of the wastewater treatment plant will further contribute to the protection of the aquatic environment and public health.

<b>ID</b>	<b>Proposed Projects</b>	<b>Sector</b>	<b>RBD</b>
14.1	WWTP of Kalymnos	01	14

#### *3.14.2 Sector 2: Urban solid wastes*

Regarding the disposal of solid wastes there are many landfills either in ooperation serving a number of Aegean islands, or currently at the bidding stage or under construction. Upon completion of the construction of all sites a total population of 170,000 will be served by organised sanitary landfills.

#### *3.14.3 Sector 3: Air Pollution*

From the data of the budget baseline analysis, the produced loads related to emissions to air are presented in the following table.

<b>RBD 14 AEGEAN ISLANDS</b>		
	BB2003 (total load discharged) (kg/y)	Load that has to be reduced by 2010 by 50%
<b>VOC</b>	552,927	525,027
<b>SO2</b>	22,589,307	22,363,414

<b>NOx</b>	19,541,825	19,444,116
<b>CO2</b>	1,214,184,367	1,202,042,523

The reduction of air pollution from the industrial activity is directly related to the enforcement of current legislation which has to be adopted by the industries during the renewal of their environmental permits. Consequently, actions will be taken from those industries which do not comply with the environmental law.

#### 3.14.4 Sector 6: Wastewater and solid waste from industrial installations

From the Budget Baseline analysis there are no records for industries discharging directly their wastewater to the coastal areas.

## 4. NATIONAL ACTION PLAN

### 4.1 Sectoral Plans - Relevant On-going National Plans - Programme support elements

Sector 1: Sewage management: The obligations derived by the 91/271/EEC Directive were the driving force for its implementation in Greece. The construction of many wastewater treatment plants the last 20 years enabled the improvement of the aquatic environment and as a result there are no significant pollution problems related to the sector of sewage management. Nevertheless, specific projects have to be included to national programming in order to avoid deterioration of the environment of individual areas. The following table presents the proposed works related to sewage management.

<b>ID</b>	<b>Proposed Projects</b>	<b>Sector</b>	<b>RBD</b>
6.1	WWTP of Elefsina (Thriasio Pedio)	01	06
6.2	WWTP of East Attica (N. Makri)	01	06
6.3	WWTP of East Attica (Artemida, Rafina, Koropi etc)	01	06
10.1	Completion of sewage network at Thessaloniki Touristic Areas	01	10
13.1	WWTP of N. Kydonia	01	13
13.2	WWTP of Mallia	01	13
14.1	WWTP of Kalymnos	01	14

Supplemented actions that are related to sewage management are related to a development of a programme for the control of operation and maintenance of wastewater treatment plants (budget 70,800 euro).

Sector 2: Urban solid wastes: The national strategic plan for solid wastes management is characterised by a very strict timetable that has to be followed in order to meet the objectives of the EU legislation. It is expected that the situation will be significantly improved in the next years. The following table presents the proposed works related to sewage management.

<b>ID</b>	<b>Proposed Projects</b>	<b>Sector</b>	<b>RBD</b>
3.1	Sanitary Landfill of Argos-Nafplio-Tolo	02	03
5.1	Sanitary Landfill of Igoumenitsa	02	05
5.2	Sanitary Landfill of Arta	02	05

6.5	Municipal Waste Sanitary Landfill of Attica	02	06
6.6	Completion of Composting Unit in Attica	02	06
9.1	Sanitary Landfill of Litochoro	02	09
12.1	Sanitary Landfill of Thasos	02	12

Supplemented actions that are related to the development of a programme for the internal control of the operation and safety of sanitary landfills (budget 76,700 euro).

Sector 3: Air pollution: The reduction of air pollution by the industrial sector can be achieved by enforcement of the legal obligations of the industries. Furthermore, several programmes of measures have been established for the period 2001-2006 at a total budget of 28.6MEuro that include, the completion of a system for the management and evaluation of air pollution, specific plans at a regional level, national plan for the reduction of VOCs, monitoring of air emissions.

Sector 6: Wastewater and solid waste from industrial installations: Enforcement mechanisms have to be activated in order to control discharges of untreated wastewater to the environment. The necessary 50% reduction can only be achieved through the adoption of proper environmental permits of the industries and enforcement of the specific emission limits defined in legislation.

Sector 7: Lubricating oil, hazardous chemicals and obsolete chemicals stockpiles;  
Sector 11: Prohibition of the manufacture, trade and new uses of PCBs: A new national plan regarding the current situation on production and disposal of hazardous wastes is currently under preparation. It is expected that the new plan will propose specific programmes of measures that will have to be implemented in the following years.

