Regional Activity Centre
for Cleaner Production
(RAC/CP)

Mediterranean Action Plan

STATE OF CLEANER PRODUCTION IN THE MEDITERRANEAN ACTION PLAN COUNTRIES

UNEP

Regional Activity Centre
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Ministry of the Environment
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Summary

Preface

Given the series of initiatives and programmes within the framework of the Mediterranean Action Plan that prioritises a relationship between business and industry and the environment based on the prevention of pollution at source, it is necessary to establish the baseline scenario from which specific aligned actions can be proposed and carried out.

This need, which is even more evident in such a varied scenario as the Mediterranean Region, is the reason for the study being presented.

The methodology used for the drawing up of the study (which involved work commissioned to independent experts, the checking of this work by the NFP of the RAC/CP, a meeting of experts brought together to go over it and the systemisation of the conclusions carried out at the Centre itself) has produced a report that will serve as the foundation for defining policies and actions and even for establishing a certain kind of benchmark for the Mediterranean area involving objectives, instruments and results.

A critical analysis is made of the study at RAC/CP and, despite the efforts made to avoid this happening, we believe that it emphasises the most successful experiences at a time when the objectives to be attained in matters of the environment, business activities and sustainable development are still numerous and there is an important need for combining wishes, efforts and resources, which is all perhaps insufficiently reflected in the following pages.

At the same time, however, and applying the universally accepted principle that "perfection is inimical to goodness", we came to the conclusion at both the Centre and its NFP that it was necessary for it to be published, despite our being aware of the gaps and shortcomings that it surely contains.

Along with this decision comes also the proposal that this basic report be revised periodically for it to serve as an instrument that reflects the developments in the relationship between economic actors and the environment that comprises one of the driving forces of sustainable development.

Moreover, and in close relationship with indicators, plans and programmes instigated by the MAP itself and other institutions, it will serve as a gauge for all of the public and private institutions involved in the development of the Region.

With the wish that it serves as a working paper and the request that the reader accept the contents in good faith, the RAC/CP hereby makes the "Study on the State of Cleaner Production in the MAP countries" available to society in the Mediterranean Region.

Víctor Macià
RAC/CP Director

Introduction

As Stage II of the Mediterranean Action Plan (MAP) was approved by means of the Barcelona Convention for the Protection of the Mediterranean Sea against Pollution, a series of priority actions concerning the environment were defined for the 1996-2005 period that included the promotion, development and application of cleaner production (CP).

One of the activities that need to be carried out on a regional scale in the course of the MAP being developed is the collection of information for the monitoring and assessment of the interaction between environment and development in the Mediterranean basin.

The Regional Activity Centre for Cleaner Production (RAC/CP) began an analytical study of the state of cleaner production in the MAP countries in 2000 in order to establish the extent to which it has been introduced in different countries and to provide basic data for monitoring in the future.

For this study to be made, the National Focal Points (NFP) of the RAC/CP were contacted in the twenty countries of the MAP (Albania, Algeria, Bosnia-Herzegovina, Croatia, Cyprus, Egypt, France, Greece, Italy, Israel, Lebanon, Libya, Malta, Morocco, Monaco, Slovenia, Spain, Syria, Turkey and Tunisia), and information was requested on:

- A description of the current situation in the country.
- A definition of CP as applied in each country.
- A list of agents responsible for CP.
- The legal framework of CP.
- CP programmes and action plans.
- Activities and tools for promoting CP.

The information provided by the NFP (not all gave information on each point, as is pointed out throughout the report) was compiled in an initial draft report.

The NFPs of the RAC/CP checked and approved the part corresponding to their respective countries appearing in the draft report, and a Meeting of Experts in Barcelona was subsequently called for 21 and 22 September 2000 to

assess this study not just from the point of view of the information that it contained but also of its usefulness for the region.

The conclusions of the meeting concerning the report were as follows:

- The validity and usefulness of the information contained in the study, for it is the first time that all such information has been compiled in one report.
- The need to draw conclusions from the information available and to include these in the report.
- The advisability of publishing and disseminating the report subsequent to the important task of editing.
- The need for the final report to be used as the basis for subsequent revisions every two or three years.

This report is the result of the editing process, and is structured as follows:

1. Chapter I gives the definitions of CP submitted by each country.
2. Chapter II gives an overview of the economic and social situation and the most important industrial sectors in each country, which provides a better understanding of the situation in each country when it comes to promoting CP and, at the same time, sets the context for the remaining chapters.
3. Chapter III gives the different agents that are responsible for CP, with details of their functions, capacity to act and sources of finance.
4. Chapter IV defines the legal framework in each country and describes the legal provisions that have been developed to support the implementation of CP.
5. Chapter V details the programmes and plans developed at the national and local levels for promoting CP through the different institutions. These plans and programmes reveal the issues considered top priority in the different countries.
6. As a final point concerning the compiling of information, Chapter VI presents the different tools and activities developed to promote CP by the institutions that are responsible for this.
7. To finish off, Chapter VII gives the conclusions drawn from the information provided, with the countries grouped in different categories according to the extent to which CP has been introduced in each one. It also provides a series of indicators to enable the subsequent monitoring of progress in the implementation of CP.

It should be pointed out that these conclusions have been drawn from the data available in the study and that, in some cases, they may not conform to the real situation. This is due to the information not always being sufficiently accurate and also the fact that a definition of the indicators was not established

prior to the study being made. This means that the countries may have interpreted the information provided in different ways.

The structure of each chapter is based on the presentation of the information country by country with a summary at the end of the chapter of the conclusions that have been drawn exclusively from the analysis of the information contained in the report.

1. Definition of CP

This chapter presents the definition of the concept of Cleaner Production adopted by the countries of the MAP. Some of these have adhered to the definitions of international bodies, principally the United Nations Environment Programme (UNEP), although in some cases CP fits the definition of the Best Available Technologies (BAT). Other countries have adapted the definition to their specific situation and intrinsic characteristics. The definitions of other associated terms, which have been provided by the different countries and are based on the definitions of international bodies, are also given.

1.1 Albania

Definition of CP

"CP is the continuous application of an integrated preventive environmental strategy to processes, products and services to increase eco-efficiency and reduce risks to humans and the environment".

The following definitions are appended to the one above:

- Production process: conserving raw materials and energy, by eliminating toxic, raw materials, and reducing the quantity of toxicity of all emissions and waste.
- Products: reducing negative impacts throughout the entire life cycle of a product, from raw materials extraction to its ultimate disposal.
- Services: incorporating environmental concerns into designing and delivering services.

CP in Albania requires changing attitudes, responsible environmental management, and evaluating technology options.

Albania has so far not used this definition in any legal text or regulation in force in the country.

1.2 Algeria

Definition of CP

"Cleaner production is defined as the broad concept that comprises environmental issues in all aspects of industrial development and scientific research, with the object of preventing and reducing the production of pollution at source and exploiting all of the country's natural resources in a sustainable way."

CP is considered to be a way of promoting new modern technologies that produce less pollution and use less energy and fewer natural resources, and has a direct effect on the country's economic and administrative capacity.

1.3 Bosnia-Herzegovina

Definition of CP

"Production that uses low or zero-waste emission technologies."

1.4 Croatia

Definition of CP

"CP is the continuous application of an integrated preventive environmental strategy to processes, products and services to increase eco-efficiency and reduce risks to humans and the environment".

Definitions annexed to the above are:

- Production process: conserving raw materials and energy, by eliminating toxic, raw materials, and reducing the quantity of toxicity of all emissions and waste.
- Products: reducing negative impacts throughout the entire life cycle of a product, from raw materials extraction to its ultimate disposal.
- Services: incorporating environmental concerns into designing and delivering services.

CP requires changing attitudes, responsible environmental management, and evaluating technology options.

1.5 Cyprus

Definition of CP

Cleaner Production is defined as the available ways to reduce the destructive disposal effects of generated wastes (liquid, gaseous or solid) by using the Best Available Technology (BAT) and Cleaner Technology (CT) and environmentally friendly techniques in the various industrial activities.

However, CP, as defined herein, is not applied in Cyprus. It falls under the national environmental policy formulated by the Council of Ministers.

1.6 Egypt

Definition of CP

"The use of industrial technologies where gas, wastewater and solid waste emissions into the environment are minimal. Industry needs to produce technologies that can guarantee the reduction of these emissions and waste."

1.7 France

The basic concept of CP can be summarised in the following aspects:

Definition of CP

"It consists of the continuous application of a preventive strategy to protect the environment that is integrated into production processes and products with the object of minimising risks to humans and the environment.

As far as production processes are concerned, cleaner production consists of savings in raw materials and energy, with no use of toxic substances and the reduction of all pollution at source (cleaner technologies).

As for products, cleaner production consists of the reduction of any impact during the period in which a service is provided (life cycle) through the simultaneous setting-up of an environmental valorisation process."

1.8 Greece

Definition of CP

There are two provisions for the definition of CP[1]:

[1] Greece's definition of CP is like the BAT definition.

- Ministerial decision, art. 17, which is similar to the meaning of BATNEEC (Best Available Technologies Not Entailing Excessive Cost).
- Article 2.11 of Directive 96/61 (IPPC) directive for the Best Available Techniques:

"Best Available Techniques means the most efficient and advanced stage of development of activities and their means of exploitation, whereby the practical capacity of certain techniques to form the basis in principle for the maximum permissible concentrations of emissions designed to avoid or at least reduce emissions in general and environmental impact as a whole is demonstrated. Techniques are also understood to be: technology used together with the methods of design, construction, maintenance, exploitation and stoppage of the installation;"

"available: techniques developed at a scale that enables them to be applied in the context of the corresponding industrial sector, in viable economic and technical conditions, bearing in mind the costs and benefits whether the techniques are used or produced in the corresponding member State or not, provided that access is granted to the holder in reasonable conditions;"

"best: the most effective techniques for achieving a high overall level of environmental protection as a whole."

1.9 Israel

Israel has not formulated its own definition of CP. It uses the following general definition:

"The continuous application of an integrated preventive strategy applied to processes, products and services to increase efficiency, improve environmental management and reduce costs. CP is the continuous use of industrial processes to prevent air, water and soil pollution, reduce wastes at source and minimise risks to humans and the environment".

1.10 Italy

Definition of CP

There is no formal definition of CP in Italy. CP is in fact considered to be a group of innovative technologies and materials that enables production to have less environmental impact in comparison with the use of traditional technologies.

1.11 Lebanon

Definition of CP

Cleaner production is defined as an integrated strategy for pollution prevention, which has the following goals:

- *Optimisation of production processes.*
- *Minimisation of waste at source.*
- *Safe housekeeping practices.*
- *Energy conservation.*
- *Water conservation.*
- *Recycling and reuse of by-products.*
- *Treatment of effluents and emissions.*
- *Possible replacement of hazardous raw materials with non-hazardous materials.*

1.12 Libya

Definition of CP

Cleaner production is the continuous use of industrial processes and products to prevent pollution and to minimise risks to public health and the environment.

1.13 Malta

In order for the concept of CP to be integrated into manufacturing processes, it must be set up in terms that are familiar to industry. To this end the director of the CP Centre ventures to offer this definition in an effort to assist business leaders to have a better understanding of the implications and possibly to start working towards implementing the concept in their enterprises.

Definition of CP

"Cleaner Technology is the adoption or modification of those processes and/or activities which while meeting the needs of the enterprises (factories) in terms of efficiency, conserving energy, minimising waste and protecting workers' health, produce an environmentally friendly product".

In other words:

Cleaner Technology + Greater Efficiency + Energy conservation + Waste Minimisation + Worker's Health Protection = Environmentally Friendly Product

As already stated, Cleaner Technology takes a holistic approach to solving the environmental problems associated with industry.

With regard to *products*, this results in a reduction of impact throughout the whole life cycle from the extraction of the raw materials to its elimination.

For processes, this means conserving raw materials and energy, eliminating the use of toxic raw materials and reducing the quantity and toxicity of all emissions and wastes before they leave a process.

These are the benefits of Cleaner Production: reduced raw material and energy consumption and cost, reduced waste generation and waste management costs, enhanced process efficiency and product quality, improved working conditions, and, finally, improved public image.

CT is about taking a proactive approach to pollution prevention, not the reactive approach. This means industry has to look for ways and means of preventing the generation of environmental problems before they occur, not afterwards. The age of end of pipe solutions is vanishing at high speed. Frankly and simply put, it is a case of "Prevention is better than cure".

1.14 Morocco

Definition of CP

"Cleaner production is the continuous application of an integrated prevention strategy in processes, products and services within the perspective of progress in the economy, society, health, safety and the environment."

1.15 Slovenia

The principles of CP, e.g. the principle of prevention, are determined in the Environmental Protection Act (1993), according to which:

Definition of CP

"All activities (e.g. a technological process) must have a minimum effect on the environment and entail the lowest environmental risk possible. All activities must also minimise as much as possible the use of space, materials and energy during construction, manufacturing, transportation and use. They must likewise take into account the principles of replacement, recycling and regeneration, and limit pollution load at source."

In implementing the preceding paragraph, the best concepts, technologies, equipment, and production methods which are available on the market and have been practically tested and found satisfactory shall be preferred, as well as replacement, regeneration and recycling, even if reasonably higher costs are involved.

CP is described in the National Environmental Action Programme as the on-going improvement of industrial processes and products aimed at reducing substance and energy use, air, water and soil pollution, the generation of waste at source and risks to humans and the environment.

1.16 Spain

Definition of CP

"CP is the continuous application of an integrated preventive environmental strategy to processes, products and services to increase eco-efficiency and reduce risks to humans and the environment".

1.17 Syria

Definition of CP

CP is understood in the broader context of this concept, meaning the introduction of modern and up-to-date technologies to reduce and stop pollution generated in the industrial sector.

CP aims mainly to control the polluting effluents, whether liquid, solid or gaseous, emerging from the different manufacturing processes. CP is considered as a tool to help industrialists increase their productivity and provide a better workplace, by replacing old polluting equipment and materials with new environmentally friendly techniques and substances.

1.18 Tunisia

Definition of CP

Cleaner production pertains to the application of practices that lead to:

- *Less polluting waste.*
- *Optimal exploitation of natural resources, taking into consideration the irreversible generation when irrational exploitation is undertaken.*

- *Better air and water qualities (minimal polluting effluents).*
- *Better quality of life.*
- *Improved productivity of industries and better workplaces.*

1.19 Turkey

Definition of CP

Continuous use of industrial processes and products to prevent the pollution of air, water and land, reduce wastes at source and minimise risks to the population and the environment.

The concepts of Best Available Technologies (BAT) and Cleaner Technologies (CT) are only meaningful if they are properly introduced and implemented as viable instruments of a national or regional wastewater management program. Thus, they will play a vital role in the formulation of:

- Adequate standards for limiting effluents/emissions.
- Solutions that are technically viable.
- Achievable in-plant modifications and recovery/recycling schemes.

The concept of CT is very new, even for related research efforts. The need for in-plant modifications to make recovery/recycling viable, comes only when and where the cost of raw materials and especially water becomes prohibitive. Improvements need to be made to the proposed solutions.

1.20 Conclusions

When defining Cleaner Production, most of the countries opted to directly adopt the definition used by the UNEP, while some others have used this same definition as their basis and then made small changes to it. In these cases, CP is defined as *the continuous application of a preventive environmental strategy that includes processes, products and services.* In the case of Greece, the definition of CP is similar to the definition of Best Available Technologies.

An analysis of the remaining definitions that have not taken the UNEP definition into account reveals that the word "technologies" stands out as being almost omnipresent. Very few countries include pre and post-production activities in their definition.

This would appear to suggest that the countries of the MAP, when applying CP, are fundamentally focusing at present on the introduction of new technologies or the replacement of raw materials with others that are less polluting in

an activity, with the object of reducing pollution at a specific site. This alternative appears to be preferable to end-of-pipe treatments although even then this continues to be a strategy that does not comprise the whole life cycle of the product in many MAP countries.

2. Summary of MAP countries

The objective of this chapter is to present a brief overview of the current economic, political and social situation of the member countries of the Mediterranean Action Plan (MAP) as well as to highlight the characteristics of their industrial activities.

Most of the countries refer to their environmental situation and the state of implementation of CP.

From the description of the general situation in each country, one can compare the differences and similarities between them to obtain an overview of the current situation in the MAP countries.

2.1 Albania

Albania is a country with a low level of income with its GDP at around US$ 550-720 per capita.The limited availability of resources restricts the investment destined to protect the environment. Nevertheless, as the contribution of industrial production to the GDP has decreased to less than a third since 1990, the impact of industrial activity on the environment has been considerably reduced as multiple dangerous sources of environmental pollution have been eliminated.

The profiles of economic and social development in Albania, as well as that of its civilian population are changing rapidly.During the transition period, the contribution of the different sectors to the GDP underwent considerable change. Seven years ago, the main sectors were agriculture (40.2% of GDP in 1990) and industry (40.2%). Currently, the main economic sector is agriculture (56% of GDP in 1997) followed by industry (12.4%), construction (11.2%) and transport (2.7%).

At present, the oil and gas industry, in both its extraction and refining stages is the most polluting industry. No treatment of waste and emissions is carried out as the treatment installations are either non-existent or

are not operational.Metal ore mining and processing also poses a serious threat to the environment, due to the amount of untreated waste they generate.

Most of Albanian industry uses outdated technology, characterised by high consumption of raw materials, energy and labour, as well as its high discharge of untreated waste.

The socio-political situation in Albania, the inadequate application of environmental legislation and a general lack of information and knowledge on matters related to cleaner production (CP), as well as a lack of capacity within the country for implementing CP, are some of the significant hurdles Albania is faced with in introducing the principles of CP.

2.2 Algeria

The main part of the Algerian population is concentrated in the large cities of Algeria, such as Oran, Annaba, Skikda, Bejaia and Mostaganem, which with over 100,000 inhabitants each have over 12% of the total national population and 62% of the coastal population.

The four most important areas of industrial activity of the country are located along its coastal area.These industries belong to the following production sectors:

- *Refineries:* Most of the refineries are located in the industrial areas of Algiers, Skikda, Arzew (Oran) and Bejaia. Although it is compulsory for these industries to treat their liquid waste, large quantities of waste are dumped into the sea containing amounts of petroleum and hydrocarbons, well above the authorised limits.This situation has arisen from the growth in industrial activity and the lack of waste treatment installations, which is aggravated by the bad condition of those that do exist, which have up to now been considered as unproductive tools, whose maintenance overloads the already strained financial management of the industries.
- *Petrochemical industry:* Although they undergo primary treatment, these industries produce fertilisers (Asmidal-Annaba) and plastic products (Skikda). The liquid and gaseous wastes are insufficiently treated and contain chrome, mercury, petroleum, etc.
- *Metal industry:* Among the main metal industries it is worth mentioning the complex at El-Hadjar (Annaba) and the manufacturing of industrial vehicles in Rouiba (Algiers). These industries consume enormous quantities of water. In addition, during the different production phases, they dump a significant amount of industrial liquids that typically contain cyanide, chrome, etc.

- *Paper manufacturing:* The waste generated by the paper factories located in the industrial areas of Algiers and Mostaganem contain particles in suspension and chemical residues (mercury and others). This situation is due to the inadequate water treatment system, which has a negative effect on the quality of the water.
- *Leather industry:* The tanneries are located in Jijel and Rouiba, where recently new wastewater treatment systems have been installed, allowing for a reduction of pollution in the receiving environment.
- *Food industry:* These industries mainly generate heavy organic pollutants. The cleaning and maintenance of the installations also generates chemical pollutants.

2.3 Bosnia-Herzegovina

Bosnia-Herzegovina is a politically and administratively decentralised country. The lack of co-ordinated co-operation between provincial (cantonal or regional) and local authorities responsible for environmental development and planning, cause, among other important matters, many difficulties for integrated environmental management planning.

In general, environmental planning is probably weakest in matters related to the operating of the water system, with limited legislation both before the war and after its outbreak. It has been concluded that the different ministries are incapable, at present, of successfully carrying out theses tasks, mainly due to a lack of human resources. There is no co-operation between the Ministry for Physical Planning and the Environment and the Ministry of Industry, Mining and Energy in preparing the plans.

In general, the industrial sector in Bosnia-Herzegovina is very weak and lacks the environmental legislative framework with which to support CP. During the period before the war, certain activities were carried out designed to reduce pollution, but most of these were based on end-of-pipe treatment.

The concepts of economic development and environmental balance are not integrated at all. Certain basic environmental criteria are taken into account during the planning process, but most of them are related to the phase of granting licences in the water sector.In the case of industrial estates, the typical authorisations issued, are related to dumping into rivers, lakes and groundwater, possibly including special permits for process industries, where the potential impact is high.

Nevertheless, an attempt at improvement has made. The basic activities related to industrial planning and the reduction of pollution have been deve-

loped within the framework of the "Institutional Consolidation of the MAP Office in Bosnia-Herzegovina", a project that has been financed by the EU LIFE-Third Countries Program. The strategy for reducing pollution has been set up within the National Action Plan for Pollution Reduction, a document prepared within the project.

It is necessary to reinforce the capacity of the pertinent ministries and all the special interest groups involved in the process of industrial development and planning on the technical and financial sides. It is equally important to strengthen the level of professional qualification.

Industrial development requires the knowledge-based management of natural resources and its environment. There is a need for a flexible and accessible information system that can be used by decision makers in planning sustainable industrial development.

For this purpose, an industrial inventory must be prepared. Decision Support Systems for identifying optimal sites for new industrial sites will be essential.

It is necessary to develop plans for mitigation, remediation and recovery actions in the cases of polluted industrial sites and in cases of disaster, as well as to develop programs for cleaner production, monitoring of industrial development, its pollution and also to assess the industrial risk of established industrial areas.

With respect to financing, the GDP is US$ 10.2 billion, US$ 2,300 per capita. The country also has economic and social problems. In view of this situation, politicians have a very real challenge in giving long-term priority to the preservation of the environment.

Bosnia-Herzegovina belongs to the Central and Eastern European Countries block i.e. the block of developing countries and shares their same problems. Bosnia-Herzegovina is currently undergoing a process of great change: the transition from one political system to another, the transition from public and state ownership to private ownership, the introduction of a market economy and the return (or movement) of hundreds of thousands of displaced people and refugees who had been forced to emigrate.

At present, there are no plans to use BAT (Best Available Techniques) or CT (Cleaner Technologies) in the country. Considering the state of the environment, the situation has improved only because of the fact that due to war activities, industrial facilities are working at approximately 5-10% of pre-war production levels.

2.4 Croatia

Croatia has a total of 1,185 islands, rocks and reefs, divided among 66 deserted islands and 652 inhabited islands, 389 rocks and 78 reefs.

The following economic activities (according to the available studies) are the most significant from an environmental point of view, and are carried out along the coastal area of Croatia:

- *Energy production:* Croatia has two thermal power generation plants that use seawater for cooling.
- *Petroleum refining:* With facilities producing asphalt, aromatic compounds, and gasoline.
- *Paper & pulp industry:* there is a paper industry facility present.
- *Cement production:* there are five cement industry facilities in the coastal area.
- *Metal industry:* there is an important shipbuilding industry with seven facilities.
- *Textile dyeing:* this industrial activity is present, but it is not as significant as the others.
- *Chemicals sector:* this industrial activity is also present.
- *Food processing:* specialised in the milk products and brewing industries, the making of wine, olive oil and fish preserves.
- *Agriculture* the main agricultural activities are vineyards, olive growing, and the growing of fruit and vegetables.
- Fish farming and fisheries.
- Tourism.

CP in Croatia started through the initiative of individuals, but fortunately, it has gained the deserved recognition of national and foreign institutions.

2.5 Cyprus

The base of the Cypriot economy is its tourism and the service sector, such as: communications, the shipping industry and banking, and agriculture (with a low presence, at 5% of GDP). Over time, the dense population of the coastal areas caused by tourist activities, services, and of the intense migration from urban areas is putting great pressure on the coastal areas, especially in peak seasons. In addition, the industrial activities contribute by increasing this pressure, as the large industries —energy production, cement production, petroleum refining and the making of wine— are all located along the coast.

These activities are generating signs of small-scale local pollution. Nevertheless, the quality of water nationwide is high, due to the strict laws on treating wastewater before discharge, and for protecting the environment and all existing habitats. Thus, wastes generated by the different land-based sources, the water quality and the protection of natural habitats are continuously monitored by the competent national authorities.

Below, is a summary of the main industries that have an environmental impact and especially have an effect on the coastal area of Cyprus:

- *Energy production:* The generation of electricity in Cyprus is split between two generation plants. The wastewater from the boilers and heaters of both plants is treated in a joint treatment plant, before being sent on to irrigation areas. There are no other treatment facilities for gaseous emissions.
- *Petroleum refining:* The refined crude petroleum is transported through tubes and pipelines to storage tanks, before being sold. Crude oil is also shipped directly from the only functioning refinery to the power generation plants and to the cement plants. The wastewater from this refinery is treated before it is dumped into the sea. There is no clear information on any scrubbers or filtration devices in the chimneys of this plant. Consequently, the gaseous emissions may be released without any prior treatment.
- *Cement production:* Two cement factories operate in Cyprus, generating no liquid discharges. Nevertheless, the dust emissions from both plants amount to 2,500 tons per year.
- *Wineries and Distilleries:* Four wineries and one brewery discharge their waste into the sea without any prior treatment. Their waste is mainly of an organic nature (around 83 percent). The lack of good housekeeping practices produces microbiological pollution in the sea.
- Other industrial activities directly affecting the quality of the environment are: the development of infrastructure for *tourism* in the coastal areas and *fish-factory* development in coastal waters.

2.6 Egypt

The Arab Republic of Egypt is a country with 65 million inhabitants concentrated in a narrow strip around the River Nile and along the coasts of the Mediterranean Sea. The Gross National Product was estimated at US$ 71.2 billion in 1997 with an average growth rate of 4.9% per annum for 1996-97.

The main water resource in Egypt is the River Nile. Industry, being one of the most important sectors in this country, consumes large quantities of Egypt's quota of Nile water (about 8%).

The number of industries with more than 10 employees in Egypt was about 22,000 in 1994 and the number of employees in the industrial sector was estimated at 2 million. Greater Cairo and Metropolitan Alexandria, the most densely populated areas in the country, account for over 80% of the industrial activities in Egypt.

Recent economic and institutional changes have affected industrial development in Egypt. A new industrial policy reform plan has been adopted within the wider framework of a Structural Adjustment Strategy (SAS) for the country. This SAS has three main objectives:

a) To provide financial resources for coping with debt servicing and the balance of payments of public sector industries.
b) To carry out a macroeconomic adjustment, by bringing demand for manufactured products into a better balance with supply, in order to provide non-inflationary growth.
c) To improve production yield through efficient, low-waste manufacturing technologies.

CP requires fundamental industrial restructuring, strong political commitment, and substantial financing. Within this context, industry is gradually introducing new capital-intensive, low-waste technologies, while implementing in-house measures for pollution prevention and improved environmental cleanliness.

In the past few years, sugar refining, aluminium smelting and chloride-alkali industries have invested over US$ 150 million, in self-financing, in pollution prevention and process modernisation projects.

2.7 France

France is the largest country in Western Europe (almost one fifth of the total surface area of the European Union), with a vast maritime zone (an exclusive economic zone extending over 11 million sq. km). The Republic of France includes metropolitan France, divided into 22 regions and is subdivided into 96 departments. Approximately 26% of France is covered by forests. France is party to many international treaties and agreements on the environment, among them United Nations agreements on climate, biodiversity and desertification.

France is the world's fourth largest economic power in terms of GDP. The economic base of this country is very heterogeneous and includes, amongst others, the following business sectors:

- transport,
- telecommunications,
- food industry,
- pharmaceutical industry,
- banking, insurance, tourism and the traditional luxury goods sectors (leather goods, ready-made fashion, perfumes, choice wines and liqueurs, etc.).

2.8 Greece

Greece is a country surrounded by sea. Its coastline is very large (the length of its coast is greater than 16,000 km) and it is the country in the European Union with the greatest number of islands (approximately 3,000). Among the main activities that consume water, one can highlight: agriculture, the domestic drinking water supply, industrial production and energy production. Most of the population and the economic activities are concentrated within 20-25 km of the coastline and are often related to use of the coastal and marine environment.

The industrial development experienced by Greece has been slower than in other European countries, so that the problem of water pollution arising from industrial activity is less serious in this country than in the rest of Europe. Moreover, the industrial sectors developed in Greece do not involve heavy industry, and therefore the wastewater produced only causes problems in certain areas. As the industrial areas are normally located in areas close to highly populated urban centres, water pollution problems usually occur simultaneously with pollution derived from municipal wastewater. Thus, the area of greater Athens, apart from being the most populated area in Greece, is also the most industrialised area. Respectively, the areas of Thessalonika, Patra, Volos and the area of Heraklion and Crete, which are the five largest Greek urban centres, are also the five largest industrial areas.

The most important economic activities, spread out along the Greek coast, are the following:

- fertiliser production,
- petroleum refining,
- cement production,
- agriculture,
- tourism,

- urban development,
- treatment and elimination of domestic wastewater,
- infrastructure projects (the building of roads, railway lines, harbours, airports, etc.),
- food processing.

2.9 Israel

The shortage of water, very limited land reserves and lack of natural resources (other than the minerals from the Dead Sea) have led Israel to base its economy on a highly-qualified and technologically advanced work force, generated by a network of academic and research institutions (120,000). Israel occupies a respected position on the international scene in various areas of industrial and agricultural production.

The most significant environmental activities carried out along the coastal area of Israel are:

- energy production (five electricity generation plants, along the Mediterranean coast),
- fertiliser production,
- petrochemical industry,
- plastics industry (Bay of Haifa),
- petroleum refining and the manufacture of pesticides (in the Ashdod area),
- waste water treatment plants (spread all over the country),
- food processing,
- textile dyeing.

All the industries are required to achieve Best Available Technologies (BAT). Most of the industries are perfectly versed in the BAT programme.

2.10 Italy

Italy, with its 324,000 km^2 of territory, has a population density of 189 inhabitants/km^2. There are about 637 coastal Municipalities and 600,000 industries (120,000 with more than 10 employees) with an extensive infrastructure network.

The Italian territory is administratively subdivided into 20 Regions, which are split into 103 Provinces (two of which have autonomous governments), and into 8,103 Municipalities.

The Italian agricultural system generates income of about US$ 127 billion, approximately 15% of the GDP.

The most significant activities from an environmental point of view, spread out along the Italian coastline are:

- fertiliser production,
- petroleum refining,
- agriculture,
- tourism,
- urban development,
- paper & pulp industry,
- leather industry,
- chemical industry,
- elimination of domestic wastewater,
- management of municipal solid waste.

The petroleum industry has commissioned the construction of three gasification plants for heavy residual refinery products, in order to reduce the emissions and improve energy conservation. These plants will allow for the treatment of about 2.5 million tons of waste per annum.

The Italian tanning industry, with its 2,400 companies and 25,000 employees, represents 65% of European production. The environmental impact of this industry is very high, especially effecting wastewater and industrial waste derived from processes. This is aggravated by the fact that one of the 14 polluted areas with a high-risk of an environmental crisis in Italy, the Sarno, is affected by environmental damage caused by the leather industry. Nevertheless, new measures are already being adopted, derived from the application of European Union legislation.

The chlorine industry is a sector with a heavy safety, health and environmental impact. Some of the products of this industry are classified as "persistent organic pollutants" (POPs), and they can appear far from where they are used, because of their low rate of degradation in the environment. Some of these substances are also toxic and accumulate within life systems (PTBs).

In the manufacturing of paper, certain hazardous substances are used, above all in the process phases that affect the environment and enter into it through wastewater.

2.11 Lebanon

In the middle of the Seventies, Lebanon was a prosperous country. However, after twenty years of civil war, virtually all its production centres and infrastructure have been seriously damaged. In the early nineties, the process of the

country's reconstruction was among the critical priorities of the Lebanese government. Although Lebanon was one of the signatory countries to the Earth Summit, held in Rio de Janeiro in 1992, the environmental aspects were given little consideration during the first years of reconstruction. In April 1993, the Ministry of the Environment was created to assume responsibility for developing a national strategy for improving the environment in Lebanon, which at that time was rapidly deteriorating.

Urgent environmental problems were challenging the Ministry due to their accumulated destructive impact over the previous twenty years. The top-priority matters that were handled by the Ministry were the disposal of solid waste generating mountains of waste near residential areas, the industrial waste dumped into rivers, the sea or into the domestic sewage networks without any type of treatment, and hospital waste which was frequently mixed with domestic waste, all this in addition to the irreversible explotation of the natural resources.

The Ministry of the Environment was supported by different active entities, both local and international. Lebanese NGOs, especially the environmental ones, have assumed an important role in substituting the limited involvement of the government at the municipal level. In addition, UN agencies, the World Bank (IBRD - International Bank for Reconstruction and Development), and other private international organisations have also supported the Ministry in proposing and carrying out vital projects.

Now after five years of hard work, the Ministry of the Environment has succeeded in obtaining positive results in promoting good environmental practices among a large percentage of the Lebanese population. It has also incorporated environmental studies into the academic syllabus for all classes. It is using all available expertise and resources to bring together all the sectors affecting the wellbeing of the environment in Lebanon. In addition, the Lebanese government has ratified numerous important international agreements and protocols that affect environmental improvement in the region.

2.12 Libya

All development activities are carried out in Libya by the public sector, the main aim being to serve the population at large.

Concerning the environment, the main problems faced on a national level are desertification, and the very limited natural fresh water resources. To solve this problem, Libya has developed the largest water supply plan in the world:

the Great Artificial River Project intended to carry water from huge underground aquifers in the Sahara to the coastal cities.

Great attention has been paid to the development of industry since the Revolution (1969). The main Libyan industries are outlined below.

- *Energy production:* electricity is almost entirely generated in power generating plants in the coastal area. On the other hand, the vast deserts, which allow the generation of approximately 2,200 kilowatt/hours/m^2/year during the 3,550 hours of sun per year, are barely used. There are different pilot projects destined to generate power by the use of solar energy systems.
- *Cement production:* there are six cement factories operating in Libya, all located in the coastal area. The process used is the so-called "dry" one, thus generating very little liquid waste. Special attention is paid to the control of gas emissions by installing filtration devices, which operate in a satisfactory manner.
- *Petroleum refining:* three main refineries, with a processing capacity of 14 million tons per year, produce gasoline. Two other smaller ones, with maximum throughput of 0.6 million tons per year offer support for these refineries. To overcome the problem of water pollution caused by oil transport and production, de-ballasting facilities were constructed in two of the main export terminals: Tobruk and Ras-Naluf.
- *Leather industry:* there are seven leather tanneries in different areas of Libya. Only four of them are located in the coastal area. They all have waste water treatment plants. In spite of this, environmental audits and controls reveal the need for routine maintenance. Regulations do exist, but they are not effectively applied.
- *Textile dyeing:* wool is processed at two large inland plants. Cotton is processed at another plant. All three textile production plants are equipped with efficient treatment devices for treating wastewater before it is dumped into the sea or the sewage system.
- *Chemical sector:* chemicals are produced at three chemical plants producing hydrochloric acid, ammonia, chlorine, urea, methanol, polyethylene, polystyrene resins, PVC, polyester, polypropylene and nylon.
- *Food Industry:* mainly milk products, poultry and olive oil.
- *Fertiliser Production:* two medium-scale recycling plants produce organic fertilisers. They produce compost using from 40 to 60 percent of solid organic waste.
- *Metal industry:* metal production takes place in publicly owned factories. This type of production includes steel, aluminium, and iron. Among the products manufactured with metal, it is worth mentioning: tubing, ovens, refrigerators, and freezers among others.

The water- related problems are those that are most important in Libya, due to the scarcity of available water resources in inland areas of the country. In addition, the waste generated by its crude oil constitutes a significant source of pollution of the sea, as do the de-ballasting waters, which are also dumped into the sea.

2.13 Malta

The archipelago is made up of two larger islands: Malta and Gozo, the island of Comino and a series of smaller islands and residual rock formations, which have been separated from the coastline by the action of sea erosion. Malta, the largest island, has an area of about 245.7 km^2. Gozo has an area of 61.7 km^2.

With a population of about 370,000, the Maltese Islands have the highest population density in Europe, about 1,000 inhabitants/km^2. Approximately 38% of the land is agricultural and 46% is undeveloped, even so, there are no wilderness areas on the islands.

Shipping activities have increased, and industries such as fish farming and urban development have also been thriving. Coastal activities such as port development and management, shipbuilding and repair, energy and fresh water production, aquaculture, offshore refuelling, tourism and waste management are crucial for the future social well-being and economic development of the Maltese islands.

Cleaner production is still a very new concept for the local industrial sector. Its diffusion among the local industries is turning out to be a very difficult task, normally caused by the small size of these businesses (mainly family businesses). These businesses have concentrated on achieving rapid economic growth, on occasion at the expense of the environment. It has only been in the last few years, and not in all sectors, that environmental matters have been taken into account when planning industrial development.

There is as a high degree of interest in CP, although its implementation is quite slow due to a series of causes, among these: the lack of experience, the belief that CP programs require significant capital investment, the perception that pollution prevention expenditure does not bring economic benefits, the lack of clear government environmental program objectives, lack of institutional support, too much emphasis on production, technological limitations, and lack of financial support.

It is possible that the concept of Cleaner Technology is still new to a considerable number of business executives and for most continues to be something abstract and theoretical. In fact, in the manufacturing sector, only those

companies with trans-national connections, practice any form of CP techniques. In most cases, it is the parent companies of the local companies that impose it.

Local micro-industries make up about 89% (it was 78% in 1990) of the total number of industries. In Malta, traditional activities are still carried out, some of them polluting. The metal finishing business is one of the main causes of hazardous waste flows. The main causes of bulky waste (although largely inert) are the mining and construction industries.

The attempts made have almost exclusively been related to the saving of the fuel and water consumed. There have been cases where the adjustments made to the production processes have led to a lower consumption of raw materials, but this has not been usual.

Redesigning in some industries has also resulted in a reduction of the use of packaging materials. Similarly, an elimination of the use of CFCs in the majority of industrial applications has also been achieved.

At present, the main efforts are being made in the treating of hazardous waste, especially following the new legislation on dumping into sewers, which sets limits on this type of dumping.

The main industrial sectors in Malta can be divided into two groups:

- Services activities: tourism, ship repairing and free-port as well as the transhipment of goods.
- Activities in the production sector: manufacturing, agriculture & fisheries, mining and construction.

2.14 Monaco

The surface area of Monaco is 1.9 km^2, and it has 3.5 km. of coastline. Its population is 30,000. Monaco is a small country and it has few industries: mainly pharmaceuticals and cosmetics. There are ties between the majority of these industries and multinational groups, which are regulated by their own environmental ruling.

Another typical characteristic of this country is the political involvement of HSH, Prince Rainier, in environmental protection, and he has deservedly been recognised for industrial eco-marketing and in fact, the action taken is prior to the publication of the legislation. The administrative control and the voluntary involvement prove to be enough to assure CP.

Even so, Monaco has been capable of modernising its environmental legislative context. This will not optimise the present situation, but it will manage to project a more consolidated image of the environmental policy of this country.

2.15 Morocco

The industrial geography of Morocco is characterised by the heavy concentration of industrial activity on the Atlantic coast, and mainly on the axis between Kenitra Casablanca and El Jadida, Safi and Agadir. The main industrial sectors located in this region are the food industry, textiles, chemicals and related products and the mechanical and electrical industry. 80% of Moroccan industry is concentrated here, as is 92% of seagoing traffic.

With regard to the Mediterranean coast, the main concentration of industry is located on the West coast, mainly in the metropolitan areas of Tangier and Tetuan. The Western Mediterranean coastline is the most built-up area, where the conflicts between tourism, agriculture and industry become most apparent. The basins of the Sebou and of the Tensift are the main industrial areas in the inland part of the country.

This geographical concentration of the main industrial activities has a negative impact on the socio-economic activities and the public health of the area.

The main part of the organic industrial waste (DBO5) is dumped into the basin of the Sebou and into the Atlantic Ocean. The basin of the Sebou concentrates the organic pollution caused by the oil refineries and the chrome pollution arising from the leather tanneries (56% of the total amount).

The Tensift basin suffers from the discharge of heavy metals arising from the presence of lead, zinc and copper mining facilities. The basins of the Moulouya, the Loukouss, the Bou-regreg and the Souss Massa are those least polluted by industrial discharges.

One of the main obstacles Morocco is faced with in developing and updating its industries is the location of certain industries in areas with little industrial vocation and the installation of class I industrial activities in class II industrial areas.

The productive fibre of the processing industry in Morocco is integrated by companies of a broad nature and size. The SMEs represent 93% of the overall total of industrial enterprises and contribute 36% of the industrial GDP. It is worth highlighting at this point that a significant number of the SMEs are concentrated in three business sectors: the food industry, the secondary food processing industry and the textile and hat-making industry which are respectively responsible for 16%, 10% and 11% of the overall SME figure.

The first hundred large companies represent 48% of the industrial business volume, more than 47% of industrial production, 42% of exports, 37% of industrial investment and give work to almost 18% of the industrial labour force. 41% of the industrial companies are concentrated in the metropolitan area of Casablanca, representing 48% of industrial production.

The industrial GDP has increased by 11% with respect to the years 1996 and 1997 and it comprises 16% of the overall GDP. Industrial production has grown more than 10% with respect to the year 1997. This is the fruit of the work of 6,583 companies, a figure that has grown by 3% with respect to that same year. All business sectors have experienced growth varying between 6% and 22%. The business sectors with the highest level of growth are the electric and electronics industries and the chemical and related products industries.

The breakdown of production by business sectors highlights the dominance of the food industry (35%) and that of the chemical and related products industries (33%). The remaining percentage, in other words 32%, is split between the textile and leather industries (17%), the mechanical and metal industries (12%) and the electric and electronics industries (3%).The Moroccan industrial sector generates important levels of organic and toxic pollution, in wastewater.

It is estimated that the total volume of wastewater contains the following amounts of pollutant substances:

- 72,000 tons of oxidizable matter (37% in the water network);
- 3,300 tons of nitrates (84% in the water network or discharged into the ground);
- 200 tons of phosphorus (30% in the water network or discharged into the ground);
- 110 tons of chrome (64% in the water network or discharged into the ground);
- 140 tons of sulphides.

The industrial installations that pollute the atmosphere most are:

- Phosphate processing plants.
- Sulphuric acid plants.
- Electricity generating plants.
- Petroleum refineries.
- Cement factories.
- Earthenware factories.
- Chemical and related products industries.

The contribution of each one of the aforementioned sources of pollution to overall atmospheric pollution varies in accordance with the polluting element (see table below).

Emissions (in thousands of tons, 1992)

Pollutant	Industry	Transport	Total	% share of the industrial sector
SO_2	180	21	201	89.5
NO_x	7	316	323	2.2
MPS	10	13	23	43.5
Pb	—	0.3	0.3	—

Source: Report on the national strategy for the protection of the environment and sustainable development.

This situation gets worse by the day, due to the non-existence of controls on emissions, the lack of decontamination systems and the use of fuels with a high sulphur content.

Solid industrial waste is eliminated by uncontrolled discharges or at sites located within the premises of the industrial installations. It is nevertheless necessary to highlight, that the industries lack means to control and manage the aforementioned waste and that in general, it is not subjected to any type of treatment before being discharged.

- *Food industry:* (1,641 companies) The food industry generates an organic type of pollution (80% of the emissions of COD and 66% of those of BOD_5) and virtually all the pollution by nitrates and phosphorus. The most polluting food industries are sugar refineries, those of vegetable oils and those of fruit and vegetable preserves. These subsectors are responsible for 85% of the pollution caused by the food industry.
    - *Food products:* The two most important industries are those of grain processing (173 companies, 56% of production) and the sugar industry (18 companies, 34% of production).
    - *Secondary food products:* (10% of companies, 17% of production).
        - Fruit and vegetable preserves and fish preserves (29% of the production, 35% of the added value).
        - The manufacture of oils and fats (122 companies, among which there are some fifteen refineries of raw vegetable oil, 28% of the overall production in this business sector).
        - Dairy industry and dairy sub-products (17% of the added value of the business sector).
        - Processing of various food products (10% of production in the business sector, 15% of the added value). The production of animal feed has grown 3% with respect to 1997.

- *Beverage and tobacco industry* (43 companies, 7% of industrial production, 18% of the added value).
    - Production of non-alcoholic beverages, beer and malt (36% of the production in the business sector).
    - Manufacturing of tobacco products (6 companies, 55% of production in the business sector).
- *Textile and leather industries:* (1,744 companies, 17% of the industrial production). The textile and leather industries are the leading cause of pollution from chrome and sulphides.
    - *Textile and hat manufacturing:* (719 companies, 51% of the production of the textile and leather industries and 9% of the national production industry, 47% of the added value of the textile and leather industries and 8% of the industrial GDP).
    - *Clothing manufacturing (excluding footwear)* (738 companies, 8% of the industrial GDP).
    - *Leather and leather footwear* (287 companies, 2% of the total production of the industrial processing sector).
- *Chemical and related products industry:* (1,963 companies, 33% of the industrial production). 97% of the total volume of wastewater generated by industry arises from the chemical and related products industry. The main parts of the waste of this business sector are produced by the discharges of the phosphate processing companies.
    - *Wood and wood products:* (307 companies, 2% of the national production).
    - *Paper, cardboard and printing:* (458 companies, 7% of the total industrial companies whose production has grown 17% with respect to 1996).
        - manufacturing of paper pulp, paper and cardboard (18 companies, 32% of the production in the business sector);
        - manufacturing of paper and cardboard articles (89% of the companies in this business, 35% of the production in this business sector);
        - printing (77% of the companies in this business, 33% of the production in this business sector).
    - *Processing of quarry products* (473 companies, 7% of industrial production).
        - cement: (3% of the companies in this business sector, 46% of the production). The emissions of CO_2 caused by the combustion and de-carbonation of the raw materials in the cement industry, are of 4 million tons per annum. The emissions of dust, on the other hand, are calculated to be of 2,200 tons per annum;

    - manufacturing of sundry prefabricated products (171 companies, 21% of production);
    - the manufacturing of sundry ceramic products and manufacturing of products from asbestos and abrasive products (15% and 5% of production, respectively).
- *The rubber and plastics industries:* (303 companies, 3% of industrial production):
    - plastic articles (270 companies, 67% of production),
    - tyres and inner tubes (27% of production).
- *The mechanical, metal, electric and electronic industries:* (1,051 companies, 15% of the production). The mechanical, metal, electric and electronics industries dump a relatively small volume of wastewater, but this contains cyanide, a highly toxic component, even in low concentrations (approximately 2 tons of cyanide).
- *The basic metal smelting industry* (smelted metal products and the first process of non-ferrous metals; non-ferrous metals and the first process of ferrous metals). There are two large companies, which comprise 15% of the companies in the industrial business sector and 15% of production).
- *The metal industry* (excluding the machinery manufacturing and transport equipment sectors): they represent 7% of the industrial companies, and 5% of the industrial production.
- *Production of machinery and other equipment:* contributes 1% of production on a national level.
- *Production of transport equipment:* represents 2% of the industrial companies, and 4% of the industrial production.
- *Electric and electronic materials:* there are 121 companies, with 3% of the total industrial production.
- *Office machinery, measuring and precision instruments:* this is a relatively undeveloped sector when compared with the other processing industries (35 production companies).

Regarding infrastructure, the programs for managing the industrial areas do not take into account the environmental requirements, the system for treating wastewater is ineffective and there is a general lack of purification plants. For the treatment of solid industrial waste, the collection systems are deficient and there are no plants for treating and eliminating hazardous and toxic waste.

From the technological point of view, it is worth pointing out the absence of a modernisation and updating process, and the obsolescence of equipment and procedures, preclude the SMEs from taking part in the current liberalisa-

tion process. The companies do not have integrated environmental protection programs. The general awareness of environmental protection matters, varies depending on the business sector and the size of the company and is especially related to problems pertaining to the management of water, energy and products and the non-existence of pre-treatment before waste discharge at the majority of industrial installations. Nevertheless, the level of prevalence of new technologies is usually insufficient and does not allow for the adoption of adequate criteria.

The investments destined for the preservation of the environment (above all that intended for the construction of waste treatment plants) only represent 0.1% of the total budget of support measures for industrial modernisation. Similarly, the use of cleaner technologies is very limited and only takes place when there are solid financial incentives. The adaptation costs are still very high and constitute the main limiting factor in the adoption of the aforementioned technologies[1].

The development of processing industries (which with an annual growth rate of the added value of 15%, have started to play a significant role in the Moroccan economy) must necessarily be accompanied by an investment ranging from US$ 163 to 522 million in the period between 1994 and 2000. Nevertheless, a large part of the loan facilities that these companies have, has already been used for financing operations. Ignorance of the current economic valuations of the damage imputable to industrial pollution and the cost of the decontamination, are obstacles to the development and application of internal financial resources for environmental management. In addition, the stimulation measures are insufficient and there is a lack of properly suited financial mechanisms (generally, international aid).

To all the above one should add the lack of immediate, trustworthy and objective information on the negative effect of the industrial sector on the quality of the environment on a local and regional level, especially in the sensitive areas. Audits are still not normal practice and are not perceived as the necessary first step in applying an ongoing improvement program.

There are few companies whose activities are related to the environment and these operate in an informal manner. Good examples of this are the small companies or micro-companies, which are dedicated to recycling certain types of waste (mainly domestic refuse). These types of companies

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[1] As an example, the analysis of smokestack emissions (O_2, CO_2) necessary for improving the efficiency of boilers cost four times more in Morocco than in the USA.

lack the framework that would allow them to offer a quality service with all the necessary hygiene and safety guarantees. The number of authorised laboratories and companies specialised in pollution prevention and control is clearly insufficient to give an adequate response to the present levels of pollution.

With respect to the Moroccan legal system, the laws and legislation are outdated and are not adjusted to present needs, and new legislation, reforms projects and existing legislation (mainly the laws on environmental impact studies, air pollution, water pollution, Royal Decrees for protected industries, the law for the protection of the coast and the law for the treatment of solid wastes) are not applied, as there are insufficient available technical and human resources. As a general rule, permits and licences are granted for financial reasons, without taking into account environmental aspects. The same thing occurs with urban planning, above all when planning for the regulation of industrial areas.

The population is starting to become aware of the seriousness of the damage inflicted on the environment.

2.16 Slovenia

The Republic of Slovenia is a country with a total surface area of 20,255 km^2, bordering with Italy, Austria, Hungary and Croatia. Its coastline, on the Adriatic Sea is 46.6 km long.

It has a population of approximately 2 million inhabitants, of which only 7.6% are employed in agriculture, which is notably different from just after the Second World War, when the percentage was 50%. Nevertheless, 48.5% of the population lives in rural communities and villages.

At present Slovenia has 192 municipalities, of which 11 are cities. The State has transferred part of its responsibilities to 58 administrative units, the centres of former municipalities. A special joint council is elected in each to ensure co-operation between the administrative unit and the municipalities in the area.

Within the former Yugoslav Federation, the Slovene economy was the most industrialised and advanced of the republics. Privatisation started in 1991, based on the creation of a privatisation agency, but gained momentum only after December 1992, when the Slovene parliament adopted the appropriate legislative framework.

In its first year of independence, the country went into an economic recession, with falling gross domestic product (GDP) and industrial output, the main reason for this being a decrease in aggregate demand and the disruption

of trade flows with other republics of the former Yugoslavia and eastern European countries. The economic recovery, stimulated by a sharp increase in demand, as well as a moderate growth in exports, began in the second half of 1993. The GDP per capita in Slovenia is by far, the highest among the economies in transition (US$ 9,352 in 1995), double that of Hungary, for example, with values close to those of the lower income countries in the EU, such as Greece or Portugal.

Slovenia has long taken a keen interest in its environment. In the late seventies, when Slovenia was a republic within the former Yugoslavia, the first official administrative body was established to tackle environmental problems. The first environmental legislation passed at the time was very sector-orientated. Little public participation in the decision-making process relating to the environment was apparent. The gradual environmental deterioration in the eighties posed serious threats to human health and to development. Following the increase in awareness of the general public, the NGOs began to carry out a significant role between the years 1986 and 1987. At that time, the basic national priorities on the environment were defined and an environmental fund was set up. Some major environmental decisions were taken, such as the gradual switching to less polluting fuels to curb air pollution.

2.17 Spain

Population statistics in Spain (1998) show that the country's population has reached 39,852,651 inhabitants, which accounts for a 0.46% increase with respect to the last official figures, relating to 1996.

With respect to the business structure and that of the population (1999), Spain has 2,518,801 active companies: 44,111 companies more than in 1998, of which 9.4% are integrated in the industrial sector, 10.8% in the building industry, 31.2% in commercial activities and 48.6% in the service industry. This last sector is composed of companies dedicated to the hotel and catering trade, transportation, communications, real estate and renting, business services and educational, health and social activities.

Small-sized companies predominate in the economy (55.1%). If all economic sectors are analysed separately, it can be seen that large companies are concentrated in the Industrial sector.

The regional analysis makes it clear that Catalonia, Andalusia, Madrid, Valencia, the Basque Country and Galicia are the regions with the largest number of companies.

Moreover, industrial companies spent over US$ 5billion on technological innovation in 1998. 10% of industrial companies and 17% of telecommunications service companies, innovate in some way.

43% of the investment on innovation corresponds to R&D activities and the remaining 57% to other activities such as the purchasing of equipment and machinery relating to new products and processes, which accounts for 39% of the expenditure for innovation.

Spanish environmental problems must be set within the structural framework, socio-economic framework and that of land occupation, as well as in the characteristics of the physical and natural environments and of developed land. In the wealthiest areas, agriculture has had to compete for land resources and basic resources such as water and labour with other activities such as tourism and the processing industry, whereas in the rest of the country it has continued to be the only existing activity, ignored by a socio-economic environment that could otherwise strengthen it and make it more profitable. The industrial sector, including part of the energy sector, has grown together with the market within a highly protected structural environment, at a national level, perpetrating the inadequate use of the resources and the mismanaging of the environment (waste and dumping), and the tourist industry, one of the most significant in Spain, has experienced sometimes disorganised growth.

2.18 Syria

Syria is an extremely arid country, with a population of nearly 15 million and an area of about 185,000 km^2, of which approximately a third is arable land and forest.

Syria began its industrialisation process in the 1950s and has since developed an industrial structure based largely on imports and investments in heavy basic industrial sectors (cement, metals, chemicals, textiles, etc). Over time, the natural growth and urban and rural migration have led to a greater degree of urban development in the country, in 1996, around 51% of the population lived in cities and urban centres.

Since the 1990s, Syria has experienced uninterrupted economic growth in almost all business sectors (4% per annum on average); where agriculture, forestry and the fishing industries have been the main components, representing 20% of the economy. In fact, all industries were developed and the bulk of public investment was channelled into large-scale industrial projects: phosphate and nitrate fertilisers, sheet steel rolling mills and engineering plants. Four main sectors constitute the bulk of manufacturing in Syria: the food industry, textiles, the engineering sector (white goods, electronic devices, etc), and cement and building materials.

Syrian industry is characterised by a dominant state-owned business sector, where investments in large-scale projects in the main industries is limited to the public sector. Nevertheless, the passing of law No. 10 in May 1991 has helped to change this attitude by giving private investors the chance to take part in industrial investments. This law was successful in attracting some new large-scale investments, generally in the form of joint ventures with a 25% government stake.

From another perspective, the location of heavy industry in Syria has been dictated by the availability of water and raw materials. Initially, considerations of an environmental type were not taken into account, consequently, the cities of Homs, Tartous and Banias, where the heavy fertiliser and refinery industries are located, are faced with poor-quality air and degraded environmental and health conditions. The small and medium-sized industries, on the other hand, are located around and within the large cities, frequently in residential areas. The technologies used in this sector are outdated and usually highly polluting.

In the food industry, the production of olive oil, dispersed throughout the rural areas of Quaik and the coastal basins, are contributing to the pollution of nearby rivers and aquifers. In addition, the uncontrolled discharge of toxic chemical products, has also caused soil pollution problems in the Barada region, through the discharges from lead foundries and battery manufacturing, the same occurs in Aleppo, where the discharges of heavy metals damage the soil and can be detected in fruit and vegetables.

The main part of Syrian industrial activities are characterised by the absence of pollution control measures. The industrial wastewater treatment plants are poorly managed and maintained. The emission control equipment, if it exists, is usually based on "end-of-pipe" techniques, which do not normally offer an efficient and effective control of pollution.

2.19 Tunisia

Within the context of international globalisation, the liberalisation of commerce and the competitiveness of new markets, Tunisia has drawn up ambitious plans to re-adjust or restructure its economy, its administrative institutions, its educational and professional training system and its legislative framework, towards sustainable development.

These plans have fulfilled their objectives perfectly, in fact the constant economic growth shown in the 8th Development Plan for 1992-1996 reflected an average increase in GDP of 4.6%, due to a greater incidence of industrial activities (30% of the GDP and 85% of the total national exports). For the 9th Development Plan for 1997-2001, an average growth in GDP of 6% is to be

expected. The main industrial activities rely on mining industries, the treatment of phosphates, and the textile and food industries. The industrial estates are mainly located along the eastern coastline (Bizert, Tunis, Sfax, Skhira and Gabes).

The industrial sector includes around 10,000 categorised enterprises. A survey conducted in 1996 identified around 3,531 polluting enterprises related to various sectors:

- Food industry: 1,188;
- Leather and textile industries: 249;
- Mechanical, electric and metal industries: 604;
- Chemical industries: 272;
- Building materials, ceramics and glass: 93;
- Other industries: 927.

This rapid industrial development has put extra burdens and pressure on the environment in Tunisia. Actually, industrial activity became the source of water, air and soil pollution and resulted in excessive energy consumption and waste production; thus becoming a real burden, particularly for small and medium-sized companies.

The government, convinced that development priorities should be accompanied by environmental protection, adopted a strategy based on the concept of sustainable development, as mentioned above.

This strategy is aimed at rehabilitating and restoring areas heavily affected by the industrial pollution by setting up emergency programs, intended to maintain pollution within admissible limits, as defined by the legislation. This plan revolves on 4 main axes:

- Conservation of natural resources.
- Preservation of the quality of natural resources.
- The introduction of quality-of-life improvements in the cities.
- Fair development (within business sectors and geographical areas).

2.20 Turkey

Physically, Turkey is the crossroads linking Asia, Europe and Africa. It is surrounded by four seas with a total coastline of over 8,300 km.

Turkey is one of the 20 most densely populated countries in the world. In mid-1997, it had an estimated population of 63.7 million people and has the fastest population growth rate of all OECD countries (1.6% in 1997).

Economically, Turkey has been growing at double the average rate for the OECD countries with a per capita GNP of US$ 2,999 (1997 estimate) and a

purchasing power parity estimated at US$ 5,580 for 1995. Industry and tourism are the economic business sectors with the highest growth rate.

In Turkey, remarkable progress has been made over the last fifteen years to create viable mechanisms for adequate environmental management. The last decade may be described as a period of increasing public awareness and demand for a cleaner environment and of substantial NGO activities. In addition, this country has been favoured by rapid economic growth, accelerating the pace of urbanisation and the consumption of natural resources, thus also increasing the scale of the waste generated.

The activities listed below are considered those most significant from an environmental point of view, along the Mediterranean coastal area of Turkey. The number of companies has been extracted from a study carried out on a national scale by the Ministry of the Environment in 1996 (Anon, 1996).

- Textile: >200.
- Food & Meat Processing: >200.
- Leather: >262.
- Pulp and paper: 9.
- Cement production: 7.
- Petroleum refining & petrochemicals: 3.
- Fertiliser production: 5.
- Thermal energy production: 4.
- Small industrial installations: 43.
- Organised industrial districts: 6.
- Tourism: <106 hotel capacity.

The textile industry is the most significant industrial sector in Turkey and consequently, constitutes the main activity among the industries in the region, which also include 3 of the largest installations for petroleum/petrochemical refining, together with four power generation plants, the most controversial and publicly debated activities from the country's environmental point of view.

2.21 Conclusions

The great majority of the countries in the MAP have industrial sectors that are "hard" from an environmental point of view. From the information presented by the different countries, one can summarise that the business sectors with the greatest presence (in order of incidence) are:

- food and food processing;
- petroleum refining & petrochemicals;
- metals;

- cement;
- textiles;
- chemicals;
- fertilisers;
- energy production;
- leather.

Other industrial sectors present to a lesser degree are paper, electric and electronic, mining, pharmaceuticals, cosmetics, etc.

In addition, the business sector that is present in practically all cases is tourism, favoured by the confluence with the Mediterranean Sea.

If there is any single aspect that characterises practically all the countries in the MAP, it is water being a scarce resource in most of them as well as their state of pollution. This explains why the treatment of wastewater is the starting point, in some cases leading to the ignoring of the rest of the waste flows.

The treatment of waste water, which does not always occur, is based on final "eop" treatments and CP is only applied on limited occasions, sometimes due to lack of knowledge by the administrative bodies and the industries and at other times from the lack of resources for implementing it.

Therefore, CP is an emerging activity in the countries of the MAP, but in most of them, it has not yet been generally implemented.

Another problem most of the countries are faced with is the geographic location of the industrial areas. These are frequently located in urban centres, provoking urban and industrial pollution and heavy degradation of the environment. Along the Mediterranean coastline, this problem is aggravated by the presence of the hotel industry.

In essence, the main environmental problems that worry the majority of the countries integrated in the MAP are: the lack of fresh water resources, water pollution, the inadequate treatment and control of wastewater and the lack of resources to implement CP.

Nevertheless, it is difficult to draw a general picture giving an overall image of the countries in the MAP. The range of nations it integrates present economic and political situations that are so different that countries such as France, the fourth economic power in the world, or Monaco, by their intrinsic characteristics, would be difficult to reflect in these conclusions.

3. List of agents responsible for CP

There are different national agents that work either directly or indirectly in the field of CP in the countries that come under the Mediterranean Action Plan.

Due to the fact that the concept of CP is a new one, mention must be made of the fact that the issues covered by CP are sometimes unclear for countries. For this reason, certain agents that appear in this chapter are not exactly responsible for matters that are connected with CP.

A description is given below of the agents, according to the information provided by each country, and:

- The objectives for CP in the country.
- The capacity and legal competency of the agents.
- The industrial sectors and waste vectors covered.
- Contacts with international bodies.

3.1 Albania

There are four agents working on CP at the present time:

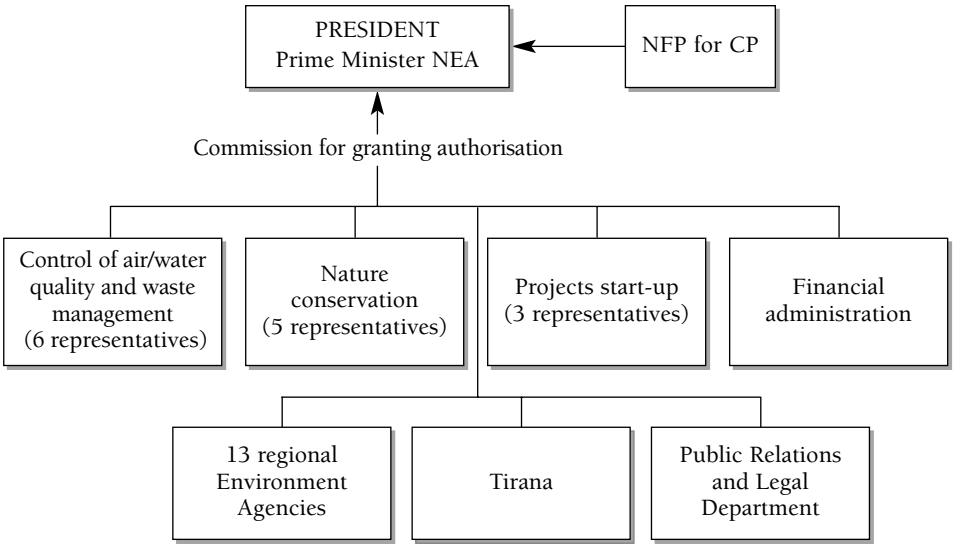
—National Environment Agency.
—Chamber of Commerce.
—Environmental Centre for Administration of Technology.
—Industrial Ecology Association.

Moreover, there are other institutions that may deal with this subject at specific times. The nature of these agents is varied, since they include universities, technological institutes and NGOs, as well as national bodies such as the Chamber of Commerce or the National Environment Agency (NEA).

3.1.1 National Environment Agency (NEA)

In 1998, the Committee for Environmental protection became the National Environment Agency of Albania under the authority of the Council of Ministers. The national administration of the NEA covers all of the regions in Albania and its main source of financing is investments from expatriate investors. It is in charge of new activities and in general only grants environmental permits on compliance with European regulations. The organisation chart is as follows:

National Environment Agency Organisation Chart



There are thirteen Regional Environment Agencies that have the preliminary tasks of granting environmental licences. These Regional Agencies also inspect and verify the compliance of environmental legislation.

In addition, the Air/Water Quality and Waste Management Directorate is one of the most relevant in CP.

The NEA has published the Report on the State of the Environment for the period 1997-1998.

3.1.2 Chamber of Commerce

The Chamber of Commerce collaborates in an important way by providing guidance on how to implement CP in business and industry in the private sector.

3.1.3 Environmental Centre for Administration of Technology (ECAT)

ECAT is an agent that was created by the EU. Its task consists of preparing project proposals, requests for funds to implement CP and, if there is no other alternative, implement CP itself. It can thus be described as a management unit.

3.1.4 Industrial Ecology Association

This NGO was set up recently. As a starting point, its members have carried out a study to assess the degree to which CP is applied in companies in Albania. The NGO deals with CP issues in the short term and on a more general level.

3.1.5 Other agents that could analyse different aspects of CP are as follows:

- University of Tirana.
- Polytechnic University of Tirana.
- Institute of Metallurgical Studies.
- Institute of Research on Chemical Technology.
- Chemistry Association (an NGO).
- Institute of Environmental Studies (an NGO).

Concerning technical and financial support, the University of Tirana, the Polytechnic University of Tirana, the Institute of Research on Chemical Technology and the Institute of Metallurgy Studies are partly funded by the state budget:

On the other hand, the agents lack the capacity and legal competency to undertake legal actions in CP. Other instruments are available, however, including the following:

- The proposal to terminate any activity liable to produce a considerable environmental impact.
- The imposition of penalties (in certain situations).
- The closing down of activities (temporary).

All these actions can be applied to small private enterprises but not to Public companies.

As for industrial sectors and waste flows, the agents do not specialise in any specific sector and experience in general is limited to gaseous emissions and solid waste.

As for international associations, an example is the contact that has been established with the CP centre in Paris (UNEP) with the aim of signing an international charter on CP.

3.2 Algeria

Agents specialising in CP in Algeria are:
—The Ministry of Land-Use Planning and the Environment.
—Council for the Environment and Sustainable Development.
—The Ministry of Water Resources.
—National Agency for Investment Promotion, Assistance and Control.
—National Agency for the Promotion and Rationalisation of Energy Use.

3.2.1 The Ministry of Land-Use Planning and the Environment

The Ministry of Land-Use Planning and the Environment is the main political institution responsible for defining the lines of the overall environmental protection strategy and setting up the policy guidelines in the country. It encourages industrial development that is beneficial for the environment and promotes industry that is less polluting.

The Ministry is responsible for ensuring compliance with national legislation so far as environmental protection is concerned and guaranteeing cross-sectoral co-ordination in matters concerning the environment. This is done through the promotion of the use of cleaner technologies to control industrial pollution, and a Bureau of Serious Hazards and Cleaner Technologies has also been established.

The functions of the *Bureau of Serious Hazards and Cleaner Technologies* are as follows:

- To undertake any action that promotes the use of production techniques that produce less pollution, the valorisation of waste and industrial by-products and the rational use of raw materials, water and energy;
- To promote actions and economic initiatives aimed at stimulating investments in processes that use cleaner technologies;
- To ensure, within the framework of the legislation controlling environmental impact studies, that industry always opts for technological processes that generate the minimum quantity of industrial waste in general, and of hazardous waste in particular.

National Environment Fund (NEF)

The National Environment Fund, which was set up by the Finance Law of 1992, is a financial instrument financed by the levy on polluting activities and the financial penalties imposed. Its purpose is to reinforce the ability of the

environment sector to overcome the problems associated with the protection of the environment. The Minister of the Environment is responsible for managing this fund.

3.2.2 Council for the Environment and Sustainable Development

The President of the Government chairs the Council. The environmental policy in Algeria is drawn up by the President, and is organised on two levels:

1. Political level: it brings together the main ministerial departments.
2. Technical level: it brings together the main participants involved in protecting the environment, representatives of the scientific community and society in general. This technical level is made up of two permanent commissions, onethat covers economic matters and the other covering cross-sector activities. The latter has the following functions, amongst others:
   a) To stimulate basic and applied research of cleaner technologies.
   b) To propose sector level programmes regarding the sustainable management of natural resources.
   c) To promote the use of renewable sources of energy.

3.2.3 The Ministry of Water Resources

The function of the Ministry of Water Resources is to protect and ensure the conservation and rational use of natural resources by applying the principles of integrated management in order to optimise the use of water resources and the tools for resource management with a view to protecting the environment and meeting the country's needs for development. In this respect, the Ministry has approved a series of preliminary measures:

- All industrial projects must of necessity take into account the criterion of water saving.
- Industry must recycle used water, provided that this practice is technically feasible and economically viable.
- Water use must be subject to reappraisal with the purpose of benefiting water saving.

The necessary financial resources for industry to adapt to the new technologies come from public funds that are assigned to these projects, together with grants given by international bodies.

3.2.4 National Agency for Investment Promotion, Assistance and Control (APSI)

This agency promotes investments in clean technology processes. The purpose of APSI is to collaborate with investors in order to stimulate investment and improve the environment in both overall and institutional terms. APSI is a key instrument for integrating environmental interests in all investment projects and its respective contribution to sustainable development. Investors benefit by way of reductions in tax and customs duties, based on the application of certain criteria, including the technology used and the conditions of environmental conservation.

3.2.5 National Agency for the Promotion and Rationalisation of Energy Use

The National Agency for the Promotion and Rationalisation of Energy Use is another organisation that provides support. This agency was set up in the context of the revised model for national energy consumption with the purpose of establishing a national energy saving programme through technical/economic studies and audits of the industrial sector that result in the reduction of energy consumption.

3.3 Bosnia-Herzegovina

The sole agent involved in CP in Bosnia-Herzegovina is:

- Centre for Environmentally Sustainable Development (CESD).

Entities in charge of the environment:

- Federal Ministry of Agriculture, Water Management and Forestry.
- The Ministry of Forestry, Water Management and Agriculture of the Republic of Srpska.
- The Federal Ministry of Planning and the Environment.
- The Ministry de Urban Planning, Municipal Affairs, Civil Engineering and Ecology of the Republic of Srpska.
- Environmental Steering Committee - inter-entity co-ordinating body for environmental issues.
- Water Steering Committee - inter-entity co-ordinating body for water issues.

3.3.1 Centre for Environmentally Sustainable Development (CESD)

This agent contributes to the future development of principles of sustainable development and optimisation of environmental aspects, improvement of education, co-operation, environmental management and inspection and control procedures.

The CESD-CP Unit has no sustainable source of financing, i.e. the Centre does not receive financial support from the State. The World University Service-Austrian Committee (WUIS-S.I.P.) funded initial activities on the opening of the Centre for Environmentally Sustainable Development (CESD), involving active engagement of two representatives of the University of Sarajevo (Faculty of Civil Engineering) and the University of Banja Luka (Faculty of Technology), who were engaged in the establishment of organisational and staff capacity building of the CESD.

A team of experts from the CESD-CP Unit looked at the current conditions at the institutional and legal levels and they checked how receptive the industry and educational institutions were towards CP.

The recruiting of representatives from different universities, government and non-government-sponsored scientific institutions is envisaged, as well as from state-owned enterprises, to provide their services in education, the development of environmental policy and prospective action programmes.

3.3.2 The Ministry of Forestry, Water Management and Agriculture of the Federation of Bosnia-Herzegovina and the Republic of Srpska

This Ministry, which has federal authority, is indirectly responsible for establishing CP through the planning of water strategies and policies, the signing of agreements, the granting of authorisations and permits, and the enforcement of regulations and the prevailing legislation through licences and inspections.

In accordance with the 1998 Water Law passed by the Federation of Bosnia-Herzegovina, this Ministry delegates its authority regarding the adoption of strategic decisions and planning (long term plans and regulations, decrees and provisions that are regarded as being necessary for applying the Water Law) to two state-owned enterprises in the administrative regions of the Sava River and the Adriatic Sea.

Cantons in FB&H also have certain competencies for the licensing and allocation of water resources that are divided between the relevant canton ministries.

3.3.3 The Federal Ministry of Planning and the Environment of the Federation of Bosnia-Herzegovina and the Ministry of Urban Planning, Municipal Affairs, Civil Engineering and Ecology of the Republic of Srpska

The scope of action of these two ministries covers issues connected with water and the environment. The Ministry of Planning and the Environment requires a legal framework that is capable of managing, protecting and improving the environment, including measures aimed at:

- The conservation and protection of the environment.
- The protection of people and the environment from pollution.
- The introduction of improvements in environmental quality to counteract the impact of hazardous substances.
- The adoption of control and recovery measures.

3.3.4 Environmental Steering Committee

The governments of both entities signed a "Statement of Official Agreement between the Federation of Bosnia-Herzegovina and the Republic of Srpska on setting up an Environmental Steering Committee (ESC)" in Szentendre (Hungary) on 11 July 1998, which establishes the following:

- No limits are to be imposed by the entities in matters concerning the environment and no restraints will be placed by man for resolving environmental issues;
- There is an urgent and important need to find solutions to environmental problems; and
- The governments of the entities recognise the need to create a mechanism to co-ordinate co-operation between entities.

Four representatives from each entity participate in the ESC, as members with right to vote. The task of the Committee consists in co-ordinating parallel work carried out by the different entities in the field of international environmental agreements, and the presentation of the results to the corresponding state authorities for subsequent monitoring.

A key institutional proposal was for integration of environmental and water administration in the creation of the respective Ministries of the Environment and Water Management of both FB&H and RS who are responsible for the making of water policies, the definition of environmental strategies, the drafting of legislation and the issue of regulations. The political directives of the Ministry are to be applied through a maximum of 7 new River Basin Steering Committees in the respective River Basin Management Authorities.

Irrespective of the institutional model ultimately adopted, professional personnel will need to be assigned to the various ministries having both federal competencies in the RS and cantonal competencies, and in the steering committees. Ministries will concentrate on policy issues.

3.4 Croatia

The agents working on CP in Croatia are:
—The Croatian Cleaner Production Centre (CRO CPC), which was formally established by registration at the Trade Court in Zagreb on February 14 2000.
—APO Ltd. (Hazardous Waste Management Agency)-Zagreb.
Both are non-governmental institutions.

3.4.1 The Croatian Cleaner Production Centre (CRO CPC)

The headquarters of the Centre is at the APO Ltd. plant, the Hazardous Waste Management Agency in Zagreb, the capital of Croatia.

APO Ltd. was one of the organising entities involved in the three-year long "Advancement in Cleaner Production " project, aimed at setting up a CP Centre in Croatia. Two CP experts that have participated in carrying out the project, figure in the organisation chart of APO Ltd. When the Croatian Cleaner Production Centre is definitively set up, these two positions (Technological Co-ordinator of APO Ltd., nominated Director of the CRO CPC, and the Deputy at the Department of Hazardous Waste at APO Ltd., as CP Promoter) will be responsible for representing the staff of CP experts. The main objective of this project has been to train people in CP at both the institutional and professional levels in Croatia in order to establish CP in the economy, politics and environmental legislation of the country in a sustainable way.

The Centre's Board of Directors has five members from the Ministry of Economy, the Ministry of Environmental Protection and Planning, the Croatian Chamber of Commerce, Industry (pharmaceutical companies), and the Host Institution (APO Ltd.).