Sector 8: Updating and adopting of national regulations on sewage discharges to the sea and rivers: As already mentioned, the current legal framework in Greece with respect to urban wastewater treatment and disposal, follows the provisions of the relevant EC Directive (91/271/EC). Regarding industrial emissions these are specified to the relevant national law in force (Ministerial Act 50388/2704/2003, Prefectural Decrees and specific environmental permits). Consequently the necessary framework is there and must be followed

Sector 9: Establishment of a system of previous authorization by competent national authorities for works which cause physical alterations on the natural state of the coastline or the degradation of coastal habitats: Law 3010/2002 describes the procedures that must be followed in order to obtain environmental permits for any type of activity. The authorisation involves public participation, as already mentioned. Additional processes that enable public participation are related to a survey on issues regarding solid wastes management (budget 140.000 Euro) and of the "polluter pays" principle (budget 0.3 MEuro).

Regarding sectors 4, 5 and 10, national monitoring programmes that are operational focus on the quality of surface and coastal water and the impact organics, heavy metals and other persistent pollutants (monitoring of the coastal environment-0.59MEuro, monitoring of microbial pollution of bathing waters-1.28MEuro, monitoring of surface water quality).

Furthermore, the following actions are programmed:

- development of support tools for the identification and control of pollution from point sources according to the provisions of European Legislation (budget 1.1 MEuro)
- provision of equipment for the effective protection of the environment (budget 1.75 MEuro)

## 4.2 Priority list

The proposed works, sorted by their capacity, are presented in the following table. The final short-list depends on the programmed actions acknowledged by the Ministry of Environment and Public Works and their specific characteristics in terms of finance.

<b>ID</b>	<b>Proposed Projects</b>	<b>Estimated Budget</b>
6.1	WWTP of Elefsina (Thrasio Pedio)	
6.5	Municipal Waste Sanitary Landfill of Attica	
6.6	Completion of Composting Unit in Attica	
10.1	Completion of sewage network at Thessaloniki Touristic Areas	
6.2	WWTP of East Attica (N. Makri)	
6.3	WWTP of East Attica (Artemida, Rafina, Koropi etc)	
3.1	Sanitary Landfill of Argos-Nafplio-Tolo	
5.1	Sanitary Landfill of Igoumenitsa	
5.2	Sanitary Landfill of Arta	
9.1	Sanitary Landfill of Litochoro	
12.1	Sanitary Landfill of Thasos	
13.1	WWTP of N. Kydonia	
13.2	WWTP of Mallia	
14.1	WWTP of Kalymnos	

The prioritisation of projects will be amended on the basis of the data to be provided by the Ministry of Environment Planning and Public Works.

## 4.3 Public participation – Economic instruments

Issues related to public participation and stakeholders during the implementation of the proposed projects are covered by the relevant legislation in force. For each category of projects a specific process has to be followed, as described in Law 3010/2002, which for large projects is lead by the Hellenic Ministry of Environment, Physical Planning and Public Works. The process involves the submission of the Environmental Impact Assessment (EIA) study to the competent authorities. The study is then forwarded to stakeholders (e.g. Prefecture, local authorities), who in their turn are responsible for the publication of the projected works to the local press, allowing for everyone who wishes to get more information from the EIA study. The approval of the study is directly related to the determination of environmental permits, which have to be followed during the construction and operation of a project. The Ministry of Environment, Physical Planning and Public Works periodically organises workshops in order to present to the public and the stakeholders its priorities and the projected works.



National economic instruments have been developed at national level and applied aiming at the sustainability of every project. In most cases these instruments are in the form of taxes or other charges paid by the citizens to local authorities responsible for sewerage systems and wastewater treatment facilities, collection and disposal of solid wastes. Regarding the industrial sector, national legislation is also referring to non-compliance fees, in cases where the industries do not comply with the environmental permits in force. As a result no additional economic instruments are being proposed during the preparation of the NAP.

#### **4.4 Cost & Funding prospects - Investment Portfolio – Final list**

The Investment Portfolio is based on the national programming and the estimated budgets of the selected for each sector projects. The IP is the determinant for the finalisation of the priorities list. It should be noted that most of the projects referred to are co-financed by the European Commission 3<sup>rd</sup> and 4<sup>th</sup> Structural Funds and the Greek government. The final short-list of the proposed projects is presented in the following table.

### **5. CONCLUSIONS AND PROSPECTS**

The NAP for Greece is based on current national programmes for each sector and the obligations that derive from the European and national legal framework. The need for compliance to this legal framework addresses most if not all the projects required under SAP and thus the establishment of the NAP did not require deviation from the already programmed actions, national planning and hierarchy of projects which are based on specific obligations and timetables set by the EU Directives.

Furthermore, within the Water Framework Directive (2000/60/EC), programmes of measures for each river basin district must be established by 2009, covering, *inter alia*, all potential sectors of pollution. This particular requirement to implement the WFD is very demanding in terms of obligations, and the completion of that task coincides to the SAP targets.