Financial support for the Centre comes from:

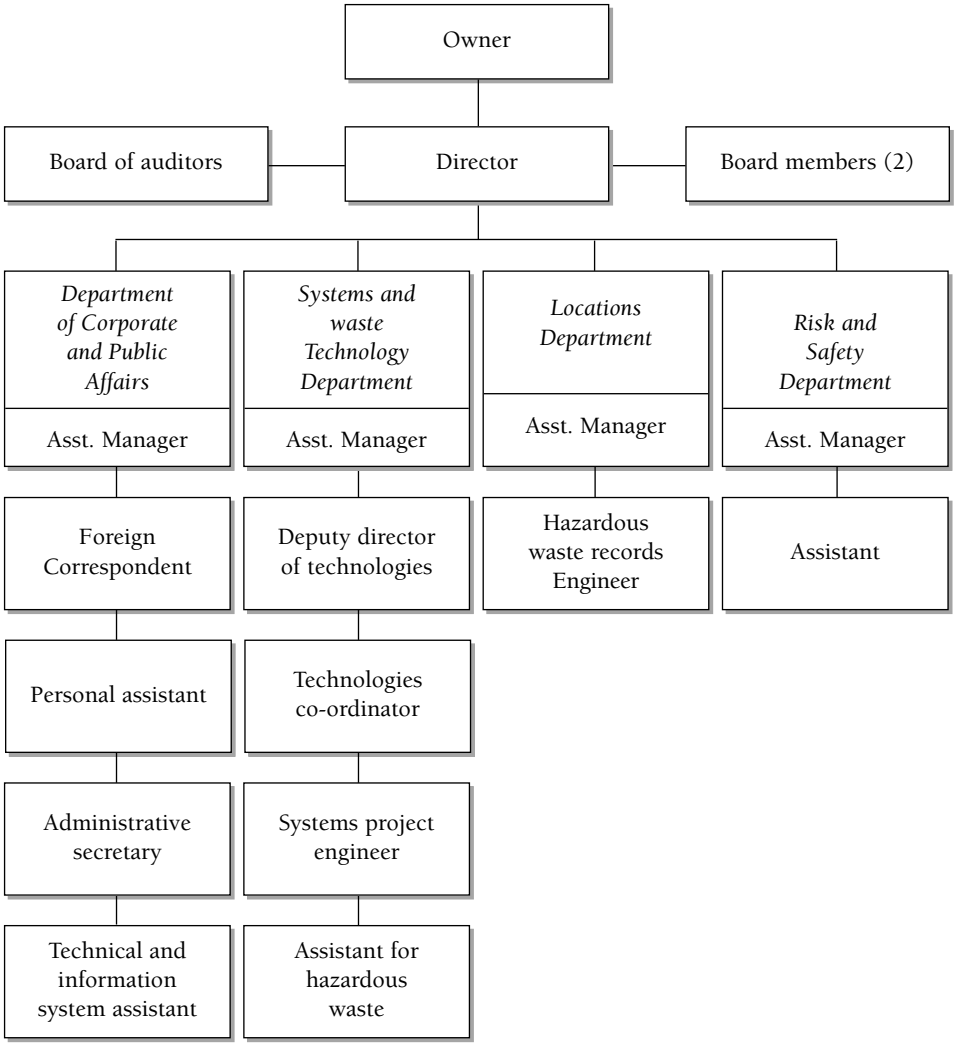
- The State budget, which partially finances the salaries.
- UNIDO equipment; 1 PC.
- The Czech government through the multinational financial programme of UNIDO/UNEP for Czech lecturers and CP-consultants.

The Czech Republic could be designated as the international contact because it was the partner designated by UNIDO to contribute to the development of basic training in CP. This was made possible by the UNIDO "Advancement in Cleaner Production" Project mentioned above, included in the UNIDO/UNEP Multilateral Aid to Development Programme.

3.4.2 APO Ltd. (Hazardous Waste Management Agency)-Zagreb

APO Ltd. (Hazardous Waste Management Agency), the host institution, is a private company, with a staff of 15 members. APO Ltd. is a firm of engineering consultants that belongs to Hrvatska Elektroprivreda and specialises in environmental protection and, more specifically, the management of hazardous and radio-active waste. The structure of the organisation is given below:

APO Ltd. (Hazardous Waste Management Agency) - Zagreb



Croatia is to organise 3 regional CPC in the future. There are 58 professionals in Croatia who can work in both the national CRO CPC in Zagreb and 3 planned regional CPCs in Croatia as CP trainers (lecturers) and CP consultants (experts). They will be involved in carrying out regional projects.

The objectives are to:

- Promote CP through the dissemination of information.
- Organise demonstration projects in industrial establishments.
- Prepare case studies.
- Organise training programmes in Cleaner Production practices.
- Identify industry's needs for guidance and guarantee that this is provided to companies interested in applying CP.
- Provide advice to key policy makers, particularly those in the Ministry of Environmental Protection and Physical Planning, the Ministry of the Economy and Financial Institutions (stakeholders, i.e. banks, insurance companies, etc.).

3.5 Cyprus

The institutional framework for environmental management and policy, which embodies the concept of cleaner production, is complex but very efficient in Cyprus. The pyramid starts with the Council of Ministers, which formulates the national environment policy. Other ministries involved in environmental issues are:

—The Ministry of Labour and Social Security.
—The Ministry of Commerce, Industry and Tourism.
—The Ministry of Agriculture, Natural Resources and the Environment.

3.5.1 The Ministry of Labour and Social Security

This Ministry is the corresponding authority that administers and enforces the Law on Air Pollution Control, the Law on Health and Safety in the Work Place, the Law on Hazardous Substances and the Asbestos Law. It operates by delegation through Plant Inspection Personnel of the Ministry of Labour, and watches over the compliance of legislation relating to Water Pollution Control by presiding over the Technical Committees for Environmental Protection created by virtue of this law.

3.5.2 The Ministry of Commerce, Industry and Tourism

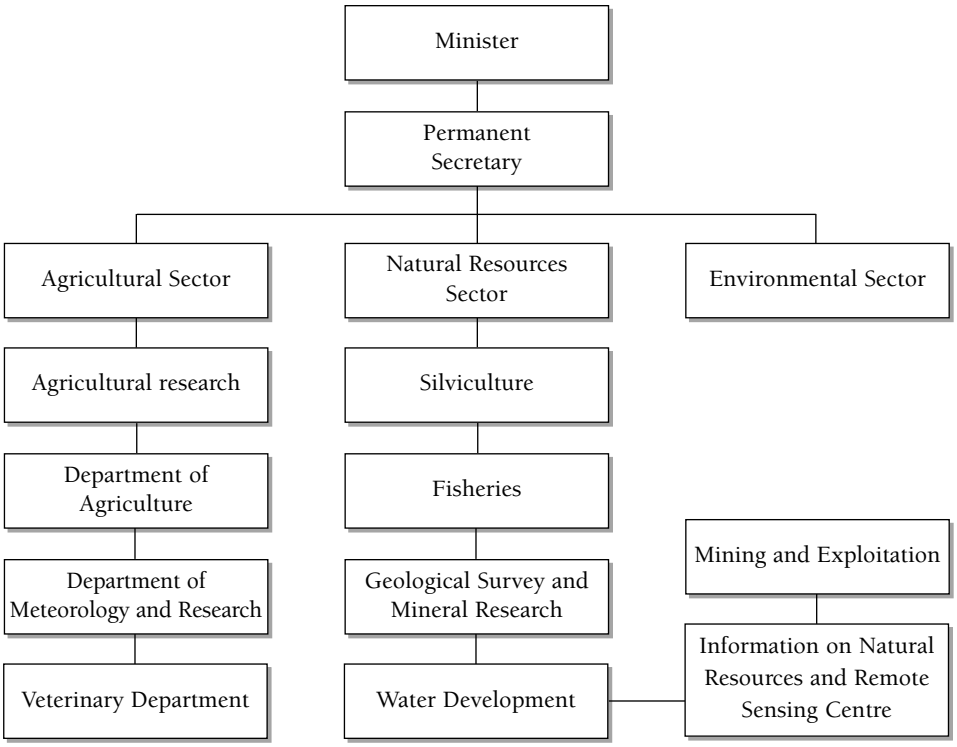
This Ministry deals with capital goods, energy conservation, exploitation of new renewable sources of energy, industrial pollution prevention techniques and the management of a grant scheme which assists manufacturing industries in installing waste treatment systems.

An affiliated organisation called the Cyprus Standards and Quality Control Organisation, deals with standards and quality assurance. Another entity, the Technology Foundation, promotes the enhancement of research and technology improvements in Cypriot industry. The Cyprus Tourism Organisation also promotes agro-tourism and is the co-ordinator of the "Blue Flags" scheme in Cyprus.

3.5.3 The Ministry of Agriculture, Natural Resources and the Environment

The organisation chart is as follows:

The Ministry of Agriculture, Natural Resources and the Environment



This Ministry is responsible for the control and co-ordination of policies for the protection and preservation of the environment (excluding town and country planning issues, which are confined to the Ministry of the Interior).

The Environment Service, which is based in the Permanent Secretary's Office, advises on environmental policy and guarantees implementation.It is responsible for co-ordinating the process of adopting EU policy and legislation, environmental protection programmes, the management of the environmental impact assessment Technical Committee, supervising the implementation of most of the legislation Water Pollution Control, promoting environmental awareness and training, together with gathering and disseminating information on the environment. The Service is considered the administrative arm of the Environment Committee and the Council for the Environment. In addition, it is the national focal point for the various international conventions and protocols (CSD, INFOTERRA, UNEP, CITES, etc).

This ministry is supported technically and financially by different executive entities, specialised in environmental issues, mainly the Council for the Environment, the Environment Committee, and the Planning Bureau.

The Council for the Environment:

Presided by the Ministry of Agriculture, Natural Resources and the Environment. Its members are representatives from governmental and quasi-governmental agencies, NGOs, the business and technical sectors and local government. The Council advises on matters concerning the environment, especially serious environmental problems or proposals connected with environmental legislation. Likewise, it issues recommendations on environmental policy and its field of action has been extended for it to serve as a forum for sustainable development.

Environment Committee:

It is presided over by the Permanent Secretary of the Ministry of Agriculture, Natural Resources and the Environment. Its members are representatives from the Ministries of the Interior, Labour and Social Security, Commerce, Industry and Tourism, Communication and Public Works, Health, Education and Culture, the Planning Bureau, the Cyprus Tourism Organisation, and the Department of Town Planning and Housing. The Committee reviews environmental programmes, further refines the objectives of environmental policy approved by the Council of Ministers and acts horizontally as a broader environmental policy co-ordinator between Ministries.

Planning Bureau:

This Bureau also has some executive responsibilities over various sectoral environmental issues. It is the economic and administrative arm of the Government; its main responsibility is the achievement of economic and social development. The Bureau is in charge of the preparation of five-year Development Plans for the national, regional, sectoral and balanced development of the country's economy. It develops the Annual Development Budget and supervises and co-ordinates its implementation. It is wholly responsible for the internal co-ordination of the Cyprus-EU negotiations.

Regarding legal capacity to take action, this ministry is a public entity with full authority to exact reparation for any violation of the applied environmental laws. Different co-operation mechanisms have been established between the different ministries affected in order to apply environmental legislation in an effective way. In more specific terms, inspectors are assigned to the different operational departments in the Ministry of Agriculture, Natural Resources and the Environment to monitor the adequate implementation of environmental legislation and regulations. For example, inspectors from the Departments of Water Development, Agriculture, Geological Survey and Fisheries are appointed under the provisions of the Water Pollution Control Law. The executability of the provisions of the law, which are the competency of the Ministry of Agriculture, Natural Resources and the Environment, are laid down in collaboration with the inspectors of the Environment Service and under the supervision of the Service Director who holds the position of Chief Inspector.

In relation to the sectors in which they are specialised through the various Departments, the Ministry of Agriculture, Natural Resources and the Environment performs a great many executive functions that are specific to or connected with the environment, such as protecting the quality of surface water, groundwater and seawater, water resource management, fish farming, soil conservation, fertilisers and pesticides, the reuse of treated effluents, hazardous waste management, mining and exploitation, geomorphology, control/monitoring/prevention of marine pollution, water resource exploitation, monitoring of water quality, waste from agriculture and stock breeding, treatment of industrial and household waste, site restoration, etc.

The personnel that provide services in each department have extensive experience with all types of waste (solid, liquid and gaseous) according to their specialised field.

3.6 Egypt

The institutions that are responsible for CP in Egypt are:

—The Ministry of State for Environmental Affairs.

—The Egyptian Environmental Affairs Agency (EEAA).

Both the Ministry and the Agency have the necessary executive competency and are authorised to warn those in charge of industrial installations to correct any non-compliance of the law through the imposition of financial penalties or by closure of a plant if transgressors do not take the corresponding corrective measures.

3.6.1 The Ministry of State for Environmental Affairs

The main industrial objectives of the Ministry are:

- To ensure that all operating facilities are in compliance with environmental laws and regulations.
- To ensure that newly-built facilities adopt cleaner technologies in their operations.

3.6.2 The Egyptian Environmental Affairs Agency (EEAA)

The Egyptian Environmental Affairs Agency is currently establishing an inspection unit entrusted with the auditing and inspection of industrial establishments in Egypt.

Around US$105 million are allocated through agreements with international and bilateral aid agencies for financing pollution prevention and waste minimisation projects to demonstrate the economic feasibility and environmental benefits of pollution control in Egyptian industry. Financial packages for different sectors include loans and grants set aside to stimulate investment in pollution prevention in industry that produces pollution.

3.7 France

The different agents handling CP in France are:

—Ministry of Land-Use Planning and the Environment - Directorate for Pollution and Risk Prevention.

—Agency for the Environment and Energy Management Directorates for Industry and Planning (ADEME).

Both have experience with all types of waste.

Moreover, some of the international partnership contacts set up with these agents are: PREPARE-EUREKA and PNU (IC).

3.7.1 Ministry of Land-Use Planning and the Environment-Directorate for Pollution and Risk Prevention

This Ministry, with regulatory power, is responsible for the inspection of registered installations.

3.7.2 Agency for the Environment and Energy Management Directorates for Industry and Planning (ADEME)

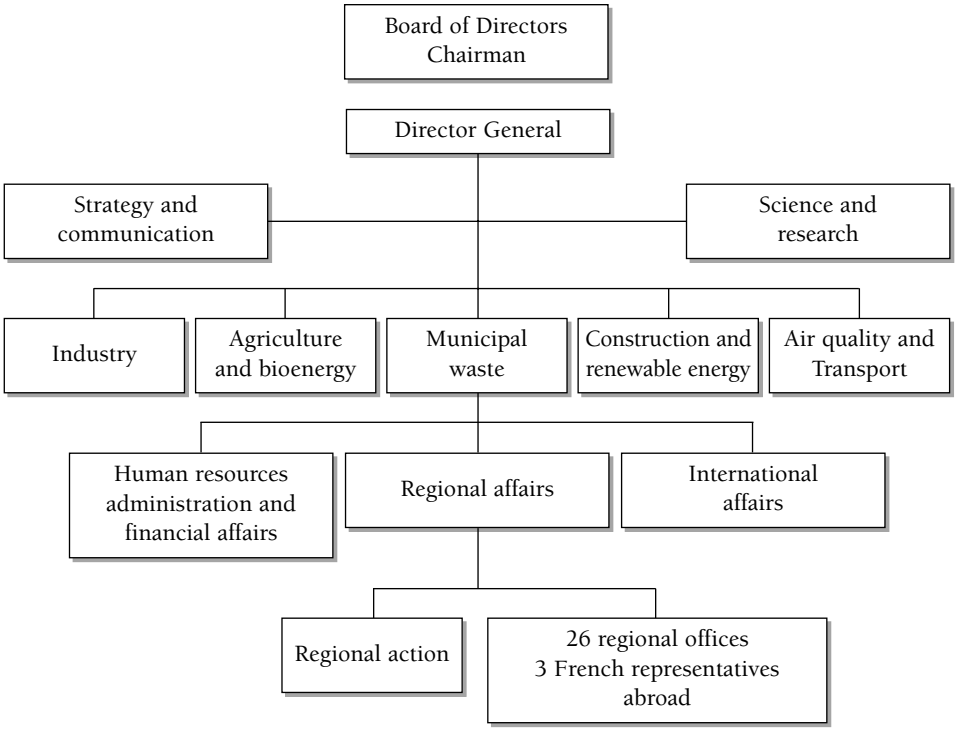
ADEME is a state-funded public industrial and commercial establishment whose activity is supervised by the French government ministries in charge of research, the environment and energy. ADEME was established on 1 January 1992. The Agency (which has 26 regional offices) deals with matters such as air pollution, soil pollution, waste, noise and energy, and specialises in all industrial sectors.

The agency's tasks include:

- Conservation of energy and raw materials.
- Promotion of renewable energy resources.
- Promotion of clean and energy-efficient technologies.
- Minimisation, elimination, recovery and valorization of waste.
- Prevention and reduction of air pollution.
- Mitigation of noise pollution.
- Prevention and remediation of soil pollution.

The main objective of ADEME is to promote pollution prevention at the corporate level by providing support to any research responding to the requirements of R&D programmes, innovative projects (demonstrations) and actions to disseminate results.

Organisation chart of ADEME



3.8 Greece

The agents working on CP in Greece are as follows:

1. Ministry of Development for the financial assistance of the enterprises introducing BAT.
2. Ministry of the Environment for Environmental Conditions (in accordance with the IPPC Directive, the BAT are to be included under environmental conditions).
3. Regions (14) and prefectures (54) for permits of non-applying IPPC enterprises.
4. Democritus Institute.

The geographical scope of action is nation-wide. They have experience with all types of emission (gaseous, liquid, solid).

With regard to contacts with international associations, the Democritus Institute is associated with agents from the European Community Programme.

3.9 Israel

The agents working on CP in Israel are as follows:

—The Ministry of the Environment.
—The Manufacturers' Association of Israel.
—The inauguration of a CP Centre is also envisaged.
—Mention is also made of the Israeli Economic Forum for the Environment.

The geographical scope of the Ministry of the Environment and the Manufacturers' Association is nation-wide, and they deal with all industrial sectors. The Ministry has district offices to identify specific industrial sectors within a specific geographical context.

The Ministry of the Environment and the Manufacturers' Association have experience with all types of waste flow: gas, liquid and solid emissions in any environment.

3.9.1 Ministry of the Environment

The administrative structure of the Ministry of the Environment is based on some 30 divisions, divided into professional directorates. The Ministry operates on three different levels —national, regional and local. Some 350 employees currently staff the Ministry of the Environment at national and district levels.

CP issues are largely within the scope of responsibility of the Chief Scientist's Office, Deputy Director General of Industry and the Economic, Regulation and Information Division. Many other divisions participate in CP matters, which especially include air quality, hazardous substances, industrial wastewater, commercial licences and solid waste.

The specific aspects of CP with which the Ministry deals are: reduction of waste, promotion of environmental investments at factory level to increase profitability, technologies to reduce or treat hazardous waste.

At national level, the Ministry is responsible for formulating an integrated national environmental policy and for developing strategies, standards and priorities for environmental protection and resource conservation.

The district level is responsible for implementing national environmental policy and provides a link between the national staff and municipal environmental units. Municipal environmental units, under the administrative jurisdiction of their respective municipalities but under the professional authority of the Ministry, are responsible for environmental improvement at the local level.

Several departments within the Ministry —including Air, Water, Solid Waste and Hazardous Substances— in co-operation with the Chief Scientist's Office, are promoting cleaner production and resource conservation through publications, guidelines and the enforcement of laws and regulations. The Industry and Business Licensing Division is responsible for supervising and controlling industrial activity nation-wide.

Over the past couple of years, the Ministry of the Environment has classified industries in Israel into four levels, according to their environmental risk and damage potential. Precedence in terms of effort, time and resources is accorded to the more dangerous industrial plants.

3.9.2 Manufacturers' Association of Israel

The Manufacturers Association represents about 1,700 industrial plants, which constitute about 90% of all industry in Israel. It is composed of several divisions encompassing such sectors as chemicals and pharmaceuticals, metal and electric industries, food, electronics and software as well as divisions on international relations, finance, economy, communications and labour and human resources.

The Chemical, Pharmaceutical and Ecology Division is made up of representatives of the various sectors of the chemical industry and it is responsible for environmental issues within the Association.

Environmental activity is structured through Committees consisting of directors of the major industries: a General Committee for the Environment and Subcommittees on Hazardous Materials, Gas Emissions, Industrial Effluents, Recycling and Packaging, Environmental Management and ISO 14000.

The environmental committee of the Chemical, Pharmaceutical and Ecology Division deals with a variety of environmental issues related to CP. The Committee also represents industry in the Knesset (Israeli Parliament) and in government bodies, which deal with the subject, including the Ministry of the Environment. It informs members about laws, regulations and environmentally- sound manufacturing processes and seeks to promote cleaner production processes.

3.9.3 The CP Centre

The Ministry of the Environment and the Manufacturers Association are in the process of establishing a CP Centre. The Centre's activities are based on the UNEP CP for Industry programme. The Centre will strive to advance awareness, extend knowledge, increase capacity, and promote instruction, training and demonstration of CP.

The objectives of Israel's CP Centre are as follows:

- To provide information to industry on the technical and administrative aspects of CP.
- To provide assistance to CP programmes, which may increase awareness and research and development capacity within government and industry.
- To assist in the introduction of a preventive approach to study programmes in the engineering and business administration faculties of institutes of higher learning.
- To establish an assistance system for the transfer of technology in this field.
- To obtain financial aid (from abroad) for the carrying out of activities. Such assistance may take the following forms: financial aid, the transfer of information, technological transfer, education and training.
- To support and promote research and development on clean production processes, products and services.

The Centre will be established and operated within the framework of the Chemical, Pharmaceutical and Ecology Division of the Manufacturers' Association. It will be staffed by professionals in the area of economics, business administration, industrial design and administration, environmental engineering and information. A Board of Directors, composed of representatives of the Ministry of the Environment and industrialists, will decide on the working programme of the Centre and will supervise its operation.

Although regional and international co-operation in the form of dissemination and exchange of information is ongoing, partnerships have not been formalised with agents/institutions dealing specifically with CP. Israel has also been an active participant in UNEP activities, in general, and in the Mediterranean Action Plan, in particular. In 1996, Israel and MAP signed a Coastal Areas Management Programme (CAMP). Within this framework, and with the financial aid of the MAP, a sustainable management strategy for Israel is being prepared. Several of the documents that have already been prepared underline the importance of CP processes.

3.9.4 The Israeli Economic Forum for the Environment

This non-governmental organisation was founded in 1991. The Forum specialises in the greening of industry in Israel. The Forum has recently joined the International Network for Environmental Management (INEM), a global federation of non-profit-making business associations which fosters environmental management and sustainable development.

3.10 Italy

In Italy there are three agents which deal with CP issues:
—ANPA (Italian Environmental Protection Agency).
—The Ministry of the Environment.
—The Ministry of Industry.
There are also two specific bodies: ENEA (Italian Agency for New Technologies, Energy and the Environment) and CNR (Italian Council for Scientific Research).

3.10.1 ANPA (Italian Environmental Protection Agency)

ANPA is organised in five Departments and three Units, of which the following are responsible for matters concerning CP:

- The Department of Integrated Strategies.
- The Department of Environmental Protection and Recovery.
- The Unit for Products Environmental Quality.

ANPA is a self-governing agency, operating with government funding. Its technical support consists of about 30 people working on topics related to CP. The agency is the technical partner of the Directorate General for the Environment in drawing up European policy concerning CP; it works in collaboration with the Department of TIE of the UNEP (the Department of Technology, Industry and Economy of the United Nation Environment Programme, based in Paris) and the UNEP MAP in promoting CP in the Mediterranean; and it works jointly with the European Environment Agency (EEA) and other European national agencies.

The ANPA has full decision-making power and legal capacity to undertake legal actions and it possesses technical and scientific experience in the main fields of environmental protection.

Department of Integrated Strategies

The Department of Integrated Strategies works for the dissemination and implementation of CP in the Mediterranean Region. It normally works in this field in collaboration with the Department of TIE of the UNEP and ECOMED (Agency for the Sustainable Development of the Mediterranean, based in Rome), although it also participates in other international scenarios.

Department of Environmental Protection

The Department of Environmental Protection works on technologies for environmental prevention and recovery, with particular concern for the production of liquid and solid waste and gas emissions. The Department particularly studies, evaluates and proposes process technologies for CP.

Unit for Product Environmental Quality

The Unit for Product Environmental Quality promotes the development of products and services with a reduced environmental impact and provides expertise and instruments for an integrated environmental policy for products and services.

3.11 Lebanon

With regard to agents that are responsible for matters relating to CP in the Lebanon, there are various entities in both the public and private sectors. The main public entity that supervises and monitors the environmental impact of different industries is:

—The Ministry of the Environment (MoE).

Other entities are:

—Envirotech.

—DELTA.

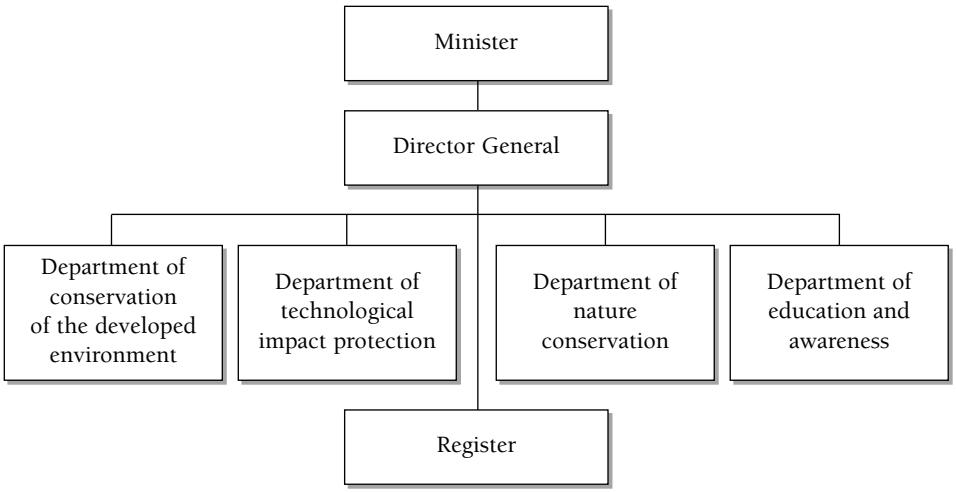
—The Lebanese Industrial Association (ALIND).

—UNIDO.

3.11.1 Ministry of the Environment

The Lebanese Ministry of the Environment, a government agent, is one of the agents and institutions working on cleaner production.

Structure of the Ministry of the Environment



The Ministry of the Environment (MoE) has the following objectives:

- Setting a general policy, projecting long- and medium-term plans for all the issues related to the environment and the use of natural resources, as well as proposing executive steps for its implementation and monitoring.
- Conducting detailed studies for the plans to be followed, concerning the protection of the environment and pollution control from all sources, and in particular solid waste, waste water, air pollutants, as well as waste water filtration to underground, drinking and irrigation water. All that, after surveying all existing constructions on the coast or on land, the discharges of which could be a danger to the environment.
- Setting the environmental legislation, specifications and standards, in order to guarantee the good quality of the urban environment, as well as managing the environmental threats caused by industry, agriculture and all aspects of urbanism.
- Setting the environmental conditions for the authorisation or permission to establish new manufacturing facilities, industrial zones, cattle and poultry farms, quarries, mines, asphalt processing plants and cement works.

The technical and financial supports for adopted projects are provided mostly by international funding-agencies, through bilateral or multilateral

agreements or contracts, coupled with the expertise and knowledge of national focal points. The Lebanese government also contributes to the financing of certain small urgent projects recommended by the MoE, although its funds and resources are limited.

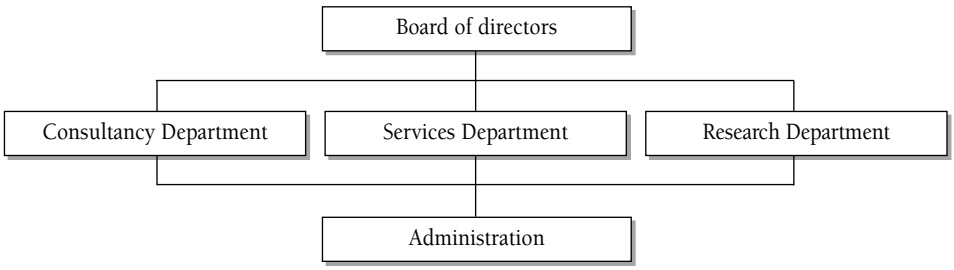
The MoE has legal power to lay down the national environmental code and watch over its compliance. The main legal tool within the scope of the legal competency of the MoE is the Organisational Decree number 216/93 of 2/4/93 on the setting up of the Ministry of the Environment, with its planning and control authorities, together with the mechanisms for co-ordinating with other ministries and executive bodies.

The MoE has experts and engineers that are environmental specialists with extensive experience in numerous studies and environmental science. Some are experts in chemical effluents, with solid waste management, water quality and wastewater treatment techniques, environmental indicators and specifications, agro-industries, etc. In addition, experts in environmental education are also active in the Ministry, supported heavily by local, regional and international NGOs.

The Ministry covers almost all polluting sectors, especially waste (solid, liquid or gaseous of household, clinical or industrial origin). Nevertheless, the limited staff and resources available are an accurate reflection of the meagre advances made at the national level.

3.11.2 Envirotech-Lebanon

This is another agent responsible for CP in the Lebanon. Envirotech is a private Lebanese company, specialised in environmental issues. It carried out environmental audits, consultancy work, and research work for both the private and public sectors in Lebanon and the region. Its headquarters is in Beirut, Lebanon, although it has regional representation (Egypt, Jordan and Syria —where it has an office). The organisation chart of Envirotech is as follows:



Being a private company, the team of permanent experts of Envirotech are auto-financed by the company's resources and funds. The company has no legal capacity to apply CP tools and techniques. It is often contracted to research technologies used and to propose cleaner production technologies, according to the needs of the client. It advises the private sector, under contract, on the best available techniques pertinent to a certain type of production or services.

Envirotech specialises in environmental auditing, environmental impact assessments, the reduction of industrial pollution, together with commercial and environmental consultancy work. It also has extensive experience in all types of waste flows and cleaner elimination techniques for solid, liquid and gaseous waste.

3.11.3 The DELTA Network

DELTA stands for "Developing Environmental Leadership Towards Action". It is a regional network, initiated by Sustainable Business Associates (SBA), based in Switzerland, and hosted in Lebanon by the International Chamber of Commerce (ICC), which is working to promote environmental development in the broad field of the private sector.

The Network, along with the ICC, is a group of private sector individuals/organisations working to promote environmentally-friendly processes in the region, namely in Lebanon, Syria, Egypt, Palestine, Jordan, Tunisia, Morocco and Algeria. This Network is organised by different entities in each country; some of them are competency of the Ministry of the Environment or the Ministry of Industry, and others depend on non-governmental organisations.

Its objectives refer mainly to the promotion of CP in the entire private sector, especially in relation to small and medium-sized enterprises. The aim of this Network consists of engaging all enterprises as participant partners in support of sustainable environmental development.

DELTA depends, technically and financially, on the individual contributions of partners, and on some fund-raising activities. DELTA has no legal authority, although it is cushioned by governmental bodies (e.g. the ministries).

DELTA focuses its activities and interests on small and medium-sized enterprises, where it provides partners with available expertise and advises them on waste flows (solid, liquid or gaseous emissions).

3.12 Libya

The agents handling CP issues in Libya are:
—The Centre for Industrial Research.
—Libyan National Centre for Standardisation and Metrology (LNCSM).
—The Environment General Authority (EGA).

3.12.1 The Centre for Industrial Research

The functions of this centre are based on:
- Quality control of industrial products.
- To advise and assist public and private industries in promoting cleaner production.

3.12.2 Libyan National Centre for Standardisation and Metrology

This centre is responsible for:
- Issuing the guide of Libyan standards in general.
- To issue the guide of Libyan standards for specific industries, mainly food, construction materials, textile, tanneries, petrochemicals, metals, cement, rubber, glass, electrical and electronic manufacturing, and the furniture industry.

3.12.3 Environment General Authority (EGA); formerly the Technical Centre for Environmental Protection

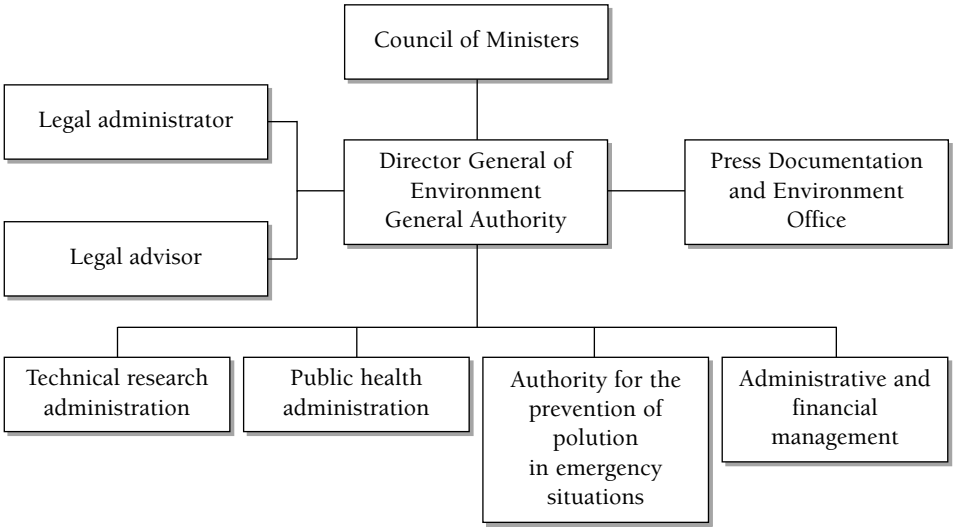
Its objectives are:
- Control of waste disposal, in particular industrial wastes.
- Monitoring of industrial emissions.
- Issuing permits for industrial activities.
- Enhancing and increasing the efficiency of CP to prevent pollution.

In this way, the EGA is in charge of all relevant environmental matters in Libya at the present time. This Authority has 4 subordinate authorities that specialise in different environmental issues.

The organisation chart of the EGA is currently the same as the organisation chart of the Technical Centre for Environmental Protection. However, this current structure is being revised to take over all expected activities related to

the environment and to be replaced by a Ministry of the Environment. See organisation chart below:

Organisation chart of the EGA



The EGA receives technical assistance from all of the research centres that are operational in Libya, including the Solar Energy Research Centre, the Centre for Industrial Research and the Centre for Nuclear Research. The EGA also receives assistance from all of the wastewater and solid waste collection companies, together with the direct support of the local officers in each District.

The only sources of financial support are the public and governmental resources, in addition to some projects which are funded by international agencies, such as the UNIDO, WHO, UNESCO, FAO and others. In fact, UNIDO has contributed more than $38 million to important projects in Libya in the period extending from 1984 to 1990.

The EGA has the necessary legal capacity and authorisation, granted by the Council of Ministers, to undertake legal actions. In fact, officials from this Authority are usually designated by the General People's Committee, and they enjoy the powers assigned to all the security forces, coast guards, municipal police, forest rangers and other officials vested with criminal research authority under legislative acts in force. They have to follow the instructions issued by the Authority in matters pertaining to the application of the provision of the Environment Act.

The major areas of concern to the EGA are environmental protection, industrial quality control and standardisation, and metrology.

The EGA, through its different administrations, handles all types of industrial waste and domestic waste, whether solid, liquid, or gaseous.

3.13 Malta

On the 4th November 1993, the Environmental Protection Department entered into an agreement with the Department of Industry and Malta University Services Ltd to set up a Cleaner Technology Centre, to be based at the University of Malta. This became operative in 1994.

3.13.1 Cleaner Technology Centre

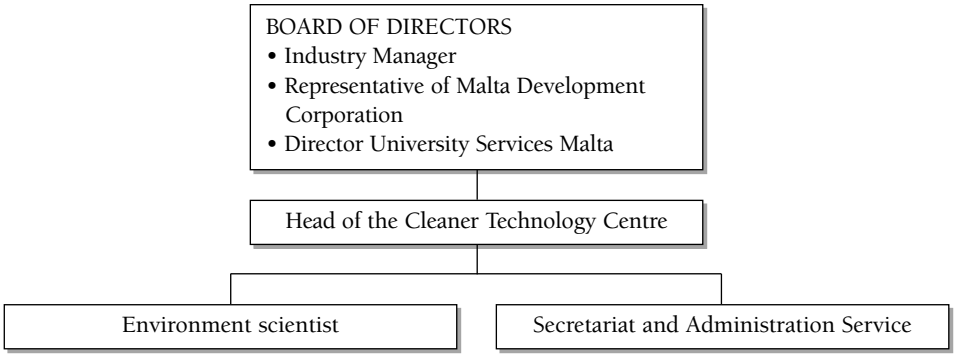
The Clean Technology Centre is a company in which the following participate:

- The Environmental Protection Department (Ministry of the Environment who are the originators of the concept and the instigators of the initiative). Its main function was to emphasise the environmental objectives of the Centre.
- The Department of Industry. Its main function is to make clear the importance of the cleanest technologies in relation to improvements in efficiency, industrial restructuring and economic development.
- Malta University Services Ltd which is a limited liability company set up within the University of Malta to facilitate interaction between the University, Government and the Private Sector through the successful exploitation of the considerable knowledge and expertise which exists within the University.

The Ministry of the Environment and the Department of Industry provide financial support to the Centre (the annual budget assigned is US$ 38,000 supplied by the Government).

See the organisation chart below:

Cleaner Technology Centre



The staff consists of one full time director and a secretary. There are four people working on CP at the Clean Technology Centre.

Board of Directors

The Cleaner Technology Centre is run by a full time co-ordinator under the direction of a Board of Directors chaired by the representative from each of the other partners (e.g. the Department of Industry and University Services Malta Ltd.).

Advisory Board

The main objective is to secure, as far as possible, a positive and proactive dialogue with the private sector and to ensure that the Centre effectively responds to the real problem facing the country of Malta. An Advisory Board has been set up to define priorities and to provide the longer-term direction of the Management Board and hence of the Centre.

The advisory board is chaired by the representative of the Malta Federation of Industry and includes members from such institutions as the Malta Chamber of Commerce, Council for Science and Technology, Department of Manufacturing Engineering at the University and the Chamber of Professional Engineers.

The Cleaner Production Centre was specifically set up to support collaborative action with industry, to find compatible solutions with development needs and a sustainable use of the environment. Its main objectives were identified as follows:

- To encourage industry to apply least polluting technologies.
- To transfer know-how to industry regarding the implementation of cleaner technologies.
- To offer assistance with the analysis of existing systems to find feasible solutions with regard to pollution prevention.
- To become involved in any initiative likely to lead to cleaner technology being taken up by local industry.
- To pursue any other objectives which both parties may consent to include.

The main function of the Clean Technology Centre needs to be as an instigator and co-ordinator. It must promote new initiatives and co-ordinate the joint effort in establishing them, without taking on the responsibilities of the individual agencies (e.g. the Department of Environmental Protection and the Department of Industry).

The Centre was specifically set up to collaborate in achieving the following aims:

- Lower energy, resource and hazardous raw material consumption.
- Generation of fewer and less toxic gaseous emissions, waste water, and solid and hazardous waste.

The objective of the Centre is to offer advice to all sectors and provide an integrated service. Due to the smallness of the country, maximum use needs to be made of all human resources.

Solid waste forms the main waste flow, although the university has experience and can give guidance on gaseous and liquid effluents.

The priorities connected with CP are mainly concerned with liquid discharges connected with hazardous materials and solid waste.

The Cleaner Technology Centre does not have partnership contacts as such but it does have very good mutual support contacts with the Barcelona RAC/CP and the UNEP/TIE in Paris. Other occasional contacts have been made with several CP centres such as those in Cyprus, Egypt and Taiwan.

3.14 Morocco

Bodies that are responsible for CP in Morocco are:

- The Secretary of State for the Environment (SEE).
- The Ministry of Commerce, Industry and Handicrafts.
- Moroccan General Business Confederation, through the recently established Moroccan CP Centre.
- Training and research institutes.

3.14.1 The Secretary of State for the Environment (SEE)

This authority has the following structure:

- The Minister's Office.
- General Secretary.
- Projects, Planning and Forward Studies Directorate.
- Co-operation and Communication Directorate.
- Risk Control and Prevention Directorate.
- Regulations and Control Directorate.
- Budget Division and Human Resources.
- Pilot Plans and Environmental Impact Study Division.

3.15 Slovenia

Nowadays, there is no specific agent in charge of CP at the national level although there are some institutions dealing with CP aspects:

—The Ministry of the Environment and Planning.
—Chamber of Commerce and Industry of Slovenia (CCIS).
—Environmental Development Fund of the Republic of Slovenia.
—Research institutions.

A CP centre will probably be established in the near future. The Chamber of Commerce and Industry and the Technology Development Department, with its contacts with the industry, should play an important role in this. The organisation scheme, the activities of the centre and its financing have yet to be defined.

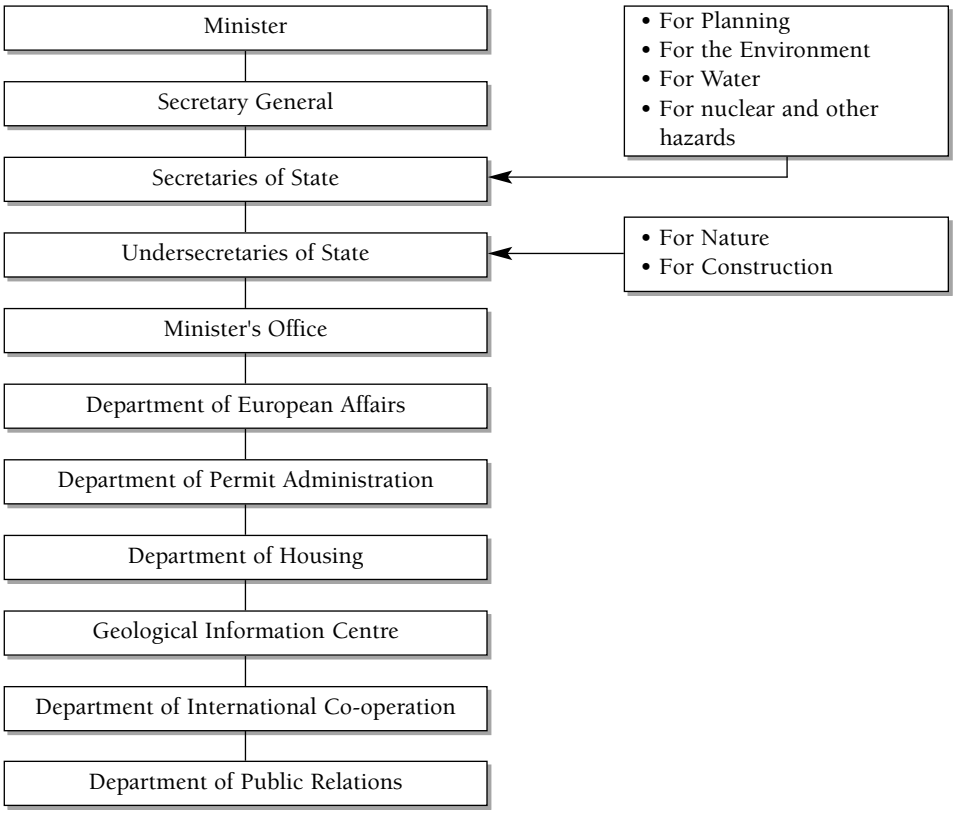
3.15.1 The Ministry of Environment and Planning

This Ministry lays down and issues control measures and is responsible, amongst other things, for matters relating to:

- The protection of the environment and nature.
- Water and water industry.
- Nuclear safety.
- Geodesy and geo-oriented information systems, and inspection monitoring in these areas.

The organisation chart of The Ministry of Environment and Spatial Planning is shown on the next page.

Organisation chart of the Ministry of the Environment and Planning



3.15.2 The Chamber of Commerce and Industry of Slovenia (CCIS)

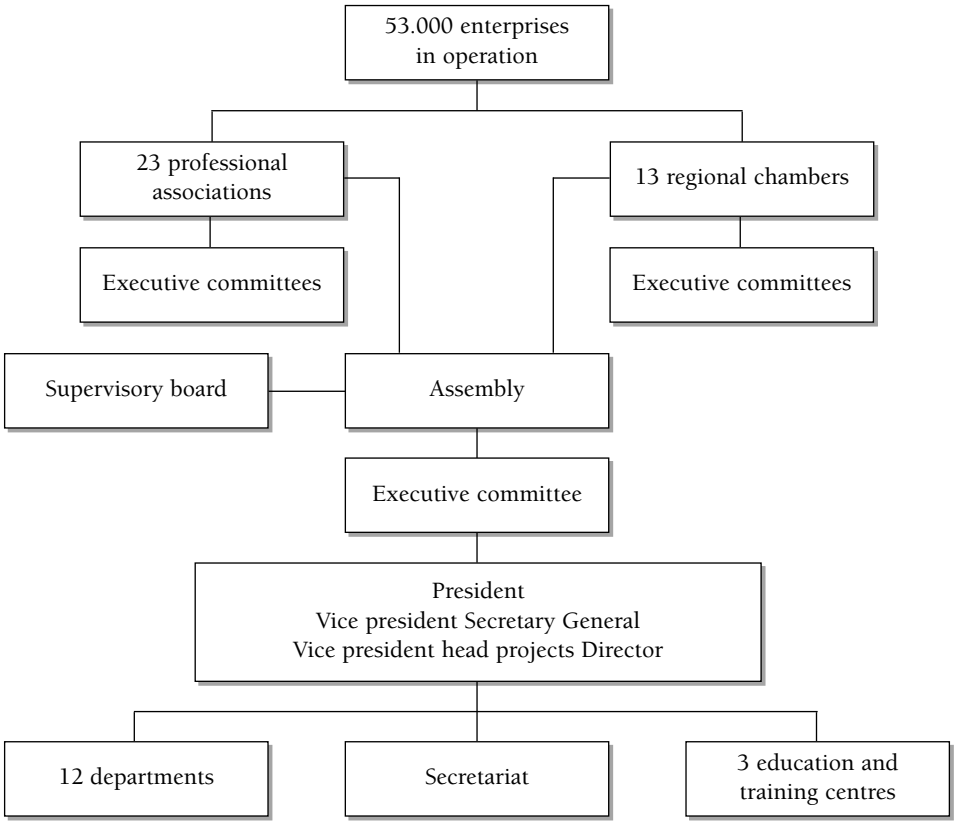
See the following CCIS (Chamber of Commerce and Industry of Slovenia) organisation chart.

The following activities are the competency of the CCIS Department of Technological Development:

- Technological development and innovation.
- Environmental protection.
- Quality management.
- Industrial design.

The Technology Development Department has 7 employees, of which 2 are in charge of environmental protection. CCIS has a total number of 250 employees at the present time.

CCIS organisation chart



The objectives of the CCIS are:

- To inform enterprises, with the object of enabling them to incorporate environmental protection into their activities and to control their environmental impact.
- Holding industry-government talks on the implementation of new legislation, a new national programme, etc, in the preparatory phase of these documents.
- Promotion, training (exchange of experiences, good housekeeping practices) in order to speed up the implementation of environmental requirements.

The sectors and waste flows covered by this agent are: hazardous substances/preparations (chemical safety) in co-operation with the Chemical and Rubber Industry Association (organised through the CCIS), HFC and SF_6 (climatic change), ozone-depleting substances, waste management (e.g. waste materials exchange, packaging waste), the system of environmental management (ISO 14000/EMAS) and the prevention of industrial pollution (implementation of the BAT concept).

Co-operation between the Chamber of Commerce and Industry, enterprises and other institutions is based on voluntary agreements. On an international scale, the Chemical Association is in contact with the European Chemical Industry Council (CEFIC) that is responsible for setting up the Responsible Care Programme. Also, the Chamber of Commerce and Industry of Slovenia had contacts with the World Bank and the GEF implementing agency for the project of phasing out ozone-depleting substances.

3.15.3 Environmental Development Fund of the Republic of Slovenia

Also called the Eco Fund is an independent public legal entity located in Ljubljana, the core activity of which is the provision of loans for investments in environmental protection projects. It was set up by virtue of the 1993 Environmental Protection Law and began operating in January 1994, which is when it disbursed all of its original-issue capital. The Eco Fund is registered as a joint-stock company and owned 100% by the Republic of Slovenia.

The Eco Fund has a staff of 11 and is divided into four sectors (Fund Management, Project Start-up, Project Implementation and Finance). Co-ordination of the Fund's policy is in the charge of external management, presided over by the Secretary of State of the Ministry of the Environment and Planning and four other members. Operations are controlled by a Supervisory Board that is made up of ten members. The bodies of the Eco-Fund are thus

the Management Committee, the Supervisory Board and the Managing Director.

For the moment, there are two public tenders under way: the loans programme for municipal environmental investment and the programme to reduce air pollution. A tender for environment investment loans for private enterprises (industry) is being prepared. The Fund provides technical guidance and information on how to prepare applications.

The Environmental Development Fund co-operates with the World Bank, Phare, REC Centre, and GEF EIG EBRD.

3.16 Spain

There are various agents and institutions working in the field of the environment in general in Spain that bear relation mainly with State Government or the individual autonomous communities.

The Spanish government establishes the basic legislation and carries out general co-ordination tasks, and the Autonomous Communities implement the environmental policies and have transferred powers to develop the State legislation.

There are four agents working on CP at the present time:

—The Centre per a l'Empresa i el Medi Ambient (CEMA), of the Government of Catalonia.

—IHOBE, a state-owned environmental management company of the Basque Government.

3.16.1 The Centre per a l'Empresa i el Medi Ambient (CEMA)

The Centre per a l'Empresa i el Medi Ambient (CEMA) is the instrument of the Ministry of the Environment of the Government of Catalonia that promotes the adoption of CP practices and technologies that are more ecologically efficient in industry.

The CEMA is a public limited company with capital that belongs in its entirety to the Government of Catalonia. It comes under the Ministry of the Environment.

The Centre was founded on July 1st 1994 as a section of the Waste Agency, and it acquired its current legal personality on October 5th 1998.

The range of services that it offers has become broader as a result of its activities. A well as disseminating and promoting the tools of CP, the Centre has become a point of reference in the relationship between the different

industrial sectors and the Ministry of the Environment of the Government of Catalonia.

In order to consolidate the dynamism in these dealings and to better identify the services offered by the Centre, the name of the Centre was changed on May 22 2000 from Centre for Cleaner Production Initiatives (Centre d'Iniciatives per a la Producció Neta s.a.-CIPN) to Centre per a l'Empresa i el Medi Ambient, s.a. —its current name.

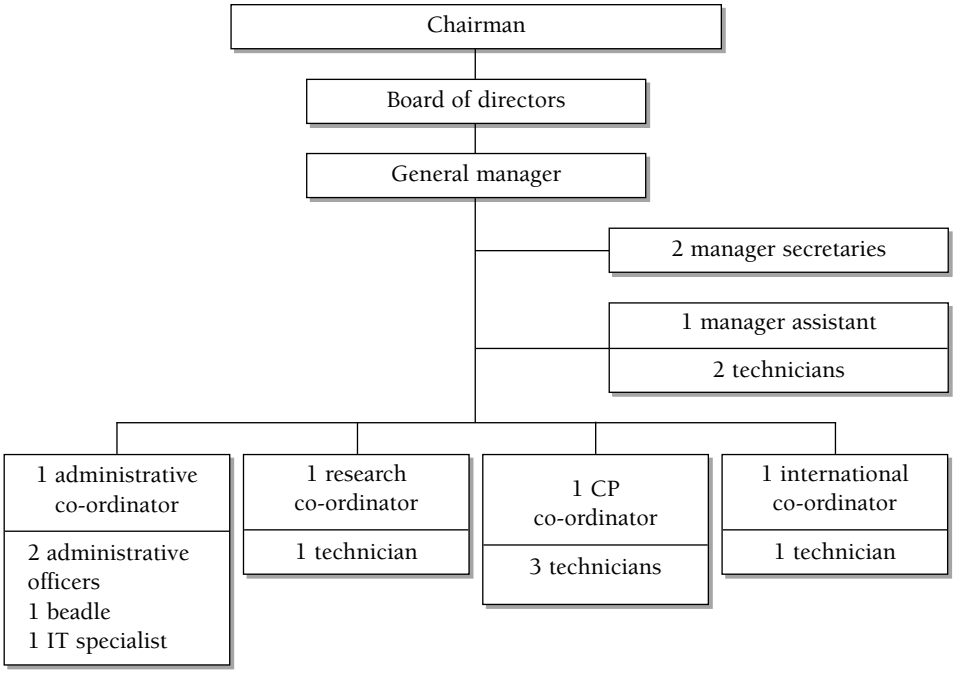
The Centre maintains its objective of disseminating and promoting the tools of cleaner production in this new stage of operations, together with consolidating its work of conducting dealings between the industrial sectors and the Ministry of the Environment.

The corporate purpose of the Centre is as follows:

1. To attend and convey the enquiries and concerns of industry and industrial sectors with regard to policies for improving the protection of the environment.
2. To advise and support enterprises, especially:
   a) In preparing integrated pollution prevention strategies for processes and products, and in the adoption of practices, techniques and technologies that result in the effective reduction of pollutant emissions through diagnoses, projects, participation in workgroups, demonstration projects and the development of applied research, by promoting and the ratification of accords and voluntary agreements in the field of environmental improvement.
   b) In introducing improvements designed for ecological efficiency, in the implementation of environmental certification standards and in obtaining emblems of environmental quality.
   c) In the training and preparation of personnel with knowledge of environmental management, especially good housekeeping practices.
3. To promote the development of the environmental goods and services sector.
4. To attend to assignments from institutions and establish agreements with them and international bodies and third party institutions from other countries, within the scope of the company's aims.
5. To organise training and dissemination activities, such as lectures, seminars and congresses relating to environmental management in industry, prepare reports, carry out studies, and participate in workgroups and meetings of experts to study issues connected with the aims of the company.

The organisation chart of the CEMA is as follows:

Organisation of CEMA



The CEMA specialises in industrial sectors, such as surface treatment textiles, graphic arts, tanning, metallurgy, food industries, chemicals, paper, paint, the service sector, etc. It has experience with the following environmental vectors: wastewater, atmospheric emissions and solid waste.

The CEMA has set up working relationships with public and private institutions around the world dealing with cleaner production issues and today, the Centre is considered internationally as one of the reference points in the field of cleaner production.

3.16.2 The Regional Activity Centre for Cleaner Production (RAC/CP)

A collaboration agreement was signed on 24 May 1995 for joint action in the promotion of cleaner technologies between what was then the Ministry of Public Works, Transport and the Environment (MOPTMA) and the Government of Catalonia. According to this agreement, the CIPN (currently the Centre per a l'Empresa i el Medi Ambient) is recognised as being the appropriate body in Spain as a whole for promoting the adoption by industry of pollution prevention practices and technologies.

It was also agreed that the Spanish Government would present the candidacy of the Centre as Regional Activity Centre for Cleaner Production (RAC/CP) within the Mediterranean Action Plan (MAP) at the IX Meeting of the Contracting Parties to the Barcelona Convention.

This tender was accepted at the extraordinary meeting of the Contracting Parties held in Montpellier on 4 July 1996 and the Centre was designated RAC/CP.

The main objectives of the RAC/CP are to:

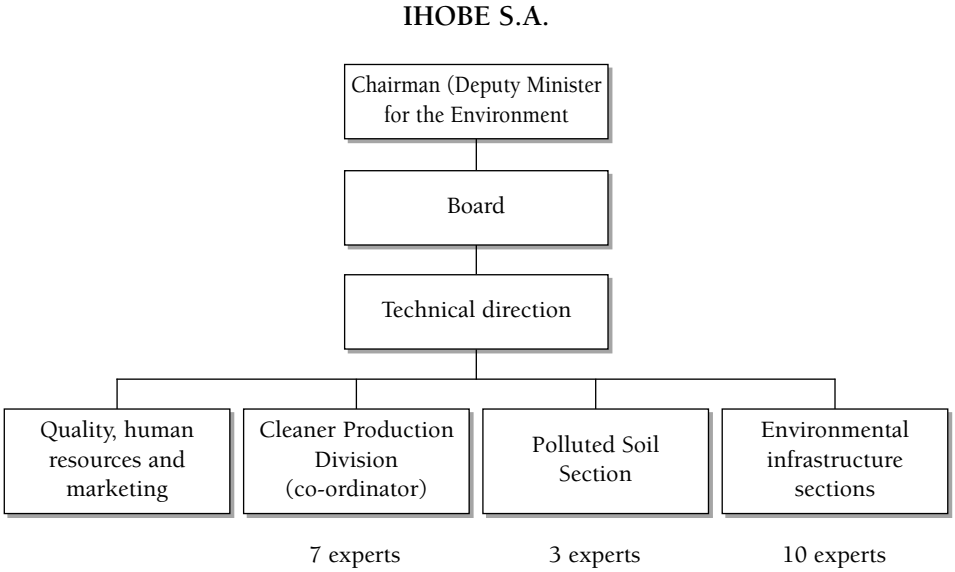
- Participate in the activities of the Mediterranean Action Plan and those of the Mediterranean Commission for Sustainable Development.
- Co-ordinate a network of National Focal Points (NFP) designated by the signatories of the Barcelona Convention.
- Advise the NFP on cleaner technologies and facilitate their transference in the Region.
- Carry out studies on alternatives for preventing pollution in different fields and sectors of interest in the Region.
- Stimulate the exchange of experts, demonstration projects and training activities.
- Publish information and practical cases that have been introduced in industry in the Mediterranean Region.

The Ministry of the Environment (MIMAM) and the Government of Catalonia signed a new collaboration Agreement in June 1999. This agreement replaced and updated the previous collaboration agreement signed with the MOPTMA. Its objective is to technically and financially support the measures aimed at the promotion, development and training on good housekeeping practices and the most appropriate technologies for reducing industrial pollution at source carried out by the Centre as Regional Activity Centre for Cleaner Production of the Mediterranean Action Plan. The territorial scope of action is the whole of Spain, with the agreement of the interested Autonomous Communities as well as the countries that have signed the Barcelona Convention.

In order to develop its activities, the RAC/CP makes use of its own human resources (see organisation chart of the CEMA) and technical team unless, in specific cases, it becomes necessary to outsource specialised experts.

3.16.3 IHOBE S.A.
(a state-owned environmental management company)

The structure is as follows:



Its objectives are:

- To support the internalisation of environmental aspects within companies.
- To provide companies with technical, economic and environmental criteria to ease decision-making.

Technical support is provided by external consultancy entities while financing is supplied (95%) by the Ministry of Land-Use Planning, Housing and the Environment of the Basque Country with an amount of US $925,830.7.

The scope of application of public policies on Cleaner Production is the territory of the Basque Country as stipulated in the General Law on the Preservation of the Environment. Likewise, the scope of action for this agency is also the Basque Country.

IHOBE has experience in different sectors (metallurgy, paper, timber, electrolytic coatings, metal machining, paint, food, plastics and graphic art) and has experience in waste trends of all types (especially with dangerous waste), namely, with solid, liquid and gas emissions in any environment.

As for international partnership contacts, IHOBE has set up contacts with the following:

- European Environment Agency.
- The corresponding sectoral ministries in Germany, Denmark, United Kingdom and the Netherlands.

The Waste Minimisation Office (now Cleaner Production) was established by IHOBE in 1993 with the aim of reducing the amount of waste and emissions generated by industry. Other objectives were set, mainly in the long term, based on concepts of environmental management such as the preservation and optimisation of material and energy resources, the sustainable management of raw materials and products through design and the optimisation of waste management.

The CP Division operates in direct contact with industry, since it is important to keep the relationship with companies and work together to achieve more positive results by combining economic and environmental profitability.

The private sector regards IHOBE as being another company that helps it to interpret and comply with the regulatory framework, obtain technical and economic information on equipment and/or measures by opening new lines of research and participating actively in the concept of CP as an intelligent challenge with a view to the future.

Nowadays, over 100 Basque companies have incorporated CP into their own processes.

3.16.4 Other public institutions that deal with CP

CP in other autonomous communities in Spain is included under the different boards of the respective departments of the environment, without there being a specific CP centre.

Many matters are covered by these departments. By way of example, mention is made of:

- The prevention and integrated control of pollution.
- Auditing system, EU environmental labelling and environmental quality guarantee emblem.
- The research, evaluation and application of Best Available Techniques.
- Minimisation plans in specific industrial sectors.
- The management of grants for environmental improvement in industry.

3.17 Syria

The main environmental agent in Syria is:

—The Ministry of the Environment, supported by the various offices in the corresponding Directorates, and the various committees reporting directly to the Cabinet at large.

The Syrian government planned new policies and regulations to meet the needs of the political and economic situation of the region. It subsequently enacted Law No. 10 in May 1991 to encourage the private sector to invest in development activities. This new law has encouraged regional and international companies to approach the Syrian markets, including:

—Syrian Environmental Technologies (Syria-Envirotech).

—The DELTA Network (Developing Environmental Leadership Towards Action).

—WWF *(World Wildlife Fund)*.

3.17.1 The Ministry of State for Environmental Affairs

One of the main objectives of the Syrian Government is to strengthen the principles of sustainable development in all sectors, especially with regard to the correct management of natural resources. Within this context, a positive level of co-operation has been developed between all of the public authorities and the Ministry of the Environment, the main environmental agent, simply guarantees the application of a participative approach between the ministries, both in terms of technical and economic co-ordination.

The objectives of the Ministry of the Environment are to:

- Plan strategies for preventing, reducing and controlling pollution.
- Devise laws and legislation to prevent and control pollution generation.
- Control and monitor all kinds of activities and evaluate their impact on the environment.
- Co-ordinate with other ministries and public and private entities to implement the national environmental plans and strategies.
- Encourage scientific research in the field of protection of the environment and the capacity building of public servants.
- Maintain contacts and liaisons with countries at regional and international level in an attempt to improve the wellbeing of the environment at large.

The activities of the Ministry of the Environment include the following:

- Regulations and specifications of water quality to guarantee its suitability for different types of use at the national scale (drinking water, industrial or commercial use, etc.).
- Standards and specifications of gaseous emissions to ensure acceptable air quality.
- Acceptable noise levels by issuing illustrative schedules on the permitted levels and pertinent to the type of activity.
- Listing of environmental pollutants (solid, liquid or gaseous) whether chemical, physical or biological; along with specific lists classifying hazardous materials (pesticides, insecticides, medical drugs, etc).

The Ministry of the Environment staff are experienced in all types of waste trends: solid, gaseous or liquid, whether generated by households, industries, hospitals or other community-based activities.

The Ministry has a staff of 150 employees distributed among its associated agencies and bureaux that belong to the different Directorates and with extensive technical experience. Their specialities differ to meet all the technical requirements of the activities handled by the Ministry.

The projects handled by the Ministry are mainly self-financed by the public funds allocated, according to pre-planned budget lines. However, a few activities, especially workshops and other dissemination activities, are sponsored partly or completely by other national or international entities concerned with the issues dealt with.

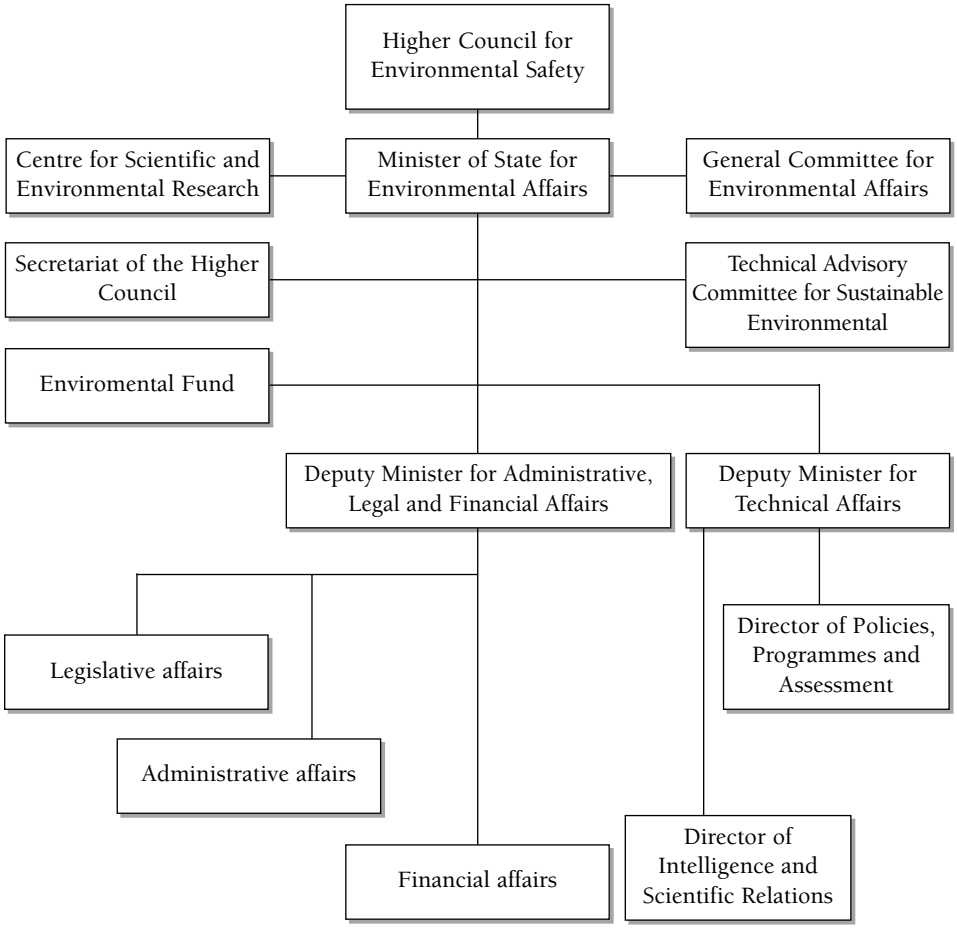
Regarding legal capacity to take action, the Ministry of the Environment is empowered by the different related executive committees and commissions. All these bodies are legally authorised to intervene in any suspected case of violation of the environmental laws and regulations in force.

The *Higher Council for Environmental Safety* is the authority with the highest political status. However, it subordinates to several powerful entities to help it carry out the national strategic policies pertinent to the environment in Syria.

It is headed by the Prime Minister and is made up of 12 members, all of whom form part of the Council of Ministers. The Council is responsible for drawing up environmental policies at the national level and for preventing the different types of pollution. It specialises in drawing up strategic national plans/policies on the environment. It sets the accepted environmental standards and indicators; it regulates the conditions and regulations of industry in operation that affect the environment and it has full powers to close down any industrial plant that does not comply with the environmental conditions laid down originally in its business licence.

Its organisation chart for is given below.

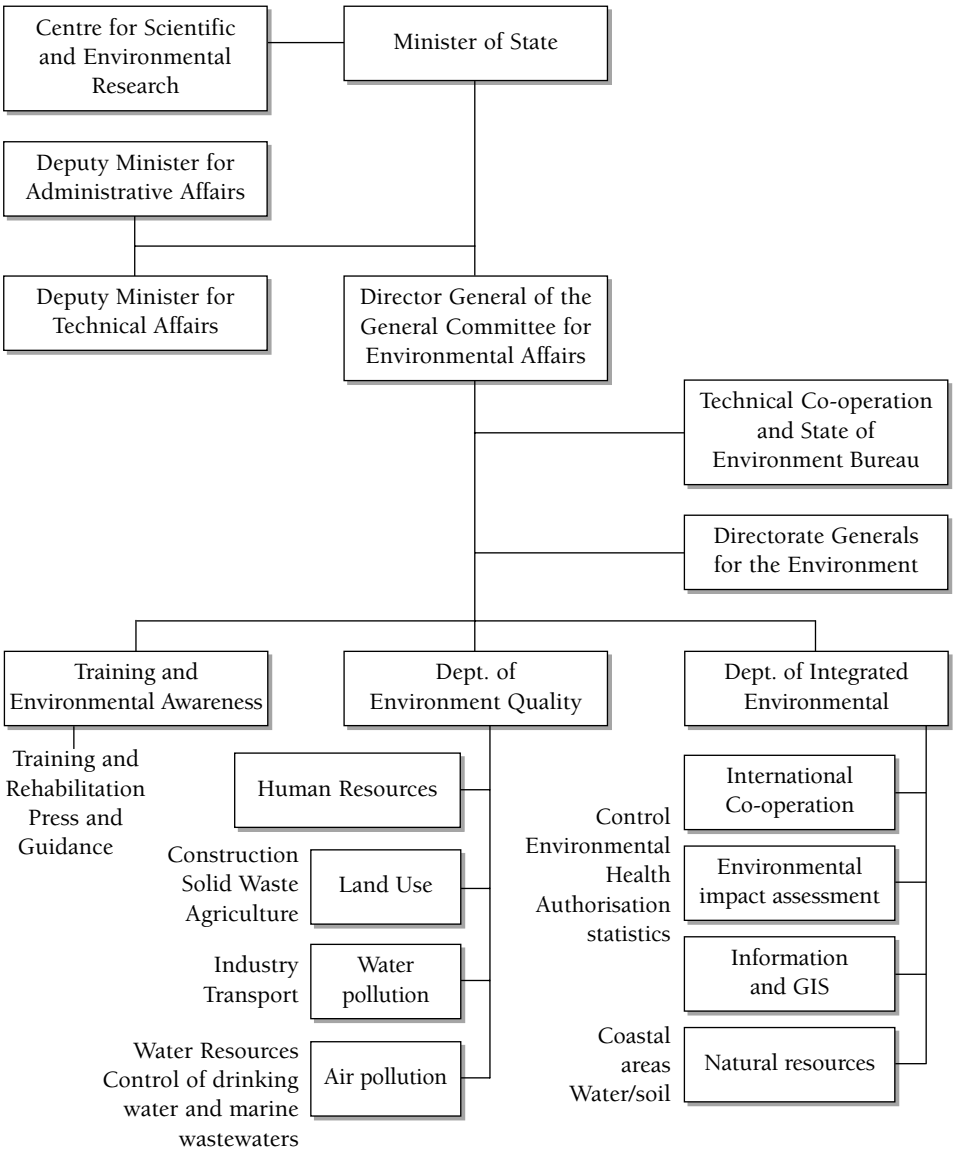
Organisation chart of the Higher Council for Environmental Safety



General Committee for Environmental Affairs

This entity aims to protect the environment from pollution by identifying direct causes and issuing pertinent corrective plans and legislation. This Commission is also responsible for spreading and increasing public awareness and setting environmental standards and indicators.

Organisation chart of the General Committee for Environmental Affairs



3.17.2 Syrian Environmental Technologies (SET-Syrian Envirotech)

Another agent working on CP is **Syrian Environmental Technologies.** (See Envirotech in the section on Lebanon).

3.18 Tunisia

The implementation of environmental plans and strategies in Tunisia urged the establishment of solid institutional and legislative mechanisms, illustrated by the many environmental public entities working seriously to fulfil the established environmental objectives.

These entities are:

- Ministry of Environment and Land Use (MEAT), set up in 1991.
- International Centre for Environmental Technologies, Tunis (CITET), set up in 1996.
- National Agency for Wastewater Management (ONAS), set up in 1974.
- National Agency for the Protection of the Environment (NAPE), set up in 1988.
- Agency for the Protection and Management of Coastal Areas, set up in 1995.
- National Agency for Renewable Energy, set up in 1985.

3.18.1 Ministry of the Environment and Land Use

The Ministry began a national strategic programme in 1992 that centres on the following axes:

- Prevention by means of compulsory environmental impact assessment studies (EIA).
- Control and follow-up.
- Technical assistance and corrective measures.

Several agencies and councils assist the Ministry in carrying out this national strategy. Likewise, it has planned various financial/fiscal tools to collaborate with the interest groups affected by the adoption of environmentally friendly practices.

3.18.2 The International Centre for Environmental Technologies, Tunis (CITET)

CITET is a non-administrative public institution that forms part of the Ministry of the Environment and Land-Use Planning, which was founded in 1996. It is managed by a Director General, who presides over both the Board of Management and the Scientific Council. The Scientific Council draws up the main lines and principal orientation of the Centre's scientific and technical development policies.

Its objectives include acquiring, adapting and developing new techniques, promoting environmentally friendly technologies, reinforcing national capacities and developing the scientific knowledge necessary to prepare and establish environmental techniques that meet national and regional needs.

The CITET is also seen as a form of partnership among various stakeholders and private/public operators by providing the technical assistance and practical capacity building as needed and adapted to the local context.

The activities of CITET are centred on 4 main areas: training, applied research and technology transfer, technical assistance and information dissemination.

3.18.3 National Agency for Wastewater Management (ONAS)

ONAS was established by Law 73/74 in order to carry out effective wastewater management through the application of the necessary strategic approach to all development activities. The Agency is a state-run industrial and commercial body. It has legal status and financial autonomy and comes under the administrative supervision of the Ministry for the Environment and Land-Use Planning.

In addition to planning and carrying out wastewater treatment projects, it has the following responsibilities:

- The control of all types of water pollution by cutting off the sources of pollution;
- To manage, operate, maintain and renew all urban wastewater facilities;
- To promote by-products from the waste water treatment plants;
- To plan and carry out integrated projects.

ONAS is financed by state financial operations, donations and outside loans, and internal financing.

As for its human resources, the ONAS has 3,026 permanent staff members at the Board, which fall into the following categories: 276 executives, 643 supervisors, and 2,107 workers. ONAS organises training courses every

year for workers and executives in the field of wastewater treatment and laboratory work. These courses are for technical executives, who are trained and go on to become specialists in the different areas relating to wastewater.

3.18.4 National Agency for the Protection of the Environment

The agency handles different activities, evolving on the following axes:

- The prevention and control of pollution that threatens the environment.
- Action to favour the rational exploitation of natural resources aimed at achieving sustainable development.
- Co-ordinating activities among the different regions in Tunisia to facilitate communication with citizens and industrialists, and to ensure the proper monitoring of the state of the environment.
- Participating in the elaboration of a national strategy to protect the environment.
- Issuing terms of references pertinent to investments in projects involving pollution control.

At the present time, it has a staff of 62 workers formed of engineers, university graduates in administration, chemistry, hydrology, geology, public health, agronomy, and others. It also hires national experts for specific tasks to meet certain requirements or for occasional experiments.

It receives grants and is also self-financing (revenue from periodic control levies and penalties imposed on transgressor enterprises). It receives financing from abroad (international co-operation, e.g. with Germany, Canada and other countries; and international organisations, e.g. UNEP, BEI, UNESCO, etc.)

The remaining authorities responsible for environmental issues and the control of effective compliance and application are the Ministry of the Interior, the Ministry of Agriculture, the Ministry of Health, the Ministry of Industry and the Ministry of Commerce. Between 1,000 and 1,500 employees are currently involved in these matters in the different ministries.

3.19 Turkey

The main CP agent is:

—**TUBITAK** (Turkish Scientific And Technical Research Council), MRC (Marmara Research Centre).

TUBITAK is the central organisation that comprises the different institutes and scientific and technical research centres in Turkey. It is based in Ankara.

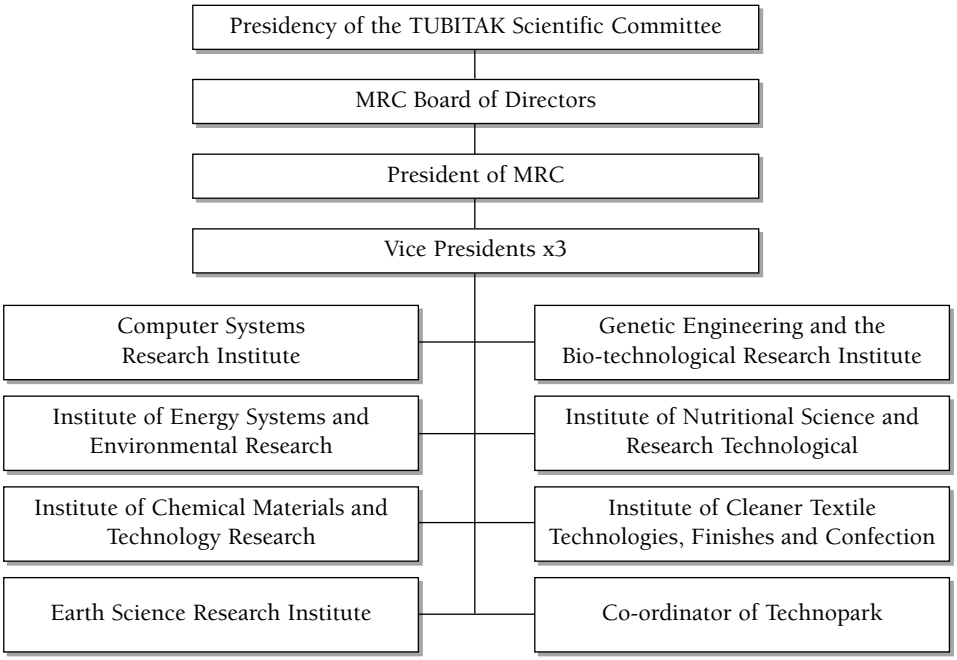
Financial support is obtained from the World Bank through the Turkish Technology Development Foundation (TDF) and from the Under-Secretariat for the Treasury and Foreign Trade.

MRC (Marmara Research Centre)

MRC is a section of TUBITAK that carries out applied research and development. MRC was founded in 1972. It is located near the town of Gebze, around 50 km to the east of Istanbul. MRC helps TUBITAK to conduct applied research and development.

MRC has a staff of 950, of which around 40% are researchers. It has 7 institutes, including the Textile Institute, where approximately 60 people work, 8 of whom are specialised in the textile industry.

Organisation chart of the Marmara Research Centre



The areas of current research and development activities are: computer technology (electronics, multimedia, software systems and space technologies), energy systems and environmental research (energy conservation, new energy

technologies, environmental control and assessment, environmental pollution control and environmental management systems), genetic engineering and biotechnology (molecular immunology, protein structure, plant biotechnology), nutritional science and technology, chemical materials and technologies, the textile industry and geology.

- TUBITAK established the *Textile Institute* in Gebze in 1995 as a part of TUBITAK-MRC and within the legal framework of TUBITAK, with the participation of a Consortium. The Consortium is formed by the Turkish Clothing Manufacturers Association, the Textile Dyeing and Finishing Industrial Association, the Turkish Textile Dye-Stuffs Importers Association, the Istanbul Chamber of Industry and the Turkish Textile Foundation.

  The objective of the institute consists of analysing the Turkish textile and clothing industry from the point of view of the materials and manufacturing processes used and the products, and disseminating the product manufacturing techniques in keeping with the regulations and national and international standards.

  In April 1996, under the Government's privatisation policy, SAGEM, a Research and Development Centre in Bursa, was taken over by TUBITAK to further contribute to solving the sector's problems. TUBITAK receives technical support from its own institute, as well as market consultants and process experts from the enterprises they work with.
- The *Institute of Energy Systems and Environmental Research (ESERI)* was created in 1996 through the unification of the Energy Systems and Environmental Research Departments.

  The activities of ESERI have been directed towards industry and applied research. Its clients are mostly governmental agents, municipalities, industrial plants and international organisations.

  The market trends have been favourable to ESERI. As a result of the promulgation of new standards and laws on resource conservation and the control of environmental pollution in keeping with global trends, ESERI has managed to occupy an optimal position and has acquired an important market share. The current trends in industry, together with total quality management, are based on the implementation of environmental management systems. Advising enterprises on the implementation of environmental management systems is an important aspect of ESERI's work.

  ESERI focuses on pollution prevention and resource conservation in all industrial sectors in Turkey from the points of view of management, development and technological adaptation. Scientists from other institutes (textiles, food industry, materials, chemicals, etc.) collaborate in pollution prevention projects.

3.20 Conclusions

Eight of the twenty countries in the MAP currently have Centres that were specifically created to promote and implement CP in the enterprises. These Centres have clearly defined objectives that focus in most cases on:

- The dissemination of the CP concept, training and information for industry and the training of government technical personnel.
- Support and technical advice on the implementation of CP for business and industry.
- The definition of adequate production techniques.
- The creation of legal instruments for enterprises to adopt CP.

Only some of these centres promote CP research and pilot projects.

Various countries are still a long way away from these objectives and are focusing for the time being on the control and recovery of the environment and the compliance of legislation. This is the case of the majority of the countries that do not have a specific CP centre. Competencies in CP are often shared between different bodies and the tasks to be carried out occasionally overlap. This may mean that an ineffective use is made of human and economic resources.

Moreover, only a minority of the countries in the MAP have sufficient and assured economic resources to carry out their activities. Many of them depend on international aid and national associations and institutions. Some countries have created legal instruments to raise funds based on the "polluter pays" principle.

As for human resources, while some government administrations have technicians that are highly qualified in CP, most of them are based on experts at the universities and in private enterprises (environmental consultancy firms).

Regarding the legal capacity of the countries to implement CP, while an in-depth analysis is made in the next chapter ("The legal framework of CP"), this capacity in most cases is the responsibility of the ministries, for it is not customary for CP centres to have legal competency. These centres normally advise and collaborate with business and industry in dealings that are very close at hand. It is therefore logical for them not to be able to take legal measures against companies and for their legal capacity to be limited to providing economic aid for implementing CP.

Legal actions carried out by governments are frequently based on the recommendation/imposition of the use of CP techniques in an activity's licence to open business and the application of the IPPC Directive in the member countries of the EU.

Various countries have developed economic aid instruments for industry, such as grants, tax reductions, etc. that encourage companies to voluntarily adopt cleaner technologies.

Concerning international associations, besides participating in the activities of the MAP, contacts are mostly made with international bodies: UNEP, UNIDO, UNESCO, etc. and, in the EU countries, with the EU. Outside of the aforementioned activities of the MAP, contacts with the national associations of third-party countries are unusual.

4. The legal framework of CP

This section introduces the legal framework of each member country of the MAP and the way that such framework reinforces the implementation of cleaner production in the heart of the industries of the Mediterranean. Specific regulations dealing exclusively with Cleaner Production issues have not been found. Notwithstanding, the concept of Cleaner Production appears often in general environmental legislation.

This chapter also includes voluntary agreements reached by public authorities or among companies, since they complement regulations. Other aspects that have been considered are the individual commitments made by industries, which, in most cases, have resulted from implementing an environmental management system.

4.1 Albania

The legislative framework including CP terminology is rather new. Some of the laws in force are:

1. Basic Law on Environmental Protection.
2. Hydrocarbons Law.
3. Minerals Law.

None implies obligations concerning the use of Best Available Technologies or cleaner technologies. However, there are some relevant provisions that consider environmental protection.

Voluntary regulation mechanisms on CP issues are not in force at present, although one of the main priorities defined in this respect is to pave the way for voluntary agreements between companies and government authorities.

4.1.1 Basic Law on Environmental Protection

In 1993, the basic law on environmental protection became effective establishing, for the first time in Albania, the foundations for sound environmental protection and paved the way for further legal, institutional, managerial and other environmental developments.

4.1.2 Hydrocarbons Law

This law came into force in 1993 to promote the investigation and production of petroleum and natural gas and of other related technologies (operations) that are not harmful for human health or the environment. This law forces the parties involved to comply with the law when carrying out operations with hydrocarbons and to prepare a development plan on the efficient use of hydrocarbon reserves with a view to environmental protection and human life in the area where operations with hydrocarbons are carried out.

4.1.3 Mineral law

The Mineral Law contemplates the obligations to prevent any environmental pollution and damage, treat the sterile mineral, protect the natural environment, find a remedy for the damaged area and minimise any environmental impact on surface water, groundwater quality, soil quality, etc.

It is worth highlighting the fact that, under Albanian law, companies and individuals are obliged to submit information to the National Environment Agency (NEA) every three months on the quantity and quality of emissions. Albania also plans to draft a law concerning air protection, referring to the type of raw materials used and the energy consumed, among other information.

The responsibility for environmental control is legally divided between a series of scientific institutions and government departments. The NEA co-ordinates this task and is in charge of collecting information accordingly. Moreover, the NEA is making a concerted effort to increase the effectiveness of the permit system by taking care of the proper enforcement of the law. Notwithstanding, industry had previously neglected to follow this authorisation process and continues to operate without the environmental permits.

4.2 Algeria

Algeria has enacted general legislation on the environment but only three of the laws include CP aspects.

- Law 83-03, of 3 February 1983, on environmental protection obliges the industry to initiate adequate treatment of waste.
- Law 99-09, of 28 July 1999 on energy controls.
- Decree 93-160 (10 July 1993) regulates industrial waste. These wastes are submitted to authorisation of the minister in charge of the environment.

The following table lists the laws and decrees in force in Algeria relating to the environment:

General	Legal framework of environmental protection (law 83-03, February 1983).
	Decree 93-180 (10 July 1993) regulates liquid industrial waste. These wastes are subject to the authorisation of the minister in charge of the environment. The effective control and the application of this decree are very meagre.
	Decree 98-339 (3 November 1994) (modifies decree 88-149) that defines the applicable regulations to reserved facilities, establishing their nomenclature.
Water	Decree 93-164 defines the necessary quality of water fit for bathing, the minimum frequency is ordered by means of a Ministerial Order.
	Decree 94-279 (17 September 1994) concerning the organisation of the fight against maritime pollution and by establishing a Tel Bahr emergency plan of the fight against accidental maritime pollution or the dumping of hydrocarbons into the sea.
	Decree 88-228 (5 November 1988) defines the conditions, procedure and the dumping modes of waste likely to pollute the sea, carried out by ships or aeroplanes.
	Regulation 96-13 (15 June 1996) modifies and completes Law 83-17 on the water code, obliging cities of more than 100,000 inhabitants to have wastewater treatment systems.
Waste	Decree 84-378 establishes the sewage conditions, elimination and treatment of urban solid waste.
	Incineration of waste: Decree 98-339; Decree 90-78, on environmental impact studies.
Energy	Law No. 99-09 (28 July 1999) concerning energy control.

4.2.1 Law 83-03, of 3 February 1983, on environmental protection

Establishes the objectives and general principles of the prevailing environmental policy in Algeria. The environmental protection and development objectives that are typified in rules and prevention principles, integration, participation and the concept of "polluter pays", are centred in the protection, restructuring and reassessment of the natural resources as well as the prevention and fight against all types of pollution, improving the quality of life.

On the lines of this Law, the Environmental Impact Assessment (EIA) is fashioned as a basic instrument for decision making by the Ministry of the Environment.

4.2.2 Law No. 99-09 (28 July 1999) on energy production control

Spans the set of measures and actions to be undertaken with a view to a more rational energy use, the development of renewable energies and the reduction of the impact of the energy producing system on environment.

In general, this Law contributes to the consolidation of a national limitation policy of gas emissions causing the greenhouse effect that is responsible for the climatic change. It also guarantees and promotes technological progress, fostering savings and contributing to sustainable development.

4.2.3 Decree No. 98-339, of 3 November 1998, that defines the applicable regulations to reserved facilities, establishing their nomenclature

The administrative procedure to authorise the exploitation of a reserved installation is composed of a series of stages, including the carrying out and approval of an Environmental Impact Assessment (EIA). This procedure is effective for national and regional projects, but the local results are not promising. To this effect, however, a local environmental service has been established to control the application of the environmental legislation and regulations.

4.3 Bosnia-Herzegovina

The legal framework in Bosnia & Herzegovina is quite complex because, on the one hand, a vast number of temporary decrees, rules and regulations with the force of law were brought about during the war. On the other hand, from the date of the signing of the Dayton Accords a number of laws were adopted from the previous legal system of the Socialist Republic of Bosnia and Herzegovina. Finally, the Federation, Republika Srpska and local authorities enacted a number of new laws and regulations. Finally, the legal systems still work with difficulties.

The following table contains a summary of environmental legislation in B&H:

Former applicable legislation in Yugoslavia	**Federal legislation**
• Law on physical planning. • Decree on classification of the internal watercourses, transboundary waters and coastlines of Yugoslavia. • Decree on water classification. • Decree on water classification of the coastal waters of Yugoslavia belonging to Bosnia-Herzegovina. • Regulation of hazardous substances whose discharge into water is banned. • Decision on maximum concentrations allowed of radionuclides. • Dangerous substances in inter-republic, transboundary and coastal waters of Yugoslavia (1)	• Water Act[1]. • Decision on special taxes in water management.. • Instruction on methods, proceedings and deadlines for accounting and payment of special water management fees. • Methods for measurement and investigation of physical and chemical characteristics of discharged wastewater, defining of population equivalent and coefficient of water pollution for specific pollutants.

[1] The water legislation does not regulate the permits, legal procedures, international rules and conditions for the use of water in a sufficiently exhaustive manner. Consequently, it fails to provide an effective basis for water regulation.

Currently the level of compliance with the legislation is scarce and the government does not control industrial production. The current insufficient environmental legislation entails a deficit of legal means to establish such control. In addition, pollution has increased due to the narrow relationship between the polluter and the regulator (the companies and the Government), and the meagre existing legislation, unable to place restrictions on the public sector industries that are the main source of contamination.

In the scope of CP legislation, mention should be made of the Urban Planning law of former Yugoslavia that established the main guidelines on protection and development of the environment (concerning water, ground and air), adopted by the Federal Parliament of Bosnia-Herzegovina. The third chapter of the Urban Planning Law known as "Protection and improvement of the human environment" includes several articles on the environment.

At present, in the Federation of Bosnia-Herzegovina and the Srpska republic, countries that have concluded the drafting of the environmental protection bill, an effective framework does not exist to grant environmental licenses and adequate legislation is lacking that can act as the basis for the future transposition of the European Community Law.

The EU has drawn up an Environmental Programme for Bosnia-Herzegovina, whose main objective is to guarantee the establishment of the UNECE Convention on:

- Access to Information, Public Participation in the Decision-making process and Access to Justice in Environmental Matters (Aarhus, Denmark, 25 June 1998).
- The Protection and Use of Transboundary Watercourses and International Lakes (Helsinki, Finland, 17 March 1992).
- Environmental Impact Assessment in a Transboundary Context (Espoo, Finland, 25 February 1991).
- The Transboundary Effects of Industrial Accidents (Helsinki, Finland, 17 March 1992).
- Long-range Transboundary Air Pollution (Geneva, Switzerland, 1979) and its various Protocols.

Bosnia and Herzegovina wishes, in the long term, to align its legislation with European Community Law. Nonetheless, significant institutional changes must take place before any strict transposition of such Community Law. Therefore, although the underlying objective of the present PHARE Programme consists in the creation of legislation that includes the transposition of European Community Law, its main priority will consist in the establishment of the legislation.

The framework law on Environment is expected to partly address the environmental regulation of industry. The establishment of new environmental regulations must be by means of the application of the following principles and obligations:

- Precautionary principle.
- "Polluter pays" principle.
- Application of the Best Environmental Practices (BEP).
- Use of best available techniques (BAT), including cleaner production techniques.
- To implement integrated pollution prevention and control.
- To implement integrated coastal and river basin management.
- To ensure public access to information.
- Carry out environmental impact assessments of the proposed activities.

In application of such principles, the legislation that should be developed is the following:

- Framework Law of the Environment;
- Water Protection Law;
- Waste Law;
- Nature Protection Law;
- Air Protection Law;
- A law providing an integrated framework for environmental licensing, including reference to supporting procedures such as environmental impact assessment based on the concept of integrated pollution prevention and control.

4.4 Croatia

Regarding CP legislation, the measures to use the Best Available Technologies (BAT) and of the Cleaner Technologies (CT) are not regulated directly by law or by other related regulations. For the moment, it is just a matter of initiative of the industry itself and its implementation is scarce.

Moreover, voluntary regulation mechanisms of CP are still not available, but the signature of an International Declaration on CP is foreseen by UNEP, the Croatian government and between 10 and 15 companies, institutions and authorities.

Some of the environmental laws in force are:

Environmental protection	Regulation on Environmental Impact Assessment (O.G. 34/97, 37/97).
	Regulation on the Conditions needed for the Issuance of permits to carry out professional activities related with the environment (O.G. 7/97).
	Rule on the Inventory of Environmental Emissions (O.G. 36/96).
	Control of the Environmental Label (O.G. 64/96).
	Law on Environmental Protection (O.G. 82/94).
Air	Law on Air Quality Protection (O.G. 48/95).
	Regulation on the Recommended Values and Air Quality Limit (O.G. 101/96, 2/97).
	Regulation on Limit Values of Pollutant Emissions from Stationary Sources into the Air (O.G. 140/97).
	Regulation on Substances Depleting the Ozone Layer (O.G. 7/99).
Waste	Waste Act (O.G. 34/95): in this law one of the basic objectives consists in avoiding and reducing waste; the minimisation of the toxic/dangerous waste that can be avoided.
	Rule on Management of Waste Containers (O.G. 53/96).
	Rule on Types of Wastes (O.G. 27/96)
Protection of water from pollution	Water Act passed in 1995 (published in Narodne Novine O.G. no. 107/95)[1].
	Regulation on Dangerous substances in Water, passed by the Government of the Republic of Croatia (Narodne Novine O.G. No. 78/98)[2]
	National Water Pollution Control Plan (National Strategic Action Plan for Water) passed by the Government of the Republic of Croatia in 1999 (O.G. 8/99).
	Regulation on the discharge into water of hazardous substances and other substances, approved by the Head of the State Water Directorate in 1999 (O.G. 40/99).

[1] This Law regulates the uses of water that exceed the maximum allowed limits and the possible deterioration of water quality. Compensation proportional to the benefit obtained will be provided, or to the degree and level of the impact exerted on the water quality.

[2] The Ordinance regulates the important issue of water pollution control with regard to water quality by identifying the hazardous substances and their concentrations which are considered dangerous, and whose elimination from this medium is a priority.

At present new rules are being drafted to calculate the pollutant loads of water whose publication will be the responsibility of the Head of the State Water Directorate and a series of regulations are being reviewed, under the competence of the Ministry of Environmental Protection and Physical Planning.

4.5 Cyprus

The application of the Best Available Techniques (BAT) and of Cleaner Technologies (CT) is not legislated in Cyprus. Nonetheless, the voluntary adoption of environmentally-friendly techniques is fostered in industry for the appropriate waste disposal. Specific rules concerning CP or environmental protection legislation do not exist with the exception of the Law of Water Control and the Law of Atmospheric Pollution Control.

In the sphere of CP, the update of the legislative framework is deemed as a priority since the ratified protocols and conventions require it.

In this context, the Environmental Framework Law is currently at the Attorney General's Office to finalise its legal drafting before being passed by the Parliament. It entails provisions regarding several protective mechanisms: penalties, offences, assessment of penalties, costs, third party liability, enforcement regulations, withdrawal and cancellation of permits, etc.

In other words, the enforceable measures are still in a weak link in the environmental management chain and the consolidation of the requirements for the granting of licenses and execution procedures is necessary.

Private industries are required to abide by the terms of the permits they are awarded to start operations, and punitive measures are strict to ensure compliance with the enacted environment laws and regulations.

The legislation on environmental protection is the following:

Water pollution	Water Pollution Control Law, No. 69/91 regarding domestic wastewater disposal; and associated regulations and decrees Numbers 52/93 and 297/95.
Air	Atmospheric Pollution Control Law No. 70/1991 and Rule 94 (I)/1992. This law partially covers the control provisions of the emissions proceeding from incineration plants.
Waste	Rules on Solid Urban Waste Disposal: Municipal Corporation Law Cap 240; The Village (Administration and Improvement) Law, Cap. 243; Law No. 19 (I)/92 on the Prevention of Pollution on Roads and in Public Places that ban the dumping of rubbish on the hard shoulder and other public places; and the Beach Protection Law (Cap. 59) and its amendment No. 75 (I)/94.
Environmental protection	Law of Planning and Housing Promotion No. 90/72 and its amendments numbers 56 7/90, 28/91, and 55/1/93. The stipulations regulate and control the activities of urban development.
	Decree No. 35.700 of the Council of Ministers, of June 1991, that requires an Environmental Impact Assessment (EIA) before starting any project.
	Law of Ratification No. 51/79, Law of Ratification No. 266/87 and Law of Ratification No. 57/89[1].
	Rules on Fishing No. 273/90 and Law on Fishing, Cap. 135 - Amendment of 1990.

[1] They ratify the Convention for the Protection of the Mediterranean Sea against pollution, the dumping and emergency protocols, the Barcelona Convention and its related protocols, especially the Land Based Sources and Special Protected Areas, and the Convention for the Prevention of Marine Pollution from Ships (MARPOL) 73/78 with the amendments of 1984 and 1985.

4.5.1 Water Pollution Control Law

Includes the provisions for the establishment of quality patterns for Cypriot waters, alluding to the industrial sources that require a waste permit detailing the levels, amount, specifications and technical conditions, operations as well as of control.

4.6 Egypt

Egypt has not passed legislation concerning CP or the BAT. The EIA are legislated as a tool to protect the environment in new activities and in the extension of existing laws but in practice these are not applied to the industrial sector.

In 1982, a Presidential Decree was issued constitutive of the Egyptian Environmental Authority to demonstrate the government's recognition of the need to dispose of a state intersectorial authority to transfer environmental matters to the national scope. Amongst other duties, the Authority was to act as a liaison between different ministries and prepare national environmental plans.

4.6.1 Law 4 of 1994

This law was the first comprehensive environmental law in Egypt regulating air, water, habitats and the human activities affecting them. The law likewise established the Egyptian Environmental Affairs Agency (EEAA) at Cabinet level to replace the former Egyptian Environmental Authority. It has introduced several important aspects, namely the need for Environmental Impact Assessment for new projects and expansions and the need for establishments to keep an Environmental Register.

Although Law 4 of 1994 focuses on industrial activities, among others, it has still not been implemented in the industrial area or sector.

Solid and toxic industrial waste, the collection, transportation and disposal of solid waste and sanitary conditions in the workplace have been legislated. The EEAA is currently in the process of developing such guidelines in co-ordination with the agencies concerned.

In addition, the EEAA has drafted a manual for the classification of industries according to the expected pollution level; this system is very popular. The review of such executive rules has been proposed and the incorporation of the BAT in several industrial sectors for the future. No provisions for using BAT exist in the current legislation.

From the legal point of view the matter to be developed related with the CP are the implementation of the IPPC Directive (69/61) and the establishment of the industrial inspection unit within the administrative structure of the EEAA.

4.7 France

French Laws that include CP aspects are the following:

- Law passed on 19th July 1976 regarding listed facilities for environmental preservation.
- Order passed on 2nd February 1998 on listed facilities where authorisation is required (preventive and comprehensive approximation on the pollution of an industrial area).

On 27th January 1971, France created the Ministry for the Protection of Nature and the Environment that was originally in charge of the co-ordination of the work of other ministries.

Currently, France has enacted a set of relatively comprehensive environmental laws and regulations. In March 1993, inter-ministerial committees for the environment were set up to promote environmental protection policies within all the services of the state. Another of the advances is the existence, since 1991, of 26 regional environmental meetings (DIREN-*Directions régionales de l'environnement*), including four in the overseas departments that act as intermediaries in controversies regarding local environmental matters.

The Ministry of the Environment emphasises a damage prevention policy. Local bodies have had a fundamental role to play since a 1983 law provided for the decentralising of urban planning decisions. Supplies of drinking water, treatment of sewage, zoning, collection and treatment of household wastes, and traffic are all placed under the responsibility of the town council. An increasing number of cities, both large and medium-sized install specialised services, almost one hundred have designed a municipal plan for the environment or have drafted an environmental charter in order to manage such matters within a framework of sustainable development.

4.8 Greece

Greece has adopted several regulations that include CP aspects related to the EIA, implementation of the EMAS, financial aid for any company that implements the Best Available Techniques or, in general, cleaner technologies and laws that include aspects of CP (for example: prohibited substances, minimisation plans in industrial sectors, prohibited manufacturing processes, etc.

The following table shows the environmental legislation that includes CP- related issues.

General	Ministerial Order 69269/5387/90 (Ministry of the Environment) concerning all kinds of industries and public works.
	Min. Order 28489/2629, implementation of the EMAS.
	Vector licensing (wastewater license, solid waste license, hazardous waste license).
	Min. Order 69269/5387/99 and its amendments (EIA).
Financing	Law 1892/90. Law 2601/98. Presidential Decree 456/95.

4.8.1 Environmental Impact Assessment

In Greece, European Directive 85/337/EC, for the assessment of the impacts of certain private and public projects or activities on the environment, has been transposed by the Common Ministerial Orders 69269/5387/90 (Common Ministerial Order of the Ministry of Environment, Physical Planning and Public Works and the other co-component Ministries) and 75308/5512/90 (Common Ministerial Order or the Ministry of Environment, Physical Planning and Public Works and the Ministry of Justice). The latter lists the public and private activities according to their category. Likewise, this Order stipulates the environmental permit procedure and the content of the EIA for each category of project or activity.

4.9 Israel

Israel's environmental legislation is wide-ranging. It covers the entire expanse of environmental issues, uses all forms of legislative instruments —laws, regulations, administrative orders and bylaws— and is linked to a comprehensive international legislative system, which includes numerous international conventions.

It encompasses laws for the protection of natural resources (air, water and soil), laws for the abatement and prevention of environmental nuisances (prevention of air, noise, water and marine pollution), and laws relating to environmental contaminants and pollutants (hazardous substances, radiation and solid and liquid waste). There are different laws with a direct link to CP issues, especially related to solid waste and air and water pollution.

The emphasis placed on enforcement in recent years has been reflected in a number of court cases in which relatively severe penalties were imposed on violators of environmental laws. The trend toward more severe punishments in the courts is accompanied by greater emphasis on prevention, abatement and treatment of environmental pollution and damage.

Furthermore, from 1998, Israel has some different voluntary regulation mechanisms on CP issues such as the voluntary compliance by industry with emissions standards, or the development of products, which do not harm the environment, and the promotion of energy and natural resource conservation.

Listed below are some examples of the legislation that includes certain CP related matters.

General	Law on the reduction of nuisance activities, 1961.
	Law on the reduction of nuisance activities, 1992.
	Law on trade, 1968.
	Law on toxic products.

4.9.1 Law on the reduction of nuisance activities, 1961

This was the first legislative instrument in Israel for the control of air, odour and noise pollution. Under the terms of the law, it is illegal to cause "any considerable or unreasonable pollution by noise or in the air, from any source

whatsoever, if its disturbs a person in the vicinity or a passer-by." Under the law, regulations have been issued to control air and noise pollution from stationary and mobile sources and draft regulations setting emission standards for air pollution have been completed. The Minister of the Environment has addressed specific polluters with personal decrees under the law, instructing them on measures to be taken for the prevention of pollution.

4.9.2 Law on the reduction of nuisance activities (Legal Action), 1992

This law enables individuals to file lawsuits in their own name or on behalf of non-profit making organisations that they might belong to in the event of environmental pollution or nuisance activities that might include atmospheric, water and marine pollution, solid waste, toxic substances and radioactive pollution as well as activities which are a nuisance to the environment that are likely to represent a threat to human health or a substantial danger. The law places three types of legal remedies at the citizens' disposal: restriction orders, preventive relapse and corrective orders.

4.9.3 Business Licensing Law, 1968

The law empowers the Minister of the Interior, in consultation with the Ministers of Health and the Environment, to designate and define businesses requiring licenses in order to ensure environmental conditions, pollution prevention and safety. Special environmental conditions may be imposed within the framework of the license which relate to management of solid waste, sewage, recycling, hazardous substances and hazardous waste, and reporting, monitoring and control systems. In the case of air polluting activities, the environmental limits are usually based on the emission levels. The law provides administrative and judicial powers for the closure of a non-complying business and has proved to be one of the most efficient tools fro pollution reduction in Israel.

4.9.4 Law on dangerous substances, 1993

This law empowers the Minister of the Environment to authorise, regulate and supervise all of the aspects of the manufacture, use, manipulation, storage, distribution, import, export and transportation of dangerous substances. Every company that deals in dangerous materials requires a license and needs to obtain the permits in relation with the businesses that handle poisons. The Minister of the Environment can enact regulation on the classification of dangerous substances according to their use, toxic level and risk and can deal with their treatment and manufacture.

In January 1998, the Israeli government adopted the recommendations of a Committee to Review Aspects of Formulating Environmentally Related Standards. This Committee created an organisational framework favourable to the Ministry of the Environment in the preparation of rules and regulations, formulating the methodology for their establishment according to which, the deliberations concerning the new rule are open to all of the interest groups. Decisions are made based on economic, technological and environmental considerations. At present, a conflict resolution mechanism is being implemented, fostering full public participation. A management committee has been enabled in order to implement it composed by the representatives of the Ministry of the Environment, the Ministry of Finance, the relevant government ministries, organs that are directly affected by the regulation and a representative of the academic sector. A regulation on reducing packaging waste is currently being discussed by the Steering Committee.

The Ministry of the Environment and the Manufacturer's Association signed an agreement concerning the Implementation of Regulations on Air Pollutant Emissions in January 1998. This agreement constituted the first example of voluntary compliance by the Israeli industry of the un-enacted emission regulations... The annex of the agreement includes regulations to eliminate the nuisances (emission of air pollutants). This agreement is the first example in Israel of voluntary compliance of emission values by industry.

In January 1999, Lahav, the Israel Federation of Independents' Organisations, signed an environmental covenant. One of the principles inherent in the covenant is the development of environmentally friendly products and the promotion of energy and natural resources conservation.

In January 1999, Lahav, the Federation of Independent Organisations of Israel signed an Environmental Agreement that declared that the establishment of objectives and long term goals in tilled land lacking water is vital in order to ensure the economic development of the country in the long term and to ensure the standard of living of future generations. Another principle of the agreement is the development of products that are not harmful to the environment and the promotion of the preservation of energy and natural resources.

4.10 Italy

A general framework law does not regulate environmental aspects. The legislative background is based on a great number of Laws, Acts and Regulations issued from year to year, which sometimes are implemented with difficulty. Some of these are characterised by a sort of guaranteed approach that can make the actual enforcement and monitoring of the prescribed rules difficult.

For this reason, a new approach is being promoted to favour the passing of framework laws or consolidation acts on specific environmental sectors, which combine the existing and practicable regulations, integrate the absent aspects and abrogate previous legislation. In this respect, three important new Acts have been issued: in 1991, on the Protection of Habitats (Law no. 394/91), in 1997, on Waste Management (DLgs. No. 22/97) and in 1999, on Water Protection, Municipal and Industrial Wastewater Treatment (DLgs. No. 152/99).

Many legal provisions have been enacted that somehow include CP and the BAT.

4.10.1 Environmental Impact Assessment

Regarding the existing provisions in legislation for the Environmental Impact Assessment of new projects, the EEC EIA Directive came into force with Law 349/86, the DPCM 377/88, the DPR 12/04/1996 and the DPR 11/02/1998.

DPR of 1996 states that all Italian Regions and autonomous Provinces should issue regional laws on EIA procedures. It also regulates whether the jurisdiction of the procedure of new EIA projects belongs to the State or the region; whether their adoption is mandatory and in this last case, the decision shall be taken on an individual basis, pursuant to a series of fixed criteria. At present, only nine Territorial Authorities have operational EIA procedures (Autonomous Province of Bolzano, Autonomous Province of Tarento, Valle d'Aosta, Friuli Venezia Giulia, Liguria, Toscana, Umbria, Abruzzo, and Basilicata).

4.10.2 DLgs. Number 22/97 of waste management

This legislative decree only identifies two categories of waste: urban and special. Industrial waste is included in the second category. The new approach of the aforementioned Act, gets over the waste disposal concept as the sole problem to be solved, and centres the attention on the reduction of the quantity and of the toxicity of the waste produced, on its reuse, and on the minimisa-

tion of the residual part that must be sent to landfill. This new approach will be taken up through, inter alia, the development of cleaner technologies, in particular those directed at saving natural resources. This decree also considers the promotion of the use of BAT in waste disposal activities. The promoting of the BAT is also encouraged by the application of the Eco-management and Auditing System-EMAS (EU Rule No. 1836/93) by Italian industry but it has still not been implemented, although it should be promoted in the near future. In general, Italian companies prefer ISO certification rather than EMAS registry since they are more familiar with the ISO standards that are already implemented in the industrial sector and due to greater expectations of perception from the international market.

Moreover, in accordance with Law no. 70/94, which introduces the MUD (Environmental Declaration Verified Model), the company declares, every year, to the territorial competent Chamber of Commerce, the characteristics of the waste, and its destination (recycling, reuse, incineration, landfill). The company also has to report all information on waste produced on the loading and unloading register. For now, the MUD system seems to be an effective tool for the creation of a Cadastre for Industrial Special Waste.

4.10.3 Water protection, municipal and industrial wastewater treatment

The recent DLgs. No. 152/99 on "Water protection, municipal and industrial wastewater treatment" establishes new rules for industrial wastewater discharges and takes into consideration the vulnerability, sensitivity and the self-purifying capacity of the receiving body. This new approach requires some time for its complete implementation. The existing operational permits and the corresponding dumping authorisations that establish pollutant concentration limits of each emission source pursuant to previous legislation, continue to be in operation. The former approach did not take into account that the sum of the nearest waste, complying with their respective limits, cannot be adjusted to the capacity of the receiving medium. This temporary situation causes some operational difficulties that should be overcome in the near future when the specific conditions for discharging treated wastewater will be established.

The cost of water is also a problem to be solved. The fees paid by the state companies because of the water concession are established based on the political premises and are not adequate (approximately 1 lira/m^3 for public ends, approximately 0,02 liras/m^3 for farming ends and approximately 7 liras/m^3 for industrial ends). An appropriate modification of each system of fees would be able to foster an extension of the efforts towards the rationalisation of consumption and the reuse of waste water.

4.11 Lebanon

Currently, Lebanon does not have specific legislation on CP, although there are some general regulations governing the use of polluting substances. Other ministries have also tried to reduce the sources of pollution by means of the adoption of cleaner technologies, although it has not yet taken the form of legislation.

The priority matters to be developed and establish on CP are their introduction by means of regular audits carried out in the most polluting industrial sectors of Lebanon and the implementation of a mechanism for the control of the execution of environmental legislation and the efficient implementation of the "polluter pays" principle.

Other voluntary regulation mechanisms of CP consist in the formalisation of agreements between companies and the public authorities.

The following laws are issued by the Ministry of the Environment, others by the Ministry of Agriculture especially those related to the classification and listing of chemical substances banned from being imported. The Lebanese Customs service, the main entity responsible for the control of the commercial and import activities, supervises their compliance.

4.11.1 Decision No. 42/1/96

Bans the import, use and transportation of blue asbestos and other materials containing blue asbestos (paint, varnish, adhesives, etc.). Thanks to this decision environmental protection of habitats and work environment have been optimised. The level of compliance with this decision is very high.

4.11.2 Decision No. 52/1/96

Defines the regulations that control water, air and soil pollution and that list the levels of acceptable pollutants in waste water, the emissions into the air and soil.

4.11.3 Decision No. 94/1/98

Displays a list of banned pesticides. The application of this decision led to the protection of the environment, agricultural products, workers and farmers. The level of compliance with this decision is very high.

4.11.4 Decision No. 23/1/95

Bans the import and use of liquid extinguishers (halons). This decision has helped to reduce the use of such hazardous substances, reflecting positively on the wellbeing of the environment in general. The level of compliance with this decision is also high.

All these decisions are integrated within MoE regulations and strategies. They are also conveyed to the Customs Service for application and implementation. This is the reason why a high level of compliance has been observed.

Other initiatives that have still not taken the shape of legislation are destined to the reduction of the polluting sources by means of the adoption of cleaner technologies are:

- The Ministry of Energy and Hydraulic Resources was studying proposals to change from thermal to hydraulic sources and windmills to generate electricity.
- The Ministry of Transport has prepared a law that promotes the substitution of old taxis for new vehicles by means of the exemption of customs rights. Another law bans the use of diesel engines for cars, and permits its use only for mini-buses and trucks. Currently the ban of diesel is being managed at parliamentary level due to the insufficient control of the quality of imported products and cars that use it.

Concerning voluntary regulation mechanisms in CP issues, there are certain agreements to adopt cleaner technologies among companies which share resources and which are members of the same trade or business union. The main import companies also apply the voluntary regulation to increase their competition in the regional and international markets and have signed a series of agreements between the public authorities and certain industrial companies, such as, for example:

- That between MoE and industries using asbestos in their production processes, especially industries based in the North of Lebanon.
- Between MoE and Cement factories in Chekka, Kehraya and Sibline.
- Between the MoE and companies using Ozone Depleting Substances (CFCs) scattered all over Lebanon; sometimes located near residential areas.

4.12 Libya

The Libyan Environmental Law is an integrated law, enabling flexibility to include additional environmental regulations, rules, agreements and bodies. There is legislation and guidelines for the regulation and control of industrial wastewater, domestic wastewater and the quality of seawater. Although nowadays there is no specific legislation on CP.

The Environmental Impact Assessments (EIA) are still pending execution, both in new projects such as those that are in process.

In brief, the major environmental laws in Libya are:

Law No. 22 or 1989 on industrial organisation.
Law No. 7 of 1982 for environmental protection.
Law No.13 of 1991 concerning the regulation and the control of industrial wastewater, of domestic use and seawater quality.
Law No. 5 of 1990 on standardisation and metrology.

These laws are used as an instrument to endorse CP by political means and to increase the discipline and arousal of the public. As for the level of compliance with these laws, it is estimated at nearly 85%.

Several national entities participate in a competent manner in the protection of the environment and in the development of national scale correct environmental activities. Such entities are the General Popular Committee on a nation-wide scale (elects the members of the Technical Centre of Protection of the Environment, that acts in the capacity of executive organ, endowed totally of the jurisdiction and the powers granted to the municipal police, coastguards, security forces, and other civil defence systems), the Management of Housing and Public Services Promotions Directorate (on a regional scale), the Health Management Directorate and the Management of Industry Directorate.

Over 200 civil servants are at the service of the aforementioned entities and their sphere of responsibility spans the supervision of compliance of the mandatory requirements of each productive sector, also taking charge of the preparation of the licenses.

Occasionally inspections are carried out in some authorised industries. Nevertheless, complaints are usually followed up. In the cases of proven transgressions strict measures have been applied that vary from the re-inspection for

the application of corrective actions up to the temporary shutdown and criminal prosecution.

Moreover, Libya has signed many regional and international protocols and conventions. The official efforts have proliferated to be able to reach the desired objectives. Libya has signed agreements/conventions on desertification, marine waste, Ban on Nuclear Tests and the Protection of the Ozone layer. In addition, it has signed, but has not yet ratified, the following agreements/conventions: Bio-diversity, Climate Change, and Law of the Sea.

4.13 Malta

Malta has not enacted any law directly related with CP although it has some indirect references thereto. The legislation in this country is closely related to police laws.

The legislation that is legally related to CP could be:

1. Environmental Protection Act. 1991.
2. Environmental Protection Regulations (Control of Ozone-Depleting Substances), 1995.
3. Environment Protection (Sewer Discharge Control) Regulations, 1993.
4. Deposit of Wastes and Rubble (Levies) Regulations, 1997.
5. Clean Air Act (object of an exhaustive review).

With regard to top priority CP issues to be developed, Malta will issue an Environmental Act concerning CP.

Some voluntary agreements usually between multinational companies and the government have been enacted.

4.13.1 Environmental Protection Act, 1991

Toxic and potentially toxic substances

This act defines toxic and potentially toxic substances, makes regulations concerning their use, imposes conditions on the importation, carriage or storage of these substances, and specifies the precise manner in which these substances or their waste may be destroyed or disposed of.

Environmental Impact Assessment

Before a permit is granted to execute a project that affects the environment by a Government organ, due to its nature, size and location, it should carry out an Environmental Impact Assessment (EIA). The EIA will identify, describe and value in each case, the direct and indirect effects on the environment.

4.13.2 Environmental Protection Regulations (Control of Ozone-Depleting Substances), 1995

These regulations are intended to control the importation, exportation, use, carriage, storage, destruction or disposal of controlled substances which are considered to be potentially toxic, in order to limit and phase out these substances in accordance with Malta's international obligations.

4.13.3 Environmental Protection (Sewer Discharge Control) Regulations, 1993

This regulation became effective on 1st of January 1994. Although the entire industrial sector does not comply, the appropriate measures are being taken to guarantee that in 2001, all industrial effluents comply with the listed parameters.

This law defines "best available technology" as the measures generally and authoritatively practised and accepted as compliance of the established actions.

4.14 Morocco

The most recent legislation and that being drawn up integrate the concept of CP by means of the application of good housekeeping practices and the use of new technologies in industry.

As a preventive measure of pollution, the EIA are also be applied.

Several voluntary agreements have been signed with various sectors to implement CP in their sector.

Rules and patterns of industrial waste are being prepared with the collaboration of the partners of the Commission of Prevention and Fight against Pollution and its effect, assigned to the National Council on the Environment. By means of the adoption of good housekeeping practices and new technologies, the maximum waste values should be observed.

Limits of waste have been established in the case of sugar refineries and cement and yeast factories. Sewage programs are being drafted and diagnosis in other sectors (oil refineries, tan yards, textile, treatment of surfaces, fish meal factories, electric power plants, paint and varnish factories, paper industries and cellulose production).

Environmental impact studies are used as a preventive measure. The SEE, through the National Committee of Environmental Impact Studies, considers the projects and councils the promoters to include the conclusions of the study on environmental protection in the management of the company.

Co-operation agreements have been signed between the State Department of the Environment and the industrial associations (CGEM, l'Office Nationale d'Electricité, l'Office Chérifienne du Phosphate, l'Association Professionnelle des Cimentiers) representing several sectors, in order to increase the efforts of such sectors in the prevention and fight against pollution and to reduce the damage caused by such industries.

Co-operation projects are being prepared concerning the exchange of experiences in cleaner technologies between the production centres and the SEE, CITET and RAC/CP, to participate in the edible oil sector and industrial training programmes with the help of professional training institutes, in particular with the *Institut Marocain de Cuir*, *l'École Supérieur Industrielle de Textile et de l'Habillement* and the SEE.

4.15 Slovenia

The rule on environmental protection takes as the legal basis Administrative Law in all procedures. The following should be underscored:

- Environmental Protection Law.
- The former Water Act was adopted in 1981, and is still in force.
- The Building Law (1984) with its amendments.
- The Law on Chemicals (adopted in 1999) and related decrees/rules (classification and labelling of dangerous substances and preparations, restrictions on marketing and use of dangerous substances and preparations, etc.)

The Environmental Protection Act and the Law on Chemicals relate to EU legislation, the national environment programme, waste management strategy, international agreements etc. These acts are the most important of those that include aspects on CP.

Slovenia has ratified several international conventions and protocols. Likewise, the implementation of the Responsible Care programme in the chemical industry should be mentioned.

Slovenia has not enacted any specific legislation concerning atmospheric, water, waste and waste pollution, nor of noise pollution attenuation but based on the Environmental Protection Law, special regulations have been published concerning those subjects.

4.15.1 The Environmental Protection Act, 1993

Enacted in 1993 —with its respective decrees/regulations (waste management, emissions into the atmosphere, emissions into water, etc.)—, regulates the protection of the environment and the general conditions of the use of natural resources, basic conditions for sustainable and healthy development.

Such Law spans a variety of aspects such as ecological labelling, specifying the possibility of granting an ecological label to the producers of consumer goods if during the production, distribution and final disposal of the product substantially less environmental incidence is detected, in comparison with similar products authorised by the rules in force.

Another matter dealt with are the work programmes, the content of the Environmental Vulnerability Study and the Environmental Impact Assessment.

4.15.2 Chemicals Act, 1999

This act shall govern the procedures and requirements for registering new substances and assessing new and existing substances, the administration of the chemicals register and exchange of information on chemicals, the release of biocides for trade, production conditions, distribution and use, classification, labelling and packaging of chemicals in relation to their level of hazardousness, and the conditions, obligations and measures for appropriate handling of chemicals.

The benefits gained from these laws are: protection of the environment, savings in energy and material, better working conditions and the removal of trade barriers.

Concerning Voluntary Regulation Mechanisms on CP Issues, it should be mentioned that within the framework of the Chamber of Commerce and Industry, the Chemical Association, and chemical companies are implementing the Responsible Care Programme. Companies of several industrial sectors are implementing an environmental management system in compliance with the ISO 14001 standard.

On an international scale, the commitments that had been previously reached with the former Yugoslavia were accepted (the Barcelona Convention, protocols and other agreements for maritime protection, the Convention on Long

Range Transboundary Airs Pollution and its EMEP Protocol, the Vienna Convention and its Montreal Protocol for the protection of the ozone layer). Furthermore, Slovenia has co-operated within the framework of the United Nations Economic Commission for Europe (UNECE). Since 1992, Slovenia has ratified various agreements: the Basle Convention on the Control of Transboundary Movements of Hazardous Waste and their disposal, the Protocol on the subsequent reduction of sulphur emissions, the amendments to the Montreal Protocol on the reducing substances of the ozone layer and the convention on the evaluation of the environmental impact in a transboundary context.

4.16 Spain

At present, Spain has comprehensive of exhaustive legislation concerning CP and the environment in general. The rules and regulations are based on the principles of prevention and the fostering of waste minimisation and reduction, reuse, recycling and other forms of valorisation.

On a countrywide basis, it is important to point out:

- Royal Decree 952/1997, of 20th June, on Waste.
- Law 10/ 1998, of 21st April, on Waste.
- Law 11/1997, of 24th April, on Packaging and Packaging Waste.

Concerning Voluntary Regulation Mechanisms on CP Issues, several agreements among industries must be pointed out (Responsible Care), as well as between public authorities and industry sectors or individual industries (Voluntary Agreements).

The Spanish environmental policy has been marked by the change of attitude at national and international level before the increasing globalisation of environmental problems. Moreover, it has been determined by the commitment assumed within the framework of the Rio Summit (1992), as well as by the integration of the environment in sector policies included in the 5th European Programme Environment "Towards Sustainable Development".

The largest short-term environmental challenges refer to the rational use and recovery of the quality of water and its environment, to the control of the loss of plant coverage, the adequate management of all types of waste, as well as the preservation and recovery of the natural environ-

ment. In this respect, one of the basic action guidelines drawn up by the Ministry of the Environment (MIMAM) is the promotion of environmental regulations.

4.16.1 Royal Decree 952/1997, of 20th June, on Waste

Includes the list of toxic and dangerous substances that are listed in Directive 91/689/EEC, and that stipulate the amounts and concentrations for the classification of the toxic or dangerous level of such waste.

Establishes a period of four years for producers of toxic and dangerous waste to prepare a minimisation study of waste per unit produced and to submit it to the corresponding regional government, undertaking to reduce its generation to the utmost.

4.16.2 Law 10/ 1998, of 21st April, on Waste

Establishes a common rule for every type of waste with the exception of emissions into the air, radioactive waste and their discharge into water. It aims to avoid the generation of waste, to establish a legal base for their generation and management, to promote their reduction at source, the re-use, recycling and valorization as opposed to other modes of waste management and to control polluted soils.

In order to achieve this, the Law enables Public Authorities to create economic tools and motivation measures. It also regulates the statement of polluted soils.

4.16.3 Law 11/1997, of 24th April, on Packaging and Packaging waste

This implies the incorporation into Spanish legislation of European Directive 94/62/CE created by the European Council and Parliament. Their objective is to avoid the environmental impact of packaging and guarantee the management of the waste generated by the packaging during its useful life. This law grants maximum priority to the preventive measures of the generation of such waste and their immediate objective consists of the promotion of its reuse, recycling or valorization. Royal Decree 782/1998, of 30th April, approved a by-law for the development and implementation of this law. Temporary close number 4 of this Royal Decree stipulates that companies must present a corporate prevention plan.

Regarding the transposition of EC Directive 96/61 on IPPC (Integrated Pollution Prevention and Control), a draft is currently being written. On a regional scale, as an example, Catalonia has transposed the Directive by means

of its law 3/1998, of 27th February, on the Integrated Intervention of the Environmental Administration.

Some grants, subsidies or allowances must be mentioned:

Order 25/4/1997 by means of which the regulatory base is approved and the announcement of the granting of subsidies for the fiscal years 1997-1999. Related to the initiative of aid to industrial technology, safety and quality (ATYCA).

Royal Decree 1594/97, of 17th October, that regulates allowances on account of investments made to preserve the environment.

Order 1/3/99 that regulates the granting of subsidies contemplated in Order 28/2/89, by means of which the management of used oils in the activities that reuse used oil during 1998 is regulated.

Order 3/3/00 that announces the granting of subsidies to carry out scientific and technological development and innovation projects. This announcement is made within the framework of the National Environment Programme of the National Plan for Scientific Research and Technological Development and Innovation (2000-2003).

Order 7/3/00 that regulates the regulating basis, the types of grants and the management of the Programme to enhance technical research (PROFIT), included in the National Plan for Scientific Research and Technological Development and Innovation (2000-2003).

Many legal texts exist, related to the regional rule in force that includes CP, which regulate in one way or another the application of CP in industrial activities. The most outstanding matters dealt with in those texts are:

- Regulation of the activities related to the collection, transportation, disposal and recycling of industrial waste. Pursuant to community regulations several autonomous communities include in their legal texts various measures leading to the reduction of the generation of waste and to guarantee that all of the management activities, regarding both the exploitation and disposal are implemented under adequate conditions for the protection of the environment and the preservation of the natural resources and the health of human beings.

  Mainly, the measures refer to:

  - The prevention and minimisation at source of wastes by reducing production and hazardousness.
  - Promoting reuse, recycling and any other form of valorisation.
  - Suitable waste disposal whenever it cannot be valorized.
  - Promoting the introduction of clean technologies to allow a more efficient use of natural resources by minimising the amount and dangerousness of the waste generated.

  - Supporting the technical development and product marketing that may reduce the amount and hazardousness of the waste generated and the risks of pollution.
  - Promoting the replacement of raw materials and complementary products that may contain dangerous elements or that may generate hazardous waste with others of lower impact.
  - Encouraging investments to reduce the generation, recovery and reuse of waste.
  - Create a database related to the raw materials contained in industrial waste that could be used later on by third parties and promote the reuse of such materials (several autonomous communities already have a waste exchange service).
  - Encouraging producers to consume recovered or transformed substances as raw materials, energy or fuel.
  - Application of levies for the use of products and production of non-reusable waste.
- The reduction of emissions at source in order to achieve a high level of atmospheric environmental protection with special reference to greenhouse gases and the agents responsible for the depletion of the ozone layer. Emission levels are also established that, among other criteria, must guarantee the non-transgression of the environmental quality standards pursuant to environmental legislation in force and take the level of the best available technology as a reference that should be applied by the corresponding industrial sector under viable economic conditions.
- Application of the Community Directive on Integrated Pollution Prevention and Control (IPPC).

  The main goals of the present law are to reach a high level of protection for people and the environment in general and to guarantee quality of life through the use of the necessary tools to prevent, minimise, correct and control the impacts generated by the activities subject to this directive. Another goal is to foster sustainable development and to make administrative procedures more agile.

  Public Authorities must ensure that the holders of activities included in the Annexes of the Directive carry them out in agreement with the following principles:

  - To prevent pollution through the application of the right measures and, especially, of the best available techniques.
  - To prevent pollution transfer from one environment to another.
  - To reduce the generation of waste through minimisation techniques and to manage them correctly as far as possible.

- To use energy, water and raw materials in a rational and efficient way.
- To take the necessary steps to avoid any risk of pollution when activities cease and ensure that the site of such activities remains in adequate condition.
- To promote the Eco-management and Eco-audit systems and the Eco-label to foster the control of the procedures and products and the improvement of environmental management, regulating aid systems for their implementation.

Finally, it must be pointed out that the economic management of the environmental policy is contemplated through all the economic, financing and tax tools proposing fiscal incentives and a suitable policy on public prices and taxes which will enable or allow the application of the "polluter pays" principle.

4.17 Syria

The various government entities (Committee for the Protection of Nature, General Commission for Environmental Matters and the Higher Council of the Environment) lend their support to the Ministry of the Environment to ensure the enforcement of the legal instruments.

The main Syrian environmental laws are:

- Law No. 181, issued on 26th May 1945.
- Presidential Resolution No. 24, of 13th March 1958.
- Legislative Decree No. 24 issued on 3rd April 1972.
- Law No. 29 issued on 24th July 1972.
- Legislative Decree No. 96 issued on 23rd September 1974.
- Decree No. 2680, issued on 22nd December 1977
- Decree No. 1239/85, issued in May 1985.
- Legislative Decree No. 11/91, issued in August 1991.
- Law for the Protection and Development of the Environment (enacted in March 1994).

Furthermore, an executive law concerning the industrial activities that is sufficiently comprehensive is dearly needed.

Certain government policies that foster increased efficiency among the business sector of the use of resources by means of their reuse, waste reduction and recycling and recovery of the energy consumed.

The major obstacle facing the rapid widespread introduction of CP in Syria is the absence of a regulatory framework that obliges the industries (public and private) to audit, modernise and adopt new cleaner technologies that minimise the adverse environmental impacts.

Detailed below are some of the laws:

4.17.1 Decree No. 2680

This decree establishes the conditions permitted for management of dangerous industries, especially those related to: aeration and ventilation conditions, quality of water used and discharged, cleanliness and sanitation of the workplace, odour control systems and treatment devices, safety conditions and prevention against fire accidents and professional risks, and safety and security of the labour force.

4.17.2 Law for the Protection and Development of the Environment

This law entails provisions to protect water and air at regional level from any sources of pollution (ships, oil refineries, aircraft, etc).

The major voluntary regulating mechanisms and activities pertinent to CP issues could be summarised as follows:

- Conducting Environmental Audits on heavy industries.
- The application of EIA studies in eight main industries in Syria.
- The adoption of the practices in the Good Housekeeping Guide for industrialists (currently, there is a proposal to implement them in 10 selected industries in Damascus) and the concept of eco-efficiency.

Furthermore other international mechanisms of voluntary regulation exist which are sponsored by international agencies and concerning CP such as for example the Ratification of the Montreal Protocol in 1989 on Ozone-Depleting Substances, the Ratification of the United Nations Convention on Climatic Change of 6th January 1996, co-operation with the EU to enable the Regional Management and collaboration with the International Academy of Geneva concerning the introduction of the ISO 14000 standard in main industries.

On the other hand, the future regional and international challenges in the commercial and environmental sphere require that Syria act and foster the application of the ISO 14000 standard, in addition to the conditions and WTO and GATT rules in order to enable Syrian industries to compete on a regional and international scale.

4.18 Tunisia

Tunisia has buttressed its regulatory and legal framework since 1992 in the context of land-use planning of the pollution and management of natural resources. On a national level the following texts have been passed:

Laws that include aspects of CP:

- Law (1994) pertaining to the management and maintenance of industrial zones.

General Environmental Laws:

- Law 88-91.
- Code on Land-Use and Urban Planning.
- Law (1995) on water and soil conservation.
- Review of the law on Maritime Public Domains (1995).
- Law 96-41 on waste management, control and disposal.
- Framework law (1996) on waste control, management and disposal.
- Law (1996) establishing a national emergency plan to fight marine pollution.
- Decree 97-1102, establishing the conditions and modes of recovery and management of packaging and packaging waste.

Tunisia has ratified more than 30 international conventions pertaining to the prevention of the pollution of seawater from hydrocarbons, trade of threatened species, combating desertification, etc).

4.18.1 Law 88-91

The law on the establishment of the National Agency for the protection of the Environment defines the obligation to present to the Agency an EIA study before establishing any industrial, agricultural or commercial unit. It stipulates provisions for the proper practices that should be ensured for manufacturing or production to prevent any risk that might pollute or degrade the environment.

While the older companies submit to decontamination programmes (with FODEP), newly-founded companies are subject to the EIA.

In the international sphere, Tunisia has ratified the following conventions and protocols:

- Ratification of the Bamako Convention on prohibiting the import of toxic waste into Africa and the control of transboundary movements and management of toxic waste.

- Ratification of the amendment of the convention regarding wetlands of international importance (law 1992).
- Adhesion of the Tunisian Republic to the Montreal Protocol (1993).
- Ratification of the Biological Diversity Convention.
- Ratification of the Convention on Climatic Change (1993).
- Adhesion of the Tunisian Republic to the Montreal Protocol (1994).
- Adhesion to the international convention of 1990 on preparation, control and co-operation in issues related to pollution from hydrocarbon sources.
- Ratification of the Convention on Combating Desertification in Africa (1995).
- Ratification of the Basle Convention on the control of the transboundary movements of toxic waste (1995).
- Adhesion to the Bern Convention on the conservation of wildlife and natural habitat in Europe (1995).

Tunisia is pursuing an active environmental policy and acts to implement the commitments, agreements and recommendations it has signed and ratified.

Its main priority is the uninterrupted legislative follow up.

4.19 Turkey

Turkey lacks a legal framework for Cleaner Production. Its environmental legislation does not contain direct provisions for the promotion of best available technologies and/or cleaner technologies. An important practical consequence is that the numerical definition of effluent and/or emission standards does not relate to or reflect these technologies.

The Turkish environmental management system was created as a consequence of the Third Five-year development plan (1973-1977), whose main bases were published in the Constitution of 1982 and the Environmental Law of 1983, among others.

The constitution system and the institutional base were established before the Declaration of Río in 1992 and Agenda 21 that advocate important changes in protection policies and environmental management systems. To this end, amendments are now being considered that could strengthen inspections, broaden public participation, promote more efficient collection of revenues that support the Environmental Pollution Prevention Fund, and better drinking water resources.

Turkey has based many of its environmental policies, laws and regulations on European and International regulations. For example, air pollution standards are based on German regulations, and a number of regulations on waste management, including those on solid waste (1991), medical waste (1993), toxic chemicals and their products (1993), and hazardous waste (1995), are based on Western European regulations.

In addition, the ISO 14000 standards on environmental management and the Eco-management and Audit System (EMAS) of the EU have been translated into Turkish and distributed among the private sector.

Certain matters are still pending, such as:

- Regional directives to reduce the diversity of existing environmental legislation.
- A regional study to redefine effluent and emission standards on the basis of BAT and/or cleaner technologies.
- A new regional directive for the protection of coastal marine environments against eutrophication and for the enhancement of tourism and recreation as major beneficial uses.

Regarding the Voluntary Regulation Mechanisms on CP Issues, there is a Responsible Care programme run by the Chemical Manufacturers' Association to promote the voluntary adoption of CP criteria in which almost all the chemical manufacturing plants in Turkey are participating.

The Istanbul Chamber of Industry and the Chemical Manufacturers' Association are acting together in environmental affairs. They include the promotion of CP in their yearly programme by giving prizes for best environmental performance, including CP.

4.20 Conclusions

Although all of the countries have developed environmental legislation, this is not easily applied. At times they lack the technical and human means to ensure their implementation and to ensure the control and follow up of the potentially polluting activities.

The tool that is most frequently used to ensure the protection of the environment in industry consists in the unavoidable procurement of a permit to set up the activity which quite often requires a prior Environmental Impact Assessment (EIA). Therefore, the Administration ensures, at least, the regulation of new installations since those antedating the enactment of the Law have not been subjected to any type of EIA.

Notwithstanding the lack of specific regulation of the implementation of CP in industry, several countries have included the pollution prevention in specific legislation on waste management, atmospheric protection or the use of substances that are dangerous for the environment and human health.

Most of the countries have adopted voluntary regulation mechanisms to reduce pollution that make up for the lack or scarcity of legislation in certain matters. These have been carried out by means of:

- Agreements between private companies, with the chemical industry's Responsible Care Commitment the one most frequently applied.
- Signature of conventions between the Administration and some industrial sectors.
- Signature/ratification of conventions and international protocols.

In summary, the development of legislative tools that favour an effective and practical application of CP in MAP countries is still an emerging activity that should be promoted in order to guarantee sustainable development.

5. Programmes and action plans on CP

The situation of the MAP countries from the environmental planning point of view is presented in this chapter. The plans and programmes developed by each country deal with the environment in general and in some cases there are specific CP programmes.

5.1 Albania

In 1983, the Albanian Government approved the **National Environmental Action Plan** (hereinafter referred to as NEAP) that includes all the tasks for the different ministries and other bodies and the respective actions to be taken for environmental protection in this country.

NEAP promotes CP and develops the related policies. The process of updating NEAP is to focus on the prioritisation of CP principles through its introduction and implementation in the entire country.

On the other hand, under Phase I, II of the **MEDPOL Programme**, the CEP (NEA) has organised work with the Faculty of Natural Science and the Institute of Hydro-meteorology to monitor biota in some coastal stations to control pesticides and heavy metals.

Albania is currently collaborating with these institutions in the setting up of the monitoring plan of the Phase III of the MEDPOL Programme, which is overcoming important obstacles arising out of the financial and logistic shortages and fragility of the state structures.

Nevertheless, the NEA has worked on the setting up of a national monitoring and control programme through the application of suitable environmental indicators that provide the Albanian agents in charge of CP with the necessary data for drawing up the "State of the Environment" report, based on OECD criteria. Another aim is the evaluation of the cost of implementing this programme in order to find and guarantee the due and stable financial sources.

5.2 Algeria

The corresponding authorities have established several programmes for promoting the application of cleaner production, and emphasising the need to introduce changes in the forms of production. Details of the main activities undertaken in this field are given below.

Environmental actions based on the five top priority axes have been started within the framework of the **Government's Three-Year Programme** (1998-2000). These especially include the integration of the environment into industrial development. The main actions are linked to the promotion of the following CP techniques:

- Undertaking environmental audits in the industries that pollute the most.
- Promoting the conversion of polluting industries into non-polluting industries.
- Providing financial support for feasibility studies (technical and economic) of industries in the process of restructuring.
- Developing programmes aimed at replacing CFCs.
- Providing financial support for research projects relating to cleaner technologies.

Various national programmes have been undertaken as a result of the Government's Three Year Programme, with the aim of gradually eradicating substances that are harmful to the ozone layer and promoting the use of resources that are less polluting in energy production (natural gas and gas oil).

A project entitled "**Integrated Competitiveness and Support for Industrial Restructuring Programme**", which was presented by the United Nations Industrial Development Organisation (UNIDO), was begun in 1999. It is currently being carried out. It includes the "promotion of a sustainable and clean environment in Algeria" and envisages the introduction of cleaner production techniques in different industrial activities.

Mention should be made of the direct effect of the regional projects/programmes on the state of the environment. Projects/programmes that are worthy of mention include the ones carried out by MAP-RAC and those of the Montreal Protocol (the Ozone and Climatic Change Agency). Other case study projects have been conceived in collaboration with the World Bank (IBRD), the European Investment Bank (EIB), UNIDO and other UN bodies.

5.3 Bosnia-Herzegovina

The following projects/programmes are in progress or have been recently completed (June 2000):

5.3.1 Financed by the EC Phare Programme:

- **The Institutional Consolidation of the Water Sector, Federation of Bosnia-Herzegovina** (Plancenter Ltd., BCEOM, and the Sarajevo Hydro-Engineering Institute. Final Report submitted in April 1999).
- The *Solid Waste Management Plan for Bosnia and Herzegovina,* development of a comprehensive solid waste master plan for Bosnia and Herzegovina including activities in both Entities (AEA Technology plc.). The Inception Report and First Interim Report have been submitted.

5.3.2 Financed by the Italian Government through the International Management Group:

- **The Institutional Consolidation of the Water Sector, Federation of Bosnia-Herzegovina, Aspects of Water Quality** - Sarajevo Hydro-Engineering Institute. Final Report submitted in January 2000.
- **The Institutional Consolidation of the Water Sector, Aspects of Water Quality, Republic of Srpska** (Water Institutes). Final Report submitted in March 2000.

5.3.3 Financed by the Spanish Government through the International Management Group:

- **The Institutional Consolidation of the Water Sector, Federation of Bosnia-Herzegovina, Development of Human Resources** (Eptisa International, EOI, and the Sarajevo Hydro-Engineering Institute. Final Report submitted in April 2000.
- **The Institutional Consolidation of the Water Sector, Federation of Bosnia-Herzegovina, Development of Human Resources** (Eptisa International, EOI, and Zavod za Vodoprivredu-Pale RS). Final Report submitted in April 2000.

5.3.4 Financed by the government of Finland:

- **The Institutional Consolidation of the Water Sector, Institutional, Legal and Financial Aspects. Republic of Srpska** (Plancenter Ltd.), International Management Group (IMG). Final report submitted March 2000.

In addition, the European Commission is planning a project to provide further support for strengthening B&H's water sector institutions, building on the achievements and results of the related projects listed above, as well as programmes for the development of environmental framework legislation.

In order to begin a thorough CP application programme in Bosnia-Herzegovina, the following assignments need to be carried out:

- A feasibility study to show, whether there is a potential for CP activities in B& H. A team of experts would look at the current conditions at institutional and legal level and they would check how receptive the industry and educational institutions are towards CP. The following subjects need to be studied in the initial phases:
  - The market.
  - General environment and demand for CP.
  - Current supply of services in the environmental sector.
  - Target groups for a CP Centre.
  - Current networks in the region and in Europe.
- Preparation of the CESD – CP Unit Programme for 2000-2002.
- The carrying out of some of the basic activities of information dissemination, CP training and counselling the Government.

In order to perform these tasks, it has been planned to engage representatives from different Universities, governmental, non-governmental and scientific institutions, public enterprises and individuals from both entities, who would work on education and culture, development of environmental policy and drawing up future action programmes.

A strategy to incorporate CP in the metal coating industry, the food industries and chemical industry sectors is to be developed in a second stage.

5.4 Croatia

The **Physical Planning Programme** (1997) of Croatia includes a chapter on environmental protection, waste reduction and pollution prevention. A new Physical Planning Programme was completed in July 1999. CP is included in the Strategy and the National Environmental Action Plan.

Another pertinent instrument concerning CP is the **National Water Pollution Control Plan** (National Strategic Action Plan for Water Resources), which was approved by the Government of the Republic of Croatia in 1999 (O.G. 8/99).

The World Bank is developing a Plan to be concluded within approximately a year, which includes CP as an important tool for sustainable development and defines the necessary industrial strategy for achieving this objective.

Numerous regional CP programmes have been planned in the two-year period covering 2000-2001. A CP Project on tourism is being prepared, and there is another one in the county of Osijek-Barama that began in February 2000. This latter programme is financed by the Croatian "Ecolinks" Programme, and it is sponsored by the Croatian Chamber of Economy - Chamber of the County of Osijek, and Dekont-Umwelttechnik in the Czech Republic. The Croatian and Czech CPCs act as consulting organisations.

One of the main Croatian objectives is the preparation of the local AGENDA 21, which will include CP as a kind of essential preventive strategy for sustainable regional development. The same concept will be used in the preparation of the other local CP policies in Croatia. There are 30 participants. 19 from 8 industrial production companies and 2 service companies and other participants from local municipalities, universities, high schools and NGOs.

5.5 Cyprus

The question of cleaner production in Cyprus has so far not been dealt with separately but has been included within the group of main environmental aspects relating to water, air and soil pollution from residential, commercial and industrial sources.

The different governmental organisations, such as the Medical Services for Microbial Pollution, the departments of Water Development and Fisheries, the Geology Department and the Sanitary Engineers in the Department of Urban Planning and Housing Development are in charge of repair activities and control at the national level. Likewise, the NGOs participate in controlling the sources of pollution and in increasing public awareness of environmentally-friendly activities.

As for regional plans and programmes, Cyprus has signed numerous regional and international protocols and conventions.

5.6 Egypt

The EEAA has developed a long-term strategy to ensure the environmental soundness of industrial development in Egypt. The strategy components include:

- Developing master policies to promote the quality of the environment through implementing industry-specific programmes for the abatement of pollution.
- Establishing regional and self-monitoring systems for industrial pollution.
- Requesting new industrial and trade activities to perform environmental impact assessment.
- Providing financial aid, through international subsidies, which enables the main polluting industries to make the transition over to CP and undergo improvements in the use of production input at the same time.

The general programmes and action plans regarding CP are the following:

5.6.1 The New Environmentally-Friendly Industrial Cities Programme

This is a national Programme that consists of setting up public and private associations between enterprises, the Government and the community. Based on this programme, new approaches were implemented to tackle the pollution problem in the chemical, metallurgical, food and textile sectors and other manufacturing activities in New Industrial Cities (NICs).

The geographical scope of the New Industrial Cities Programme covers: 10th Ramdan City located 60 kilometres east of Cairo, Sadat City located midway between Cairo and Alexandria, 6th October located in Giza "governorate", Obour City located 20 kilometres east of Cairo and Borg El Arab City, located 60 kilometres east of Alexandria on the northern coast of Egypt.

Investment in pollution prevention in the five cities participating in the programme has so far exceeded U$ 300 million. The promotion of the Programme received modest support from investment associations and NIC management, which generated expectation in the NGOs and the general public.

5.6.2 National Industrial Pollution Prevention Programme

This programme, sponsored by the EEAA, is being financed by international donors for a total amount of U$ 55 million. The NIPP projects involve strengthening the institutional and technical capabilities of the EEAA, sector ministries and local governments, establishing a pollution-monitoring network, supporting NGOs, and conducting environmental audits in major polluting industries.

Lastly, there is project to finance the setting up of clean technologies and control techniques in the charge of the World Bank and the European Investment Bank, amongst an infinite number of other projects, financed by way of grants to provide technical support to industry in the CP sector.

5.7 France

ADEME has disseminated the **Environment-Enterprise Plan (EEP)** since 1995. The Plan was designed to contribute to the introduction of environmental management systems in enterprise, and over 2,000 companies already participate. The agency is currently developing the plan so that it can be adapted to the ISO 14001 standard on environmental management systems and the regulations on eco-auditing, and likewise adapting it to other sectors of the economy, as in the case of agricultural co-operatives.

The national ADEME "**Clean Technologies and Eco-design Promotion Programme**" and the "**Public Water Services**" plan have been developed in France.

At the regional level, mention should be made of the "**Nord-Pas-de-Calais, Burgundy and Aquitaine regions**" programme.

5.8 Greece

Greece is currently carrying out a programme to adapt the IPPC Directive (Integrated Pollution Prevention and Control). The most important points of this programme are the implementation and application of Directive 96/61 and the national inventory of the main emissions, in accordance with article 15.3.

There is an uninterrupted process for determining the BAT of all of the industrial sectors indicated in the IPPC Directive that appears in the publication of the Guides to the Best Available Techniques and Environmentally-Sound Technologies. This process is co-ordinated and financed by the Ministry of the Environment, with a view to preparing reference documents that contain all of the technical, economic and environmental data (e.g. a description of the technique, expected values relating to emissions, the possibilities of it being applied to new/existing plants etc.) of each BAT. The national/local authorities responsible for granting environmental permits and industry will need to take all of these documents into account in questions concerning new environmental investments.

Lastly, the programmes developed on a regional scale in Greece involve environmental awareness and are also informative.

5.9 Israel

Israel's programmes are national in nature.

In 1998, the Ministry of the Environment launched a programme to encourage pollution abatement in the manufacturing sector through CP processes and environmental investments. Within the framework of the new programme, case studies and guidelines on eco-efficiency, pollution prevention and CP were published and workshops for different industrial sectors were organised.

The Ministry launched an experimental programme in September 1999 to provide financial aid to industry interested in joining the ISO 14001-certification process. The purpose of the programme is to contribute to the application of environmental management methods in the industrial sector to stimulate CP and reduce pollution.

5.10 Italy

The Italian Ministry of the Environment must refer to the Parliament and to the State Audit Court each year regarding the activities, actions, investments and programmes in progress regarding the Environment. Moreover, every three years, the Minister issues a report on the State of the Environment including current data about the different sectors that directly or indirectly influence the environment.

In Italy, the provisions for using Best Available Technology (BAT) and Cleaner Technology are limited. They are mainly based on voluntary agreements with the competent ministries and industrial associations.

5.11 Lebanon

Regarding nation-wide programmes and action plans, the Directorate General for Industrial Planning has started to identify different industrial areas, in order to group industrial activities to facilitate the sharing of resources, protection of the urban environment, and better control of the effluents generated during manufacturing processes.

Clean technologies are integrated in the national programme concerning the "Permit and Auditing System for Industry". One of the objectives of the programme is to develop a Compliance Action Plan for specific industrial sectors and provide the necessary tools for carrying out this activity.

The METAP Planning and Programming Unit (PPU) has carried out a study in the Ministry of the Environment where the **Decision-Making Support System for the Control of Industrial Pollution** has been used to identify the most polluting industrial sectors in the Lebanon.

The Delta Network is another programme. This is a regional programme started by an NGO based in Switzerland known as *Sustainable Business Associates* (SBA). It has been adopted on a regional basis in the region (Lebanon, Syria, Egypt, Palestine, Jordan, Tunisia, Morocco and Algeria). This NGO helps governments to disseminate the CP concept in the private sector, mainly in industry.

5.12 Malta

The **CP Programme** is managed by the Cleaner Technology Centre (CTC) and is nation-wide. It focuses on environmental awareness. A demonstration pilot plant that shows the benefits of CP for industry has also been planned.

One of the most important environmental programmes applied in the Maltese Islands is the MAP **MED POL** programme for monitoring the sea, which was revised in 1996 and is currently being carried out in stages.

5.13 Morocco

The action programme of the Secretary of State for the Environment (SEE) is designed to provide support, within the context of its five-year plan (2000-2004), the environmental modernisation of SMEs, mainly through the search for public-private co-operation mechanisms that enable the adoption of cleaner technologies adapted to the context and particular characteristics of the Moroccan industrial system. This plan envisages the following objectives and actions:

5.13.1 Objectives and actions programmed within the context of the five-year plan (2000-2004)

Objectives

- To reinforce co-operation with the private sector (professional associations; laboratories, research centres; the Moroccan Engineers' Association, etc.) concerning:
    - Training in the areas of auditing, the management of industrial hazards, self-monitoring and monitoring of industrial pollution.
    - Establishment of regulations and standards of waste treatment in the different sectors.
    - The contribution of industry to the development of economic instruments that offer support to environmental regulations.
    - To reinforce the current incentives and programmes for preventing and controlling industrial pollution.
- Develop co-operation with the different training and research bodies and institutes in order to:
    - Benefit from research work already done in this field.
    - Direct the choice of subjects to be studied according to local and regional requirements.
    - To improve the understanding and assessment of the contribution made by industry to environmental degradation, especially in areas that are more sensitive.
    - To endow Morocco with standards that are adapted to and in keeping with national and international regulations (ISO 9000, ISO 14000, etc.) that affect the industrial sector.
    - To carry out the actions recommended by local enterprises and other agents in the sensitive area of the Mohammédia - Casablanca axis.
    - To improve the facilities and capacity of the laboratories that are responsible for the monitoring and control of pollution.
    - To integrate the environmental component into the development of the different programmes relating to good housekeeping practices in industrial areas (SDAU, environmental management plans, etc.)
    - To collaborate with the authorities and local groups in the organisation of anti-industrial hazard intervention and aid measures for the population.

Programmed Actions

- Support for the environmental adaptation of the industrial sector.
    - Training in the areas of auditing, the management of industrial hazards, self-monitoring and the monitoring of industrial pollution.

    - Nation-wide training in the field of management of technological hazards (institutional and legal plans).
    - Enhancement of the industrial decontamination fund (FODEP).
    - Nation-wide training in the development of classification plans for industrial areas.
- The creation of an environmental labelling system for Moroccan industrial products.
- The development of research studies on the interrelationship between international trade and the environment in Morocco.
- The prevention and control of industrial pollution in sensitive areas.
    - Setting up of an industrial decontamination action plan at a regional level in the Casablanca - Mohammédia axis area.
    - Setting up of a management centre (elimination and treatment) of industrial waste in the Casablanca - Mohammédia axis area.
    - Developing and setting up of industrial decontamination action plans in the sensitive areas of El Jadida and Safi.
- The standardisation of industrial waste.
    - Creation of regulations and standards for industrial waste (solid, liquid and gas) in the priority industrial and mining sectors.
- Inventories and management plans of hazardous substances and waste and technological hazards.
    - Drawing up of an inventory of organic pollutants.
    - Developing and establishing a management plan for chemical substances and dangerous pesticides.
    - Developing and establishing a management plan of hazardous waste (including out of date products).
    - Promoting the occupational health to protect workers from health risks associated with the handling of dangerous products.

5.14 Slovenia

The National Assembly approved the **National Environmental Action Programme (NEAP)** in September 1999. It was drawn up pursuant to articles 47 and 104 of the Environmental Protection Act. It contains the objectives, guidelines and strategy of environmental protection and regarding the use of natural resources for a minimum period of ten years. Individual activities that affect the environment and individual environmental components (water, air, soil, biodiversity, etc.) must end, according to the NEAP.

Expectations regarding positive changes in the environment are high. The NEAP does not offer quick solutions, for even countries with substantially better material and organisational conditions have taken decades to resolve their environmental problems. The document does not merely repeat the objectives and tasks included in Agenda 21 (Rio, 1992), the European Environmental Action Programme (Towards Sustainability) and the EPA, but takes them fully into account in laying down objectives and development tasks.

In terms of methodology, the NEAP follows the proposals of the Ministerial Conference held in Lucerne (1993). It is based on the 1990, 1995 and 1996 reports on the state of the environment, on research carried out within Environmental Target Research Programmes, and PHARE aid programmes, and on development programmes of individual government sectors, with emphasis on the Strategy for the Economic Development of Slovenia (1995).

The measures aimed at supervising the NEAP are defined in the aforementioned programme, together with the responsibilities of the Ministry of the Environment and Physical Planning in setting up the NEAP.

Slovenia has not yet successfully mastered the problems that threaten biological diversity and the landscape. Nevertheless, there are various factors that can alleviate the pressure on the environment:

- The creation of institutions at all levels and reinforcement of the control of pollution sources.
- Development of refurbishment programmes on the basis of "ecological reserves" (funds reserved for environmental protection) in the process of the ownership transformation of companies.
- Increase environmental awareness and a greater understanding of measures to protect the environment.

The programme achieved a more balanced relationship between the environment and industry by:

- Substituting raw and other input materials (the use of less toxic substances and long-lasting materials).
- The conversion of technological processes (new technologies and improved productive processes).
- Modifying equipment (to increase efficiency and reduce losses).
- Improving the management of resources (optimal maintenance of appliances and machinery).
- Recycling of waste within the company.
- Producing useful by-products (adaptation of processes that generate waste, for potential reuse as by-products outside the company).
- The introduction of modifications in products (with the aim of reducing the consumption of raw materials and the waste flows produced).

National Environmental Action Programme according to certain selected areas

Industry	Energy Sector	Transport	Agriculture and forestry	Tourism	
Control of Emissions: • Regularisation of emissions. • National and operational monitoring. • ISO 14001 + EMAS. • Taxes on pollution. • Development and application of more environmentally friendly technologies. • Use of the best available techniques not entailing excessive cost (BATNEEC).	Reduction of emissions: • Defining targets by pollutants. • Econ. and fiscal incentives. • Safety guarantee concerning radiation. • ISO 14001 + EMAS.	"Cleaner" vehicles and fuels: • Prohibiting the use of less environmentally friendly vehicles. • Greater safety in the transport of hazardous substances.	Enforcing sustainable agricultural production: • Controlled intensive production when this is inevitable. • Controlled use of fertilisers and chemical preparations. • Educating producers and users. • Support for organic farming.	Sustainable development: • Protection of the basic resource of the activity. • Effective waste management. • Encouraging mobility according to the principle of Sustainability. • Taking into account the capacity of the area for the development of an individual activity.	1
Optimisation of waste management: • Greater responsability. • ISO 14001 + EMAS. • Deposit/refund. • Organisational measures. • Organised assistance in the preparation of projects.	Optimum use of resources: • Rational use of energy. • Greater use of renewable sources. • Encouraging research and development. • Household energy saving.	Managing traffic flows from the perspective of environmental protection: • Controlling traffic congestion. • Use of more environmentally friendly forms of transport. • Protection of natural animal migration routes.	Enforcing modern principles of sustainability: • Encouraging the utilisation of resources according to the principle of sustainability. • Introduction of mechanisms for the protection of resources.	Protection of resources for tourism: • Protection of cultural and natural heritage. • Protection of forests against fires. • Conservation of biological diversity.	2
More environmentally sound products with: • ISO 14001, EMAS and product labelling. • Modern production standards. • Consumer information. • Differentiated taxation.	Lower energy consumption: • Introduction of incentives. • Implementing the programme for efficient energy use. • ISO 14001, EMAS and product labelling.	Changing drivers' behaviour: • Information and education. • Choice of alternative routes. • Incentives.	Development of the countryside: • Linking tourism and agriculture. • Education. • Countryside management.	Offering greater choice: • The promotion of destinations and places that are environmentally more appropriate. • Better information. • Management of peak periods.	3

Legend: 1. Impact of the activity on the environment. 2. Impact on resources. 3. Modified behaviour.

The overhaul of large pollution sources, which cause the main environmental and health problems, is closely bound together with denationalisation and the transition towards a market economy (investment and aid priorities are determined, and will continue to be so, according to the situation of the area). In addition to the outstanding problems relating to the overhaul of old conflictive points, the programme defines two groups of tasks that are particularly important:

- Ensuring the functioning of public services.
- Searching for the best ways to encourage "win-win" solutions and to promote solutions according to the principle of good management in terms of lower emissions of all types as the result of the economic sector's tendency to reduce costs.

Consequently, the NEAP pursues the introduction of various economic instruments that have a two-fold function:

- As a source for setting up environmental protection programmes.
- As motivation for all of the participating members in the field of environmental protection.

Economic instruments ensure the inclusion of environmental costs in the business costs of economic entities. The system of economic incentives has to be designed in such a way that it encourages manufacturers and consumers to use resources more "ecologically".

Regarding the application of instruments, there are two areas that need to be distinguished: the economic (industrial) area of the private sector, and the sector of public and state-owned companies including public utility services and large state systems.

The main goal of the economic (industrial) sector is to guarantee clear conditions of management at least for the medium term. Priority will be given to the introduction of some of the following instruments:

- Bringing into force increased charges for emissions of individual pollutants at least to a level comparable with that of the EU.
- The gradual increase of prices of specific energy feedstock and raw materials (progressive taxation of energy feedstock with comparatively high emissions and uniform taxation of natural non-renewable resources), which in practice means the introduction of an "ecology tax" in accordance with Article 10 of EPA.
- Differentiation of tax rates for different fuel (higher taxes on fuels with greater CO_2 emissions).
- Introduction of subsidies for organic farming and the introduction of specific tax relief for the introduction of efficient energy-use technolo-

gies and for highly profitable investments in environmentally friendly equipment.
- The introduction of other subsidies that guarantee win-win solutions, e.g. the increase of energy efficiency, the introduction of technologies with low atmospheric emissions, etc.

The public sector, including public utility companies, operates within the framework of the public finance system and will need additional financing from funds collected from polluters.

5.15 Spain

The Spanish Ministry of the Environment has the task of national planning in order to develop, in collaboration with the Autonomous Communities, a series of activities aimed at solving the main environmental problems in the country.

In 1995, the Ministry of Public Works, Transport and the Environment approved the **National Plan for Hazardous Waste (1995-2000)**. The objective of this is to avoid the generation of waste and prioritise waste minimisation, recycling and reuse.

Different measures were promoted to set up this plan, including the dissemination and systematic analysis of the generation of hazardous waste and available technologies for minimising this, R+D on new prevention technologies, and fiscal, financial and legislative measures, together with the research and application of the best available technologies.

The new **National Plan for Hazardous Waste** for the 2001-2006 period is shortly to be approved and will include new criteria set by the European Union.

The **National Plan for Urban Waste** (2000-2006) aims at reducing the total generation of urban wastes and reducing the total weight of packaging wastes, promoting selective collection, enhancing reuse and recovery of wastes, valorization of organic waste, enhancing energy valorization, and eliminating uncontrolled landfills. To develop this **National Plan for Urban Waste**, specific National Programmes for each of the above-mentioned objectives have been developed. Special waste, such as the sludge generated by the wastewater treatment plants, cars out of use, etc, will be dealt with in a **National Plan for Special Waste.**

Other examples of industrial plans launched by the Spanish Ministry of the Environment are the **National Plan for the Recovery of Polluted Soil** (1995-

2005), the **National Plan for Sanitation and Wastewater Treatment**, and the **National Plan for Used Batteries.**

On a regional scale, competency in environmental protection has been transferred to the Autonomous Communities, who have developed plans and environmental programmes.

The main issues dealt with in the different plans/programmes include:

—**Industrial waste management** and, more specifically, the **management of hazardous waste.** Amongst other objectives, these programmes pursue the prevention of pollution produced by hazardous waste and the minimisation, valorization and optimisation of waste disposal methods (by prioritising waste minimisation and the setting of limits for controlled elimination and incineration).

Thus, on the basis of the goals set in the programme, the objectives proposed are:

- To foster the use of raw materials and intermediate products that cause minimum environmental impact in agreement with the minimisation objectives in the generation of waste and also to increase the change and modification of production processes.
- To foster waste recycling and recovery and thus extend the life of the resources involved.

—**Municipal waste management.** The main objectives are:

- To reduce the quantity and toxicity of waste and reduce the use of special (hazardous) materials, both in the production stage and in finished products.
- To increase the reuse, recycling and valorization of waste, and limiting waste disposal to the non-valorizable fractions: final waste.
- Provide the necessary infrastructure for the disposal of final waste and selective collection.

—**The environmental quality of enterprises and products.** The objectives are to:

- Stimulate the implementation of environmental management systems within the enterprises.
- Grant environmental-quality labels to products.

5.16 Syria

The annual strategy of the Ministry of the Environment regarding programmes at the national level is based on sustainable development and its contribution to environmental conventions, whether these are bilateral, multilateral or global. The environmental quality in Syria is improving through the increased application of Environmental Impact Assessments in development activities or projects.

Co-operation at the present time is becoming extensive in the different public authorities with the aim of integrating the concept of CP into a broader field of application. The formal and effective initiatives that are being undertaken are a clear example of this.

In the same context, Syria has received assistance from the EU in building the capacity of the regional directorates, along with a national strategy and a national action plan under preparation to ensure sustainable development in Syria.

5.17 Tunisia

The **National Programme for the Management of Solid Waste** was launched in 1993 with the objective to provide the Tunisian territory with solid waste treatment units and seek for adequate solutions for each type of waste. The main components of this Programme are:

- Domestic waste.
- lndustrial and toxic waste.
- Special waste (hospital, slaughter houses, treatment plant effluents, organic waste, etc.)
- Ecological labelling.

In addition to the above, and in order to promote environmental management in enterprises, CITET conducted two programmes (capacity building and technical assistance) in collaboration with the United Nations Industrial Development Organisation (UNIDO). The first programme, entitled "**Promoting techniques of environmental management in enterprises**" aims to demonstrate that environmental management is a sound economical actor mainly in terms of controlling consumption of raw materials, optimisation of manufacturing processes, energy saving and waste minimisation, which consequently would lead to the reduction of production costs. The first phase of this programme was implemented from May 97 to April 98 whereby 7 SMEs

were selected representing the sectors of textiles, chemical industry, construction, leather and printing.

This Programme comprises:

- Making SMEs aware of the concept of environmental management.
- Identifying the needs of SMEs to apply the EMAS.
- Drawing up a diagnosis guide to identify these needs.
- Drawing up an action plan to develop the capacities of SMEs.

The second programme, "**The development of national capacity building programme in cleaner industrial production**", seeks capacity building in waste minimisation audits at the national level, and to produce substantial profits for the participants. Financed by the Norwegian government and UNIDO, the application of this programme was ensured by the Norwegian Institute for Industrial Cleaner Production and CITET.

ECO-lef is a public system for recovering and reusing used packages created by NAPE. Financed by members' contributions, the main target groups of this programme are:

- Producers of packaging materials directly designed for consumption.
- Food handlers, and workers in the chemical cleaning and cosmetic products sector, who do not produce their own packaging materials.
- Food handlers, chemical cleaning and cosmetic products, which do not produce their own packaging materials.
- Importers of packaged products.
- Distributors of imported products.

5.18 Turkey

The **Seventh Five-Year Development Plan (SFYDP) (1996-2000)** currently embodies national policy in all key sectors, including the environment. Major objectives, principles and policies of the SFYDP under the heading "Protection and Improvement of the Environment" include:

- Pollution prevention instead of ultimate elimination.
- Using an appropriate combination of economic and regulatory instruments.
- Developing regional and eco-basin strategies.
- Strengthening environmental management systems.
- Ensuring that policies and solutions are in accordance with EU regulations and international standards.
- Revising and enhancing the financing system for environmental protection, management and improvement.

- Promoting environmental awareness through formal and non-formal channels.
- Harmonising legislation to ensure compatibility between economic development and environmental protection.

Turkey has prepared the **National Environmental Action Plan (NEAP)**, which defines the priority environmental actions and identifies the sources of pollution that represent a threat to human health and the environment.

The NEAP can make four additional contributions to national policy:

- As an integral element in the Eighth Development Plan.
- As a block for constructing the Turkish national Agenda 21 plan.
- As a basis for discussion in the two-yearly meeting of the Higher Council for the Environment in the Ministry of the Environment.
- As representation of the Turkish environmental panorama in the drawing together of regional and international spheres.

The NEAP has drawn up a list of 150 action groups, and those relating to CP are as follows:

- Action 31: Encouragement of technologies and projects that prevent environmental pollution, protect natural resources and save energy.
- Action 33: Development, implementation, and encouragement of techniques and technologies that prevent pollution at source.
- Action 76: Use of modern environmental management techniques.
- Action 77: Development of environmentally sound technologies and the promotion of their use in production.
- Action 83: The promotion of technologies, techniques and processes that are environmentally sound.
- Action 117: Establishment of an Environmental Protection Centre.

These actions are based on the NEAP principles, which ensure that the Plan can be successfully implemented:

- By means of democratic and participatory mechanisms.
- Through the search for agreement and commitment.
- Through the combination of efficiency and economic rationality.
- With the co-ordination and internalisation of the priority actions.
- Through the decentralisation of solutions at the appropriate level.

With regard to regional programmes, the country participates in various regional initiatives such as the Mediterranean Environmental Technical Assis-

tance Programme (METAP), the Mediterranean Action Plan, Black Sea Environmental Programme and Regional Agenda 21.

To date, METAP has supported projects on solid waste management, the institutional reinforcement of the Ministry of Environment, coastal area management, and environmental finance. Its support has also recently been requested for five new projects for the 1996-2000 period.

Finally, it began preparing the Regional Agenda 21 together with the MoEs of the Central Asian and Balkan countries.

5.19 Conclusions

The overwhelming majority of MAP countries have developed national environment plans through the integration of CP criteria, together with other more specific programmes on particular issues (e.g. waste reduction, capacity building, packaging, etc.).

Although the most recent programmes include CP globally, others deal with the question of the environment in a sectoral way (water, air, soil, etc.). Another form is programmes that have an overall geographical scope that incorporates CP in all industrial sectors. This is the case of the New Industrial Cities programme in Egypt and the Lebanese programme. Both of these programmes aim to group industrial activities with the purpose of improving the management of resources and exerting greater control over pollution.

The most outstanding aspects in the preparation of action plans for establishing CP are:

- Industrial minimisation through the substitution of raw materials, the modernisation of processes and facilities, and the incorporation of new technologies (and, in some cases, even BAT).
- Improvements in waste management by promoting recovery at source, valorization and recycling.
- Stimulating the establishment of environmental management systems in enterprise (ISO 14001 and EMAS).
- The creation of economic instruments as an incentive for the business sector to apply CP.
- Training of those in charge of the environment at the national level to ensure the correct application of the CP concept.
- Training in industry.
- Increasing the awareness of enterprises and the general public.

International aid (UE, UNIDO, third countries, etc.) is available in many cases for setting up these plans, especially through economic aid and technical assistance.

Nevertheless, some countries such as Bosnia-Herzegovina are still in a preliminary stage of identifying the most polluting activities for designing the best action plan in each particular case.

6. Activities and tools developed for promoting CP

This chapter is intended to give clear information on the activities and tools for each one of the countries and agents in the context of Cleaner Production and to identify, where this is possible, the individual priorities relating to the different aspects of CP.

The structure of each one of the points that make up this chapter, is the following:

1. Description of the activities and tools based on the information given by the agent responsible for its promotion and development.
2. Summary of the tools used in the country, classified according to the following:
   - Tools aimed at applying Cleaner Production (environmental management systems, environmental diagnoses, work groups, ecological labelling, ecological design, life cycle analysis, environmental impact assessment, and others).
   - Economic tools to protect the environment (environmental impact taxes, public/private financing, tax deductions, and others).
   - Tools aimed at disseminating knowledge of Cleaner Production knowledge (publications, seminars, training courses, and others).
3. A table of CP priorities relating to each country, where this information is available.

6.1 Albania

The Albanian activities addressing the application and promotion of Cleaner Production are:

- Promoting CP within the university programmes of the Chemical Engineering Department.
- Preparatory work to transpose CP principles and BAT into environmental legislation.

- Promoting the development of environmental audits of some old oil refineries and other industry as a tool for preparing low-cost mitigation plans (Updating of the National Environmental Action Plan).

6.1.1 The National Environment Agency (NEA)

The NEA is currently preparing a plan on **EIA** for certain important sources of pollution in the existing industrial plants. The law is intended to implement this procedure in no more than 5 years. In this process, Albania will probably have the participation of the industry that is still state-owned, as well as that of some new plants, for example: tanneries, cement factories, fertiliser plants, oil refineries, metal industries, etc.

6.1.2 Industrial Environmental Association

As has been mentioned in chapter III, an evaluation study is being carried out on the applicability of CP.

6.1.3 University of Tirana

In spite of the non-existence of study programmes on CP in Albania, some professors at the University of Tirana have made tentative attempts to introduce the principles of CP. Some undergraduate and postgraduate courses are being introduced in the different university faculties. An important point would be the setting up of a library on CP and matters relating to waste management, which would facilitate the task of preparing teaching materials in the local language.

6.1.4 Environmental Centre for the Administration of Technology (ECAT)

It is responsible for disseminating information on the practical improvements and preparation of drafts and preliminary legislation.

Albania's top **priorities to develop** are:
- Dissemination of information on CP.
- Promotion of awareness of CP in the business sector.
- CP principles in university study syllabi and programmes.
- Capacity building (training of staff of the NEA, NGOs and state authorities).
- Co-operation between associations, business, NGOs and state authorities.
- Pilot Demonstration Project in two small and medium-sized companies (SMEs).
- Creating awareness within the decision-making hierarchy at a national level of the CP principles.

6.2 Algeria

The Ministry of Land-Use Planning and of the Environment has started up many different activities destined to promote the application of cleaner production.

The National Environment Fund (NEF) and the National Agency for Investment Promotion, Assistance and Control (APSI) are two financial instruments that promote investment in the process of cleaner production. At present, the APFI has examined over thirty projects for recovering and recycling waste.

Environmental audits have been carried out which have been translated into a programme of investments for minimising waste, the recycling and installation of the most adequate technology, particularly in the production of fertilisers, metals and plastics. Based on these audits, the production processes of 3 highly polluting industries have been changed: the production of metals and fertilisers with phosphates in Annaba, financed by the World Bank (IBRD); the production of plastics in Skikda, financed by the European Investment Bank (EIB).

Pilot studies have been started to promote the introduction of cleaner technologies in the large industries of Algiers, Oran, Annaba, Skikda and Constantine, based on the following points:

- Identification of the most polluting industrial sectors with the objective of setting priorities for the application of CP.
- Identification of appropriate, financially viable alternatives for pollution prevention, at a national level.
- Assessment of the substitution costs to be able to establish a list of priorities.
- The launching of a national programme for progressively eliminating all substances that damage the ozone layer.
- Promotion of the use of less polluting energy sources, such as natural gas and diesel oil (domestic and industrial use). For some years now, there has been increased use of diesel oil in motor vehicle engines.

The creation of the National Agency for the Promotion and Rationalisation of Energy Use, which has allowed for the production of less polluting energy.

In addition, UNIDO has managed about 13 million US$ in Algeria in projects relating to cleaner production (elimination of CFC) between 1994 and 1999. Some of them are detailed in the table below.

- Preliminary assistance for the progressive elimination of CFCs in the manufacturing of aerosols and solvents (ENAD), 1994.
- Preliminary assistance in the elimination of CFCs in the manufacturing of domestic refrigerators and freezers (ENIEM), 1994.
- Preparation of an investment project for the progressive elimination of CFC-11 in the production of three-layer panels (PROSIDER, Annaba), 1995.
- Preparation of an investment project for the progressive suppression of CFC in the production of hard foam (BATIMETAL), 1995.
- Progressive elimination of CFCs in companies COPHYD, 1996.
- Preparation of investment projects in the aerosol, foam and refrigeration businesses, 1997.

At present, a new agreement is being prepared between the Algerian government and the World Bank to finance the project "Control of Industrial Pollution", intended to reinforce institutional, technical and legal help offered to industry. This project consists of environmental audits that allow for the increase in productivity, while respecting the environment, through the modification of production processes, the recycling of by-products and the minimisation of the generation of waste. The programme also includes the implementation of a pilot study, relating to the introduction of cleaner technologies into the large industrial complexes.

All these instruments are intended to reduce the amount of polluting waste generated by the different activities within the community. The joint effect of the instruments used will allow for an improvement in the state of the environment and favour sustainable development in all aspects of national activity.

Some industries have proposed the use of optional mechanisms associated with cleaner production to obtain EMAS and ISO 14000 certifications (which will allow them to increase their competencies at a regional and international level). In addition, negotiations are under way for membership in the World Trade Organisation (WTO).

As has already mentioned in chapter IV, the EIAs are compulsory for any type of project, requiring the preferential use of the least polluting technologies when being implemented.

Most of these instruments are included in national legislation and programmes, especially those relating to compliance with the EIAs for new projects, the progressive suppression of ozone-depleting substances and the promotion of the use of natural gas and diesel oil.

6.3 Bosnia-Herzegovina

The tools used by the CESD (Centre for Environmentally Sustainable Development), are the following:

- Workshops for target groups (institutions, ministries, water management entities, business associations to promote CP as a strategy, and for the surface treatment industries and the leather industry, for promoting CP techniques).
- Distribution of information, conferences, debates, round tables, group discussions, etc.
- The preparation of brochures, slides or a video presentation on the prevention of pollution.
- Consulting function of the government, helping it to understand the importance of the implementation of CP and compliance, by forwarding it the legislation on CP from other countries.
- Demo projects.
- Research and consultancy projects and programmes.

In addition, Bosnia-Herzegovina has developed financial instruments directed at protecting the environment, which do not play a significant role in the sources and applications of financing for the environment in Bosnia-Herzegovina, with the exception of the special taxes on water, which are already used mainly to increase income for the state budget, used for purposes other than environmental protection.

Bosnia-Herzegovina intends to increase the effectiveness of the existing tools, such as the taxes levied on pollution, and to establish new mechanisms (taxes on products and users and fuel taxes). The revenues raised by these financial instruments would be crucial in financing environmental investments.

A decision on four of the five existing special water taxes was enacted in December 1998 in Bosnia-Herzegovina, creating the following taxes:

- Water abstraction tax: 0.1 Km/m^3;
- Water pollution tax: 2 Km/inhabitant equivalent;
- Tax for hydroelectric power plants: 2% of the production price, for fossil fuel generation plants: 1% of the production price;
- Gravel extraction: 1 Km/m^3.

The tax on water effluents is based on the equivalent number of inhabitants and is of 2 Km per inhabitant equivalent. This is levied as from the end of 1998.

The RS Government defines rates and amounts of general and specific water management taxes.

- General water management tax in RS: 1.5% of the gross salaries and/or of gross earnings arising from copyright and patent rights.
- Specific tax on water use in the RS, according to its destined use:
    - Agricultural: 0.01 Km/m.
    - Irrigation: 0.006 Km/m^3;
    - Fish farming in artificial tanks: 0.013 Km/m^3;
    - Industry, construction, mining, energy, forestry, water management, transport, hotel trade, commerce and tourism: 0.045 Km/m^3;
    - Financial, technical and professional services: 0.040 Km/m^3;
    - Municipal companies supplying water that carry out other water-using business (public and other companies): 0.035 Km/m^3;
    - Power generation (except fossil fuel power generation plants), besides the special fee for their own water consumption, also 0.00015 Km/kWh of energy produced, and
    - Producers of mineral drinking water pay 0.03 KM per litre of water produced.
- Specific water tax for water protection in the RS: The taxes for water protection are: of 1.0 Km/inhabitant equivalent to an amount lower than 10,000 inhabitants equivalent up to 14,700 Km plus 0.00483 Km per inhabitants equivalent for an amount in excess of 2,000,000 inhabitants equivalent.

6.4 Croatia

The CP tools and activities have been developed and introduced by the two agents that exist at present: APO Ltd. (The Hazardous Waste Management Agency) and the Croatian Cleaner Production Centre.

6.4.1 APO Ltd. (The Hazardous Waste Management Agency)

Has participated in, among others, the following studies and feasibility studies:

- Design of documents for the establishment of the system for hazardous waste management in the Republic of Croatia.
- Disposal of hazardous waste - worldwide practice and experience (1993).
- Treatment technologies for various classes of hazardous waste - worldwide practice and experience (1993).

- Management of residual pesticides and their packaging in the Republic of Croatia. Zero-state analysis (1995).
- Status Analysis in the management of residual edible oils in the Republic of Croatia and proposals for their management (1996).
- Management of residual pesticides and their packaging in the Republic of Croatia. Proposal for the adoption of immediate and long-term corrective measures (1996).
- Industrial waste management in the Republic of Croatia (1996).
- Strategy for the introduction of the Cleaner Production programme in the Republic of Croatia (1996/1997).
- Management of inorganic waste by means of the manufacturing of bricks (1997).
- Solidification of oily mud and sludge containing heavy metals (1997).
- The role of the cement industry in environmental protection (1997).
- The system of recycling and reusing coolants with freon (1998).
- Assessment of the situation at the site of the Obrovac aluminium factory with suggested improvement measures, allowing it to be made suitable for subsequent building (1999).
- Several environmental impact studies carried out in 1999.

6.4.2 The UNIDO Project

One of the activities that have been developed is the UNIDO Project, on Capacity Building in CP. It was started in June 1997 by a joint agreement between UNIDO, the Czech Republic and the Croatian Government. It is a three-year project designed to train Croatian professionals in CP concepts and methods and finally to establish a Croatian CP Centre (CRO CPC). The project is being implemented within the framework of the UNIDO/UNEP programme for the establishment of a National CP Centre Network. Its objective is to develop the basic CP capabilities in Croatia, using the professional aptitude and experience available in the Czech Republic. This project includes the following tools:

- 11 Half-day introductory marketing seminars for different industrial sectors and regional seminars.
- Two long-term interactive training courses – each including:
    - Practical workshops (3 five-day workshops).
    - CP assessments.
    - Demonstration projects (11 for each training course).

The half-day marketing seminars, the regional marketing seminars and the two long-term interactive training courses, are essentially:

Half-day Marketing Seminars

Firstly, the Ministry of Finance, the State Management Board for the protection of nature and the environment, the Czech CP Centre and APO Ltd. (The Agency for the Management of Hazardous Waste) organised a seminar promoting CP, which was attended by over 200 participants from the different industrial sectors, the Government, universities, non-government organisations and consultancy firms. The Chamber of Commerce played a decisive role in the participation in the seminar. In addition, it was the sponsor of the seminars and contributed the conference rooms, making the necessary space available in its regional offices (for example: District Chambers of Commerce).

After the marketing seminar (held in Zagreb, in June 1997), 10 smaller half-day seminars were organised. Of those 10 half-day seminars: 4 were regional marketing seminars and 6 were business sector orientated. The Croatian Chamber of Commerce, APO Ltd. and the Ministry of Finance organised the seminars during the period between 1997 and 1998. Each one of them was organised and attended by three speakers from APO Ltd./CRO CPC.

Regional-marketing seminars

There were 4 regional marketing seminars (held in Rijeka, Osijek, Pula and Split, respectively). Managers from all economic areas (i.e. industrial companies from all relevant sectors in the region: tourism, transportation, NGOs, universities and local governments) were invited. Each seminar was attended by approximately 30 to 60 people.

Industrial sector seminars (sector-orientated marketing seminars)

6 sector-orientated seminars were held, all of them in the capital (Zagreb), although each one of them was related to a different industrial sector:

- food processing industry;
- timber and construction industry;
- chemical and pharmaceutical companies;
- Metal industry;
- Textile and leather industries;
- transport sector.

The sector-orientated seminars were attended by 20 to 50 people, and presented the concept and method behind CP by means of specific practical

case studies, from all over the world. A small amount of documentation in Croatian was distributed in class.

The marketing seminars have considerably increased awareness and involvement of the regional groups and has awoken a growing interest in the different industrial sectors towards CP assessments and training in the field of CP and pollution prevention in general. In addition, some of the participating professionals in the marketing seminars also participated in the long-term training courses at a later stage

No legislation has arisen from the seminars but nevertheless, these were included in the CP action plan of Croatia (APO Ltd., October 1996).

Two long-term interactive training-courses

3 five-day workshops including lectures and exercises on theory (presentations and exercises in CP, EMS, etc.), CP assessments and demonstration CP projects in participating companies They were organised over a 10-month period: the first took place from November 1997 to October 1998 and the second from December 1998 to October 1999.

In the first training course, 32 experts from the industrial sector, the Government, universities, consultancy firms, the Chamber of Commerce and non-government organisations, took part. They were trained in environmental management systems (EMS) and CP and carried out 11 CP demo projects in 9 industrial companies. About 20 people came from industry, at least 2 from each company, and they formed 11 work teams with the other experts.

In the second training course, 26 experts from different industrial sectors, universities and consultancy firms, took part. They were trained in EMS and CP and carried out 10 CP demo projects in 9 industrial companies. Two Czech consultants made three visits to each of the companies and received the co-operation of Croatian CP experts from the first training course, who after this first course, became CP monitors and consultants.

At the end of the training period, all participants who successfully finished it were awarded an internationally recognised Professional Development Certificate.

The benefits obtained thanks to the two long-term training courses, were the following:

58 national professionals specialised in CP received training to obtain the Professional Development Certificate in Environmental Management and CP in Industry; and at the same time, CP assessments of the industrial and service companies which participated were carried out, as were 21 CP demonstration projects (practical case studies), which translated into both a reduction of pollution and significant financial savings.

Through 21 implemented CP Demonstration Projects, the estimated annual saving was of US$ 3.89 million (US$ 1.6 million in the 11 projects developed in 1998, and US$ 2.29 million in the 10 projects developed in 1999) (see the tables of CP Projects in Croatia 1997/1998 and 1998/1999: investments, savings and the return investment, which are shown below). At the same time, a substantial reduction was achieved in emissions of pollutants into the air, water and soil (see the table of Environmental benefits in 21 CP projects; 1997-1999 below). With the registration of the Croatian Centre for Cleaner Production in February 2000, the final objective of the project was reached.

Finally, interest was generated amongst other Croatian industrial companies in CP education and projects also at a regional level and CP as a tool for EMAS and ISO 14000 systems in their companies.

CP Projects in Croatia (1997/1997); investments, savings and return on investment

No.	Company	CP Project Tittle/ description	Investment (US$)	Savings (US$/year)	Return on investment
1	CIMOS BUZET doo	Reduction of environmental burden (passive chrome ions) in the zinc plating process.	300	5,200	Immediate
2	ERICSSON NIKOLA LABUD dd, Zagreb	Raw material consumption and waste reduction in the soldering process of printed circuit board assemblies.	0	23,700	Immediate
3	HERBOS dd, Sisak - Production gf	Increase in the yield of raw materials of 0.5%. Reduction in the pollution of wastewater by substituting additives and installing turbidimeters.	0 12,000	125,800 116,000	Immediate <1 month
4	KIO dd, - Ceramic industry Orahovica	Reduction of ceramic waste tiles (unbaked raw pieces, glazed pieces and tired scrap) and improvements in working conditions.	122,300	159,000	9.5 months
5	KRAS dd, Zagreb	Reduction of raw material losses and total amount of waste in the production of ferrite plates.	3,435.600	715,000	4.9 years
6	LABUD dd, Zagreb	Water consumption reduction in the liquid detergent production plant.	7,250	1,730	4.2 years
7	PLIVA dd Zagreb - yeast production	Good water management and reduction of the atmospheric emissions in the production of yeast.	300,000	458,000	8 months
8	SAPONIA dd, Osijek	Improved raw materials dosage and yield and packaging waste reduction in abrasive materials production.	161,300	36,300	4.4 years
9	SIPRO dd, Umag	Raw materials saving and waste reduction by lowering BIOPP films in adhesive tape production. Air emissions reduction by hexane recovery and the recycling of cooling water.	0 23,700	15,000 19,630	Immediate 1.2 years
	TOTAL:		4,061,850	1,675,360	

CP Projects in Croatia (1998/1999): Investments, savings and return on investment

No.	Company	CP Project Title/ description	Investment (US$)	Savings (US$/year)	Return on investment
1	Shipbuilding company ULJANIK dd - Pula	Measures for rationalising the use of water (17 measures implemented).	35,225	868,000	0.5 months
2	LURA dd – Zagreb Factory (DUKAT)	Reduction of drinking water and energy consumption in the dairy industry.	23,360	342,000	1 month
3	GAVRILOVIC doo Petrinja	Reduction in the use of water and reduction of the volume and pollutant load in wastewater.	24,620	110,000	< 6 months
4	HEP dd - Thermal power plant SISAK	Water saving by the use of the purges of the cooling water for preparing chemical products. Waste sludge & wastewater reduction in water treatment plant.	450 319,450	79,550 561,160	Immediate 7 months
5	KARBON dd Zagreb	Rationalisation of water consumption and reduction of waste emissions.	142,360	95,100	1.9 years
6	KRAS dd Zagreb	Savings in heat energy used in manufacturing sweets, through improvements in insulation of the pipes.	12,470	11,100	1.12 years
7	PLIVA dd - KALINOVICA	Rationalisation of steam consumption and distribution, together with lower environmental hazars.	16,670	6,000	2.8 years
8	Shipyard V. LENAC dd-Rijeka	Optimal workshop primer consumption in correlation with the roughness profile of shot blasted surfaces.	0	95,000	Immediately
9	LURA dd-Bjelovar Factory (SIRELA)	Water saving and wastewater reduction.	14,700	121,100	1.5 months
	TOTAL:		601,755	2,290,000	

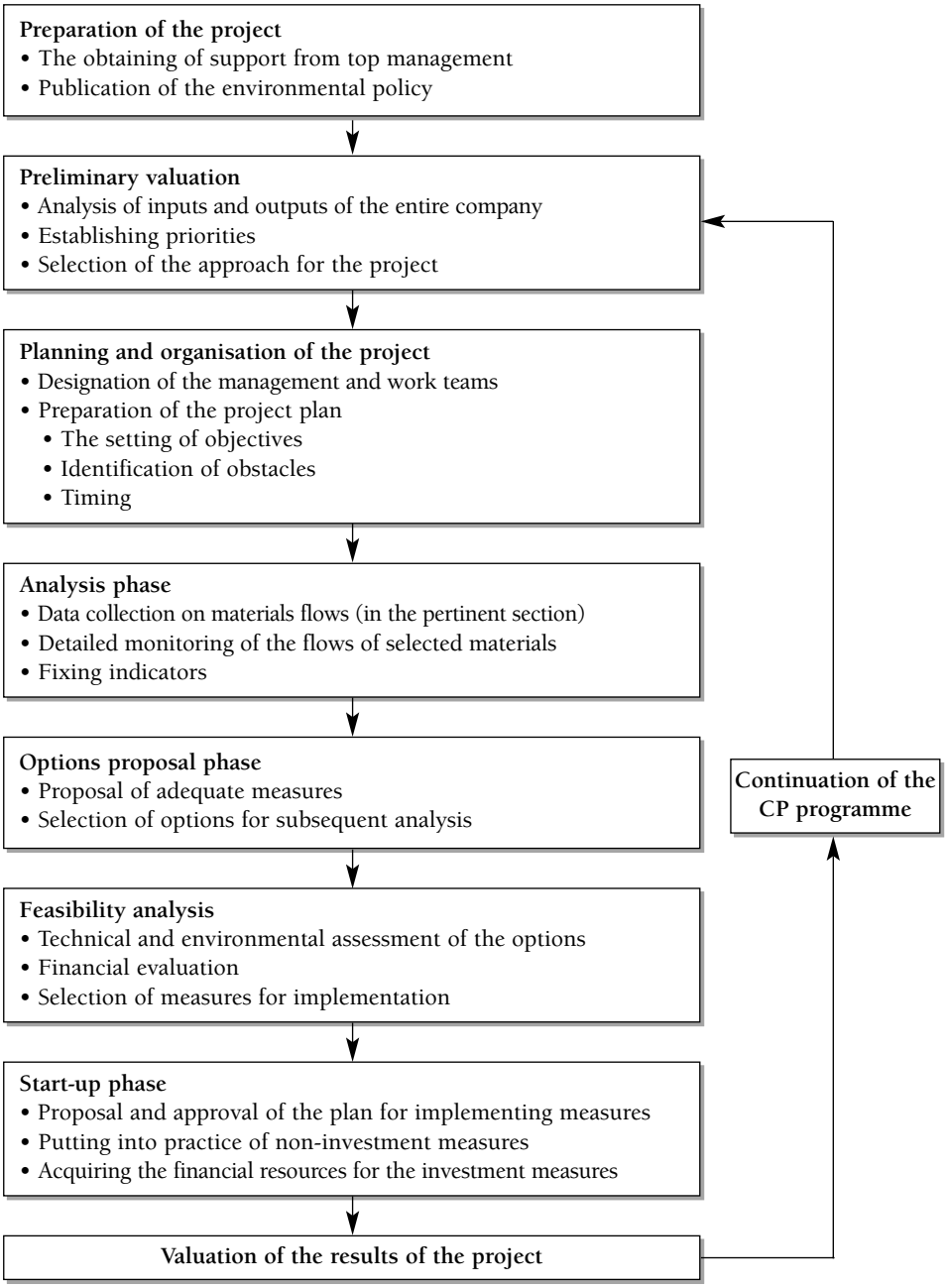
Environmental benefits in 21 CP Projects: 1997-1999

EMISSIONS INTO THE ATMOSPHERE	
Air pollutants	**Emission reduction (t/year)**
Flue gases (except CO_2) and particles	0.8
Volatile organic compounds, organic solvents (VOC)	32.4
TOTAL (t/year):	33.2
DISCHARGE INTO WATER	
Water pollutant	**Discharge reduction (m^3/year)**
Wastewater	2,400,000
Chemical oxygen demand (COD)	54.6 t O_2
SOIL	
Waste Type	**Waste Reduction (t/year)**
Hazardous waste (miscellaneous)	264
Waste from ceramic industry (inert)	1,040
Waste carbonate sludge (non-hazardous)	14,550
Other industrial waste (non-hazardous)	470
Packaging waste (wooden pallets & natron sacks)	216*
TOTAL (t/year):	16,540
RAW MATERIAL, WATER AND ENERGY SAVINGS	
Raw materials/energy sources	**Saving (annual)**
Fresh water (m^3/year)	2,370,000
Other raw materials (t/year)	1,564
Energy sources **: Steam (t/yr) Fuel-gas (m^3/yr) Fuel oil (t/year):	 8,078 52,000 35

* 7,200 wooden pallets, each weighing 25 kg, and 90,800 natron sacks, each weighing 0.45 kg.
** Savings in energy sources only refers to three demo projects.

6.4.3 CP Assessment

Diagram of the method used



The **high priority CP matters** are the following:

- Booklet of Croatian case studies (1997-1999).
- The good housekeeping guide (for industry and service sectors).
- Manual: from CP to EMS.

6.5 Cyprus

The different departments of the Ministry of Agriculture, Natural Resources and the Environment are responsible for supplying the necessary human and technical resources, relating to the different tools explained below.

One tool used in Cyprus, is the Environmental Impact Assessment with the objective of ascertaining whether the inherent activities of a proposed project are suited to environmental yardsticks and indicators allowed for this type of activities. In this sense, for example, six recently opened fish farms have been adapted to the EIAs, but without carrying out EIAs on existing projects, except for cases where there is a request for extending facilities.

Another of the tools used for instituting CP in Cyprus is the implementation of the EMAS and of ISO 14000 for individual businesses. The Cypriot Organisation of Quality Standards and Controls grants the corresponding certification to companies that voluntarily apply the ISO 9000, ISO 14000 and EMAS standards. In fact, the strong regional and international competition in opening new markets has led a significant number of Cypriot industries to adopt and apply the EU legislation to adjust to international standards and specifications.

With regard to the level of implementation, many companies seek to obtain the ISO 14000 and EMAS certifications, in order to achieve local and international recognition of their quality control. The Cypriot Organisation of Quality Standards and Controls is responsible for assigning experienced auditors to offer the necessary advisory services and adequate orientation to the applicant companies that do not comply with the legislative requirements.

Some companies have created joint participation companies with Greek companies applying green management practices, sales practices and ecological labelling in order to compete in new markets.

In Cyprus, the dissemination mechanisms, trade unions, syndicates and NGOs are very active and count on the accredited support of government bodies.

With regard to the modes of financing, the Institute for Industrial Development, which reports to the Ministry of Industry, manages a programme of subsidies, giving support to industry for the installation of waste treatment equipment.

6.6 Egypt

Within the framework of the Structural Adjustment Strategy, incentives are offered to businesses to invest in cleaner technologies and in minimising waste.

The subsidies of production factors are gradually being eliminated and the ownership of state-owned industries is being progressively transferred to the private sector. As a result of the Structural Adjustment Strategy, most industrial public enterprises were removed from the control of the ministries for business sectors, and were reorganised under financially independent holding companies.

6.7 France

The activities presently being carried out in France are the following:

- Research and development.
- Demonstration operations.
- Good Housekeeping practices.
- Dissemination and communication.

The tools used to apply CP by the French agents are the following:

- The evolution of the governing responsibilities.
- The promotion of technology.
- Facility supervision.

6.7.1 ADEME (Agency for the Environment and Energy Management - Directorates for Industry and Planning

The ADEME has committed itself to carrying out the following activities, among others:

- Guidance and management of technological research.
- Guidance and management of the initial and ongoing training programmes.
- Development, demonstration and dissemination of practical techniques.

- Work relating to the execution, preparation or operation of any type of related tasks.
- Data collection.
- Information and advisory services to public and private bodies.
- Participation in the preparation and implementation of international co-operation agreements and managing of international co-operation funds.

The ADEME has applied the following tools:

- Publishing and disseminating of the working method (cleaner technologies) implemented by industry.
- Assistance in the introduction of environmental management systems (EMS) in companies.
- Help for companies in reducing emissions by adopting cleaner technologies or equipment for treating pollution.
- The training of training instructors for small and medium-sized companies and industries.
- Financing of preliminary environmental diagnoses for companies.
- Support in the development of green products and a programme of associations with companies committed to the design of products that respect the environment (with some 90 examples).

Priorities:

Waste economy

Public authorities are strongly committed to reducing waste landfill, and promoting recycling and conversion. Amongst other activities, ADEME promotes the development of behaviour patterns in companies and homes destined to reduce waste at source through better product design and a lower volume of packaging. In addition, ADEME is consolidating its work on promoting the collective management of non-hazardous industrial waste and establishing systems for reprocessing products at the end of their useful lives (vehicles, batteries, small household appliances, etc.)

Air pollution

People are very concerned about air pollution, especially in urban areas. ADEME is acting at three levels. Firstly, it is working with the Ministry of the Environment and local authorities; they will equip the country with a monitoring system that meets the requirements of the national Air Pollution Act. This also means improving their ability to predict pollution peaks

and enhancing the knowledge of the effects of this type of pollution on health. ADEME is also helping to reduce emissions by supporting investments for treating industrial emissions. One of the priorities is centred on reducing the emissions of volatile organic compounds (hydrocarbons and solvents), which contribute to the forming of oxidising agents (ozone). Finally, the Agency is consolidating its work within the transport sector: participation in the research and development of engines and alternative fuels (electric, gas or bio-synthesised fuel vehicles) and the contribution in equipping public and private fleets with alternative automotive vehicles.

Energy management

The stabilisation of the carbon dioxide (CO_2) emissions from 1990 to 2010, in accordance with the commitments acquired in Kyoto, imply a greater effort in energy management, especially with respect to research, centred on transport, new building strategies, home equipment and innovations in small and medium-sized industries using energy-efficient, clean industrial processes. Besides reducing CO_2 emissions, renewable energy sources stimulate local development and employment. ADEME is also contributing to improved competitiveness and long-term viability of the methods currently being developed, as well as enhancing the promotion of technically mature products and services.

Main lines of evolution

With the restructuring of its organisation, ADEME has set objectives and has committed itself to mobilise all participants in the environmental sphere of activity, in order to promote good housekeeping practices and better diffuse the results of its actions.

Creating new alliances

In order to be effective, ADEME must act in synergy with many players who share its aims and the objectives of its actions. Through the work of its regional branches, ADEME helps by giving strong support to the projects that promote the respectful management of land use and job creation. Its effectiveness is reinforced by its contractual relationship with the districts in waste disposal and with the regions through the State-Regional Plan. Both in the area of waste treatment and in the control of air quality, ADEME is close to decision-makers and users.

In the same vein, the regional branches work with professional federations and chambers. On a national level, the agency has public and private personnel specialised in the implementation and dissemination of good housekeeping practices. On a European and international level, ADEME participates in the work of the European Commission and carries out projects in collaboration with the World Bank, the OECD and the International Energy Agency. In particular, it participates in bringing the legislation of Central and Eastern European countries into compliance with European environmental regulations, with a view to their admission into the European Union. ADEME also takes part in setting up and organising international networks, grouping similar agencies: the European energy network; the Mediterranean Association of National Agencies for Energy Conservation; the European Council for Efficient Energy Economy; and the European Renewable resources and the Association of Materials. All these projects, alliances and co-operative efforts (to which the Agency is committed for several years) are intended to communicate the concept of sustainable growth to a broader hierarchy of political decision-makers.

Promoting good housekeeping practices

With a view to increasing the dissemination of the good housekeeping practices and as a result of research developments, ADEME carries out a policy of active communication with different objectives. It makes the issues in energy management and environmental policy known to decision-makers, elected representatives and opinion leaders, and improves awareness on legal deadlines and international commitments, such as those made at Kyoto. Scientific and technical information is also communicated to engineers and technicians in companies and local authorities by means of regular publications and events. When it is addressing the general public, ADEME contributes by diffusing knowledge on the causes of pollution, the improvements achieved and the results of the technology used on a daily basis by the citizens. To do this, the agency uses new information technologies, such as its Internet website, and takes part in a variety of public events and communication operations. The information is also diffused through the press and by means of the publishing of informative documentation to increase awareness on the matter.

6.8 Greece

The activities depending on the Greek entities are as follows:

- financial assistance to companies that apply BAT;
- definition of the environmental conditions and the granting of environmental licences;
- the granting of permits to companies not included in the IPPC.

Thus, the BAT are being studied for all the Greek industrial sectors affected by the IPPC directive, in order to prepare business sector guides.

According to the management plans relating to toxic industrial waste, the last-resort alternative should be disposal in landfill. As there are no hazardous waste treatment and disposal facilities in Greece, the Ministry of the Environment is planning the construction of such a facility

There is no official procedure for Strategic EIA. Nevertheless, on an ad hoc basis, a type of Strategic Environmental Assessment will be carried out. For example, studies have been carried out on the specific use of land for the last 5 years, in order to assess the possible environmental impacts of certain physical planning in sensitive areas. Another of the assessments carried out by the Ministry of the Environment, Physical Planning and Public Works, valued the effect of the withdrawal of conventional motor vehicles and their subsequent replacement with new-technology automobiles (motors with catalytic converters) with the purpose of reducing air pollution.

6.9 Israel

The attempts to promote CP in Israel only began in the last few years. Regarding the tools applied in Israel, specific details on the tools to apply or promote CP are not yet available. It is anticipated that more details will be available when the CP Centre begins its operation. It is reasonable to expect that the proposed establishment of this Centre will increase awareness of CP in all economic sectors.

Up until now, Israel has employed environmental management tools, such as: the environmental impact assessment, legislation on air pollution and toxic waste, publications and guidelines.

Israel has developed certain activities: conferences, CP projects (using technologies targeted at reducing hazardous waste) and financial support. These activities have increased awareness of CP processes. In a joint initiative, the Ministry of the Environment and the Manufacturers' Association awarded prizes to industrial plants excelling in environmental problem solving and eco-

efficiency. Among the criteria followed, it is worth mentioning: investment in air quality, drainage, waste, noise pollution, ecological products and recycling.

6.9.1 Conferences

The Ministry of the Environment, with the co-operation of the Manufacturers' Association, the Ministry of Science and the United States-Israel Science and Technology Commission, organised a conference in 1998 called "The economic benefits of environmental investments, at factory level". The conference placed an emphasis on the obtaining of savings, derived from financial investments in productive technology and strategies, the objective of which was to eliminate or reduce waste at source. Among the participants, there were representatives from the chemical, electronic, pharmaceutical, energy generation and metal industrial sectors.

In 1999, the Ministry of the Environment and the Manufacturers' Association, organised the First Conference on the Integration of Air Quality and the Profitability of the Chemical Industry, which dealt with planning and the design of products that respected the environment, and innovations in water and air treatment systems.

In May 1999, the Israel Economic Forum for the Environment of Israel (a non-governmental organisation) in co-operation with the Ministry of the Environment and the International Network for Environmental Management (INEM) with the sponsorship of Clal Environmental Infrastructure Ltd., held a conference in this country on the subject "Global perspective on Environmental Management Best Practices, which formed part of the INEM Annual Conference and was attended by participants from the Israeli industrial sector, as well as experts renowned the world over in environmental management. The subjects discussed were related to private sector initiatives to improve the environment, the implications for industry of the environmental considerations of the banking and insurance sectors, the benefits of ISO 14001 and the future prospects of sustainable management systems.

In October 1999, the Ministry of the Environment, with the co-operation of the UNEP and the Israeli organisation Maale (a member of the US commercial organisation Business for Social Responsibility) organised a conference on the subject Environmental Financial Risks and Opportunities, with the attendance of renowned members of the Israeli financial community, as well as representatives of financial institutions known the world over. The subject matter dealt with the risks of the environmental financial regulations, the management of environmental risk, environmental financial risks and opportunities, and environmental information and the capital market.

All these initiatives (conferences) elicited major interest in Israel's environmental and industrial communities, highlighting the importance of introducing certain environmental parameters into management and financial systems, and have helped pave the way towards CP in Israel.

6.9.2 Cleaner Production projects

In addition to the aforementioned activities, three other CP projects were recently approved.

In 1999, the Ministry for the Environment destined US$ 120,000 of its budget to give financial help to industries which develop and/or use technologies orientated towards the reduction of dangerous waste at plant level.

In September 1999, the U.S.-Israel Science and Technology Foundation issued a request for proposals to provide grants of 1.4 million US$, to U.S. and Israeli entities. These institutions have entered into a joint venture to carry out research and development and/or practices for the reduction and/or treatment of hazardous waste at source in the Ramat Hovav hazardous waste plant, Israel's sole site for the disposal and treatment of this type of waste. This project is carried out in co-operation with the U.S.-Israeli Science and Technology Commission, the Ministry of the Environment and the Ministry of Trade and Industry. The foundation was constituted in 1995 for the development of scientific and technological co-operation activities between the United States and Israel.

The financing is destined to projects that yield significant economic benefits for both countries (the United States and Israel): development, demonstrations and trade.

In December 1999, the Ministry of the Environment and the US-Israeli Science and Technology Commission issued a request for proposals to Israeli industry on improvements in the reduction of pollution and progress in the knowledge of industrial investment in order to optimise environmental quality as an economic benefit. The project will be carried out jointly by Israeli firms and American environmental consultancy firms and/or American consultancy firms working jointly with Israeli environmental consultancy firms. It will be centred on the preparation of studies. The proposals will relate to the environmental problems encountered by Israeli industry, including toxic waste, solid waste, energy, noise pollution, etc. The financial scope of the project is US$ 225,000.

All of the above-mentioned projects require matching funds by the participating industries.

6.10 Italy

With regard to pollution prevention, the ANPA (Italian Environmental Protection Agency) carries out studies on the application of technologies for waste exploitation, analysing the operation of plants (experimental and industrial) with new technologies.

In addition, ANPA, is promoting CP through the preparation of the second regional report on "CP in the Mediterranean Region", in co-operation with UNEP TIE and ECOMED, under the auspices of the Italian Ministry of the Environment and the City of Rome.

Italian Database for supporting Life-Cycle Assessment (I-LCA)

One of the methods that can be used for assessing innovative technologies and materials, is the Life-Cycle Assessment (I-LCA). The ANPA has developed a database in CD-ROM format (I-LCA) as support for the Life-Cycle Assessment, the objective of which is to give support to the Italian users of LCA: private companies, local governments, associations, consultancy firms and research institutes. The expected benefit will be an increase in the quality and the dissemination of LCA studies in Italy. The LCA is a voluntary instrument, nevertheless it is recommended in some European and national laws like the Council Regulation 880/92 (Ecolabel) or Italian Decree 22/97

The I-LCA contains an inventory of data on the main industrial and service processes carried out in Italy. The database is made up of about 700 modules, divided into four categories: materials and production processes, energy, transport and end of useful life matters. For each module, an inventory of the main environmental aspects, such as resource consumption, emissions and waste, is provided with additional information on the quality of the data and the data collection procedures. In this first release of the I-LCA, data is derived from the most important bibliographical sources in Europe, although the authors have already made some pertinent adaptations to Italian reality.

The main problems encountered during the implementation process were related to the data quality in the original sources. In certain cases, data is too much aggregated and the description of the system is not transparent enough. This fact sometimes causes difficulty in evaluating the suitability of the data to the Italian situation. In future releases of this tool, these problems will have been resolved.

6.11 Lebanon

The top priority matters on cleaner production to be developed and established are the integrated management of industrial waste and the furnishing of good incentives for cleaner production, through regular and formal audits carried out in the most polluting industrial sectors in Lebanon.

6.11.1 The Ministry of the Environment

Tools used by the Ministry of the Environment are:

- Specific design workshops (the most environmentally-friendly Pressing methods in Olive Oil Production, etc.)
- Environmental Audits.
- The Good Housekeeping Guide.

The objectives of these tools are:

- To classify the methods of treatment and elimination of pollutants.
- Suggest specifications, define standards and authorisation guidelines, the participation in the establishing of the Terms of Reference prepared by the related ministries in all aspects concerning pollution control, and the protection and safety of the environment.
- Specify the types of chemicals and pollutants, their effects on environmental and human health, and suggest the most appropriate recommendations and alternatives for applying cleaner production.

The level of implementation of these tools is low and limited due to the following:

- Outdated legislative texts, which do not have provisions that help meet modern and advanced industrial requirements and their implications.
- Misinterpretation of these texts.
- Insufficient internal control devices.
- Ineffective penal sanctions and corrective measures.
- Lack of financial instruments for sustainable development.
- Lack of national data on polluting enterprises.
- Overlapping authorities and responsibilities of the different ministries and stakeholders.
- Lack of pollution indicators and the monitoring of measurement equipment, and adequate laboratories.

The tools used are supported by law no. 216/93. This support will be further reinforced when the Code for the Environment is approved by the Lebanese Parliament.

Projects and studies/workshops

The Ministry of the Environment, with the UNDP – Capacity 21 programme, has launched projects and studies related to cleaner production, mainly relevant to the furrier sector and the olive oil industry. With respect to the latter, it has prepared and presented a project proposal on the "Waste Management in the Production of Olive Oil in Lebanon" to different agencies to seek financing.

The Regional Activity Centre for Cleaner Production (RAC/CP) reviewed the proposal and gave technical assistance to Lebanon for introducing the cleaner production options into the olive oil industry. To this effect, the Director of RAC/CP and the experts went to Lebanon, visited the olive oil presses, adopting different production processes, and held a seminar intended to introduce the alternative options for adopting a pressing process, which is more respectful with the environment.

This seminar was organised by the Ministry of the Environment and UNDP - Capacity 21 and involved private industrialists that worked in this field, the relevant NGOs, industrial co-operatives, and international organisations as well as representatives from all concerned ministries. The seminar was a forum open to recommendations relating to environmental problems inherent to the processing of olive oil, to establish contacts between all those involved, promoting adequate management.

The Ministry of the Environment is still seeking funds to implement the recommended activities of the project proposal, as it provides a comprehensive solution to this problem.

Environmental Audit

The Ministry of the Environment contacted "Envirotech", a regional consultancy firm, to carry out an environmental audit of a selected tannery, identifying the options for cleaner production and promoting financially sound, environmentally efficient operations.

The Ministry of the Environment held a seminar to present the results of the study to businesspeople in the private sector, working in this field, and to representatives of all ministries concerned. Contacts are still maintained with funding agencies in an attempt to mobilise resources to implement the recommendations of the study.

Good Housekeeping Practices

As part of the change in the behaviour of the private sector and the introduction of the concept of eco-efficiency and cleaner production, the Ministry of the Environment is encouraging the dissemination of the Good Housekeeping Practices Guide for the industries. This guide, developed by the German Agency for Technical co-operation (GTZ) and Sustainable Business Associates (SBA) of Switzerland, constitutes a management tool for small and medium-sized companies. It is comprised of checklists that help small and medium-sized companies to identify simple, practical, common-sense measures, which can be adopted to reduce production costs, enhance the overall productivity of the company and mitigate the environmental impact.

It is to be expected that this guide will improve financial efficiency and reduce industrial pollution in Lebanon, increasing its competitiveness and promoting environmentally sustainable development in the country.

The Ministry of the Environment and PNUD-Capacity 21, sponsor the publication of this guide, in co-operation with the Association of Lebanese Industries, and it was analysed and amended, thus being reconfigured as a specific guide for the country and, in addition, a strategy was publicly prepared for its launch, to increase the effectiveness of its dissemination and widespread distribution.

This activity was carried out at the same time as the participation in different seminars and workshops intended to present and launch it. A training session was held for the instructors, representatives of the different industrial trade unions, so that their subsequent contribution in applying this guide in similar industrial installations is expected. The Ministry of the Environment is also distributing it to the different industries of the municipalities that are adhered to the Pilot Project and Local Agenda. The Ministry is also working on the editing and printing of an Arabic version of this guide, in order to make it more accessible to all industrial sectors in Lebanon.

On the other hand, the Ministry of the Environment and the DELTA/SBA Network have reached an agreement to set up and implement a far-reaching programme to make this guide available to most industrial sectors in the country, and especially the private sector.

Dissemination of environmental information

It is carried out by means of general awareness campaigns (seminars, workshops, training, materials, etc.) and site visits. In addition, the Good Housekeeping Practices Guide distributed to Lebanese industries, is helping in divulging the concept of cleaner technologies.

The success of these projects is closely related to the involvement and commitment of the different Lebanese industrial sectors, together with the participation and contribution of local NGOs, which help raise public awareness of cleaner technologies.

From the financial point of view, the Lebanese Government and the international financial organisations, sponsor the pertinent projects, both jointly and individually. The main international sponsors are: the International Bank for Reconstruction and Development-World Bank, the European Union, and different agencies of the United Nations, operating in Lebanon.

The benefits of these tools are limited due to the low level of implementation and the absence of proper monitoring and enforcement tools which it is expected, will be imposed by other bodies and government ministries, among other factors.

Nevertheless, one should not ignore the awareness acquired by the industrialists through the "snowball effect", of the recommendations and practices suggested by the workshops held, and the Good Housekeeping Practices Guide.

6.11.2 Envirotech

The main tool Envirotech is using to promote Cleaner Production and to encourage its application, is the Industrial Facility Programme (IFP), which is a programme providing cleaner production options tailored to the needs of the selected facility.

The training aspects used by Envirotech are considered as a main tool or a mechanism for the dissemination of awareness, in this context. These training activities are usually financed by both public and private means, depending on which agency is contracting them.

The consultancy services provided by Envirotech cover the following fields:

- Environmental Impact Assessment, Environmental Monitoring and the Audit of Integrated Solid Waste Management.
- Hazardous Waste Management, including industrial and hospital waste.
- Management of Water Resources.
- Emergency Response Planning.
- Supervision of Construction Projects.
- Specialised design of environmental water management systems and wastewater treatment plants.
- Environmental and commercial studies.
- Energy audits.

6.11.3 The Industrial Facilities Programme (IFP)

This programme aims to introduce new environmental management practices into the industrial sector, intending to reduce waste discharges into water and to increase production efficiency.

A detailed IFP study is usually conducted to investigate the possible optimisation of production processes, the minimisation of waste at source and pollution prevention, safe housekeeping practices, the saving of raw and auxiliary materials, energy conversion and conservation, water conservation, recycling and reuse, treatment of effluents and emissions, occupational health and safety, and the possible replacement of hazardous raw materials with non-hazardous materials.

The programme is carried out with a view to minimising waste. It is usually centred on three aspects:

A detailed evaluation and environmental review of the facility, that includes:

- General conditions of the facility (process, operation, management, etc).
- Industrial operations and management.
- Water consumption patterns, quality, and alternative sources.
- Energy use: consumption patterns, efficiency of the combustion processes, losses, and reuse of heat/energy generated.
- Quantities and qualities of effluents (solid, gaseous, and liquid) from the different processes in the facility.
- Raw and auxiliary material inflows and outflows.
- Storage, internal circulation, handling, processing, labelling and packaging.
- Plant environment and matters related to workers' health (the ergonomic conditions of the work environment).

Provision of feasible solutions (technical and financial) that include:

- Waste minimisation and residuals management (wastewater treatment, solid waste management and air pollution control).
- Energy savings.
- Conservation programmes (for raw materials, feed water, etc).
- Re-engineering, when needed, to replace the hazardous raw materials with non-hazardous materials.
- Workers' health and safety.

Training, which is considered the main dissemination tool and includes:

- Technical staff training programme.
- Maintenance training programme.

- Emergency response training programme.
- Regular follow-up and advice.

6.11.4 DELTA Network

The main activities carried out by DELTA in Lebanon, may be summarised as follows:

- The promotion of the concept of eco-efficiency.
- Seminars/workshops on the role of the private sector in environmental development.
- Distribution of the Good Housekeeping Guide amongst the Lebanese companies.
- Training of instructors on the implementation of the Good Housekeeping Practices Guide.

6.12 Libya

Among the **high-priority matters** to be developed, the matters relating to water resources are still the most important in Libya, due to the scarcity of natural inland water sources. In addition, crude oil waste heavily pollutes seawater as well as de-ballasting waters dumped into the sea. Subsequently, the wellbeing of the public health, economy and environment, requires quick and serious action to introduce cleaner technologies into the industries located in the coastal areas. End-of-pipe technologies should be avoided, although they are known to reduce the damage, but to a lesser extent since they are devised mainly for short-term emergency solutions.

In the same context of improving the state of the environment in Libya, the following industries should be those of the highest concern when implementing CP within their manufacturing activities: cement, leather, chemicals, textiles, steel and petrochemical production.

Activities developed in this country and the areas of interest are the following:

- The restructuring of the public administration system in order to be able to fulfil the new environmental requirements and to increase the efficiency and competence of the socio-economic conditions.
- The devising of a strict authorisation mechanism to control the organisation of national development in all sectors.

- The creation of de-ballasting facilities in the crude oil export terminals, especially in Tobruk and Ras-naluf, to reduce the pollution in seawater.
- Use of TV and radio stations to launch campaigns to raise public awareness.
- Issuing annual reports on the state of the environment, addressed to the general population, to increase awareness.
- Involving active participation of NGOs in environmental activities and the necessary help in building their capabilities, allowing them to resume their functions effectively.

Below, a list shows some of the pertinent projects sponsored by the UNIDO, between 1984 and 1990.

- Assistance to the Secretariat of Strategic Industries for setting up a computer-aided design and drafting (CAD-D) unit, 1990.
- Technical Assistance to the General company for Chemical Industries, Abu Kammash Chemical Complex, Abu Kammash, (Libya) 1990.
- Study Tour on the Production and Processing of Leather and the Obtaining of the Comfar Programme, 1990.
- Technical assistance for the industrial sector, 1989.
- Technical assistance for the Libyan cement company, Benghazi, 1989.
- Assistance to the Oil Training and Qualifying Institute, Tripoli, 1987.
- Technical Assistance to the Fatayeh Cement Factory, Derna, 1986.
- Assistance to the General Pipe Company, Benghazi, 1984.

6.13 Malta

Due to the extremely limited resources of the Cleaner Technology Centre (CTC), it has decided that the main vehicle for achieving its objectives is information and training. For the past two years, it has been using the following methods:

- The creation of a small library of specialised printed and audio-visual material on CP and related subjects.
- Designing and publishing leaflets and posters explaining the CP concept.
- Co-operation with the Institute for the Promotion of Small Businesses by providing it with information about CP.
- Organising a series of lectures on the CP concept for University students of Commerce, Business Administration and Business Sciences.
- Organising a series of seminars and workshops targeting sectors of industry e.g. Metal Finishing, Refrigeration, Packaging, Tourism, Cons-

truction, Waste Disposal, etc. After each seminar, the CTC has tried to form work groups to maintain interest in the subject discussed. Although the initial response was good, interest tended to wane with time.

- Providing a limited free consultancy service for industries with pollution problems.
- Co-operating with the Malta Federation of Industry and the Environmental Protection Department to introduce an Eco management and Audit Scheme (EMAS).
- Conducting a study with the Planning Authority to identify hazardous and harmful industries operating in Malta.
- Carrying out a survey within industry to quantify the level of environmental protection awareness.
- Contacts with foreign organisations to exchange information on CP. Whenever any related information is supplied, it is subsequently distributed to local industry.

Due to its lack of resources, the CTC has been incapable of carrying out the pilot demonstration project, which would be essential for convincing industry of the need to adopt CP technologies, both from an environmental and from a financial point of view.

More specifically, the activities carried out by the CTC in Malta associated with CP have been:

CTC activities in 1994:

- 16th April: Engineering and the Environment Conference held by the Chamber of Professional Engineers, partly sponsored by the CTC
- 19th May: Official launching of the CTC during the 2nd conference on industry and the environment held in Malta, with the specific title: "Clean Technology – A Good Business Proposal"
- 15th July: One-day seminar on the subject "CFCs: What Future?"
- 9th September: Presentation of "Cleaner Technology" at the "EVAC Building Systems Seminar"
- 25th November: One-day seminar on the subject "Metal Finishing – Environmental Focus".

CTC activities in 1995:

- 30th January – 3rd February: Seminars on the general subject: "Energy Management" held in conjunction with the Institute for Energy Technology of the University of Malta.

- 31st January: Inaugural meeting for "Focal Points" in Industry on environmental matters.
- 23rd March: One-day seminar –"The construction Industry and the environment" (in conjunction with the Planning Authority)
- 25th October: One-day seminar –"Workshop on the National Programme for the Reduction of Ozone Layer Depleting Substances".
- 26th October: One-day Industry and Environment Conference –"Recycle, Reuse and Recover our Resources".
- 15th December: Seminar on Waste Disposal-New Regulations.

CTC activities in 1996:
- 21st March: One-day seminar "Packaging Waste – A Threat to the Environment?"
- 11th July: 4th Industry and Environment Conference – "Waste Management - Options?"
- 13th November: "Industrial Activity and Environmental Health" (in conjunction with the Ministry of Public Health).

CTC activities in 1997:
- 20th February: Joint organisation in launching the Malta Institute for Waste Management.
- 22nd April: One-day seminar –"Waste Management in Small Island States" (in conjunction with the Malta Institute of Waste Management).
- 10th September: One day seminar –"Our Ozone Layer – Its Science and Protection".
- 5th December: 5th Industry and Environment Conference – "Design for the Environment".

CTC activities in 1998:
- 5th June: Video Forum – "Dirt turns green – Its business aspects and the environment".

CTC activities in 1999:
- 16th September: Video Forum – "Let's save the sky – Let's be respectful to the ozone layer"
- 4th November: Scientific meeting: "Air pollution - Stratospheric and Tropospheric Ozone" (in conjunction with the Malta Chamber of Scientists).
- 8th December: 6th Industry and Environment Conference - "Environmental Law for Industry - Harmonisation with EU Regulations".

CTC activities in 2000 (up to May):
- 26th May: Seminars for SMEs: "Management of waste and energy in the chemical industry".

6.14 Morocco

Among the main resources intended to promote the use of cleaner technologies in Morocco, the following are noteworthy:

6.14.1 Technical resources

The performance of environmental audits

This is a voluntary, joint-effort programme set up in close co-operation with the different industrial sectors located in sensitive areas, such as the Sebou basin and the Casablanca-Mohammédia axis, the aim of which is to contribute to the assessment of the impact of its activity on the environment, as well as in defining the solutions that include the technical, financial and legislative aspects, to prevent and minimise pollution.

Within the framework of this programme, different pilot audits have been carried out in different business sectors such as the food industry, chemicals and related products, textiles and leather, mechanical, metal and electric. These audits have been centred on 10 companies on the Mohammedia-Casablanca axis, 12 leather tanneries in the industrial area of Dokkarat, 3 Boilermaking plants in Fez, oil refineries, sugar refineries, yeast factories and a paper industry located in the Sebou basin. As a result of these audits, consensual action plans have been prepared, directed at decontaminating these sensitive areas. Nevertheless, the audits carried out have only allowed for the obtaining of a partial knowledge of the present situation and the impact of the different types of industrial pollution in these areas.

The experience on the Casablanca-Mohammedia axis and the industrial area of Dokkarat, in Fez, constitute the first instance of this type of co-operation. From this experience, the 10 audited companies in the sensitive area of the Mohammedia-Casablanca axis, committed themselves by means of agreements to put into practice their own environmental action plans. This pilot study has also led to the preparation of a joint regional action plan in which the following priorities are established:

- Creation of a pre-treatment plant for industrial liquid waste.
- Control of air quality.
- Creation of a plant for recycling and eliminating hazardous and toxic industrial solid waste in the Casablanca-Mohammedia region.

- Creation of a collection plant for the recycling of the chrome generated by the leather tanneries in the industrial area of Dokkarat, in Fez.
- Preparation of good housekeeping practices manuals (projected).
- Creation of the Moroccan centre for cleaner production.
- Creation of a programme of ecological labelling (projected).

6.14.2 Training, information, rising awareness and communication

The organisation of workshops and trade fairs

Workshops have been organised for specific training in the field of technical resources in environmental management and, especially, on environmental audits and the ISO 14000 standards, intended for industry managers, managers in public administration, authorities and local collective bodies in the sensitive areas (Mohammedia-Casablanca axis and Sebou). The objectives of these workshops are to:

- Create awareness in business industry leaders of the interest and advantages of carrying out audits in environmental and financial matters.
- Inform the business industry leaders of the legislative framework that is being prepared.
- Give them training on the ISO 14000 certifications, EMAS, etc., and on the different rulings in environmental management, within and outside the company.
- Guarantee their market share and level of competitiveness.

With the objective of facilitating the implementation of cleaner technologies adapted to the Moroccan industrial context and the exchange of positive experiences in cleaner production matters, two trade fairs are being organised in Casablanca (one on protection of the environment and of the workers and another trade fair called Enviro-Maroc, held in June 1998 and March 1999, respectively).

At the same time as these trade fairs were taking place, workshops were organised with the aim of promoting economic, technical and financial cooperation between Morocco and Europe. The specific objectives were centred on:

- Assistance to companies in developing the appropriate management plans, allowing them to reduce their production costs, increase productivity and to minimise environmental impact.
- Inform the companies on the means of finance and investment available at a national, European and international level in the field of pollution prevention and control.

- Offer solutions to the problems of industrial pollution, the treatment of wastewater, the collection and treatment of hazardous and toxic industrial waste, hygiene and safety in the workplace.
- Encourage companies to express their point of view with respect to the integrated environmental protection policies within company management.
- Identify the business co-operation and investment opportunities in environmental matters and in good housekeeping management practices, within the company.

The organisation of study visits

With a view to taking advantage of other positive experiences in CP matters, and the objective of facilitating the adoption of cleaner technologies within the Moroccan industrial context, visits were organised to the industries belonging to the following industrial sectors:

- Attendance at meetings of experts at the Regional Activity Centre for Cleaner Production (RAC/CP) in Barcelona, held since December 1997, with representatives from the surface treatment, olive oil production, leather business sectors, etc.
- Visits by the representatives of the chemical and related business sectors of the Casablanca-Mohammedia area, within the framework of the Med – Branch programme for the promotion of integrated environmental management (1997/1998).
- Visits by representatives of the leather industry, within the framework of the programme to prevent and control the pollution generated by the tanneries at Dokkarat, called *"Durability of Moroccan Water Resources: pilot project for the prevention and control of pollution generated by the tanneries in the industrial area of Dokkarat"*, in Fez (1998).

Co-operation in some publications of RAC/CP (CPNews, MedClean) on the efforts being carried out by industry and organisations in Morocco in using cleaner technologies.

Organisation of the "DELTA" forum on the organisation of eco-efficiency in the Tenu Company, in Marrakech, in February 1998. The DELTA forum (Developing Environmental Leadership Towards Action) has led to the creation of national networks of companies in eco-efficiency matters within the countries of North Africa (Algeria, Morocco, Tunisia, Libya and Mauritania).

In this forum, almost twenty speakers, from the region and other countries, lectured on the actions and resources that lead to eco-efficiency, such as:

- The manual for good company management.
- The method for managing environmental costs.
- Environmental audits.

The forum also allowed for certain common directives to be highlighted, such as:

- Better application of the eco-efficient resources within the company.
- Improved dissemination of the information relating to ISO 14000, to the environmental management system of the European Union (EMAS), and on ecological labelling
- A will to develop a co-operative framework between the State and the companies.

6.14.3 Delta Morocco

An environmental committee was created to give support and carry out the follow-up on the different phases of the action plan for the network of companies "DELTA Morocco". This Committee held a meeting in December 1998, with the Swiss association, Sustainable Business Associates (SBA) to debate the guidelines of the DELTA action plan, which covered the following actions:

- The organisation of a national seminar on eco-efficiency in Casablanca on the 4th and 5th June 1999, preceded by a test of the good environmental management manual in three companies, the results of which were presented during the seminar.
- The programming of training sessions for instructors on good company management matters. This group of experts (formed by a selection of 20-25 managers, from different Professional Associations from industry sectors, Chambers of Commerce, industrial and service sectors, the Ministry of Industry, the Ministry of the Environment, companies, project offices, etc.) would have as a mission the giving of support to companies willing to put into practice the manual on good company management.
- The organisation of a broad scope national campaign to diffuse the manual and its application in the business environment (being prepared).
- The organisation of a German - Moroccan professional co-operation meeting for the firms of consultancy engineers, held on the 7th and 8th February 2000 in Casablanca, with the objective of strengthening co-operation between Germany and Morocco in the field of environmental engineering. From this meeting, different firms of German advisory engineers established contact with specialised Moroccan technicians in environ-

mental matters and related infrastructure, for the treatment of wastewater, the management of waste, the fight against air pollution and the development of renewable energy sources.

6.14.4 Economic, financial and incentive instruments

The fund for industrial decontamination (FODEP) is responsible for financing the decontamination projects and the application of clean technologies, subsidising up to 80% of the project cost. This fund was created to give support to industry in adopting preventive action plans and in fighting against industrial pollution and ensuring respect for the maximum values established for the business sector. It consists of two main financial incentive mechanisms: grants and long-term loans. On the other hand, contacts are currently being maintained with other lenders in order to fund the FODEP and make it available to industry.

Eight companies (see the table below) have already benefited from the help of the FODEP, with the following objectives:

- Integrated projects in the production process for reducing pollution, water and energy consumption, and in adopting non-polluting technologies.
- Projects for improving the production process with the intention of reducing pollution, by the adoption of a system for treating and eliminating liquid, solid or gaseous waste.

Table 1: Companies benefiting from the FODEP

Company	Activity	Project Type	Project cost-(Dirhams)	Financial and environmental benefits
Lesie ur-Crist al	Edible oils and soaps	Study and construction of a treatment plant for wastewater by means of active sludge.	13,101,905	Compliance with the specific liquid waste legislation for the business sector.
Lever Maroc	Detergents and margarines	Installation of a sleeve filter in the main chimney of the factory to reduce dust emissions.	4,547,562	1. Reduce the loss in raw materials. 2. Compliance with the legislation for atmospheric emissions.
Fonderie et aciérie du Maroc	Fundry of metallic parts and scrap	Thermal regeneration of sand (the amount of sand polluted with heavy metal is approx. 2,000 t/year).	3,038,200	1. Gains in foreign currency on the import of sand. 2. Reduction of the environmental impact. 3. Reuse of treated sand.
Ciment du Maroc	Cement	Installation of a 4th field of electric filters.	1,997,160	1. Reduction of cement losses. 2. Compliance with the legislation for atmospheric emissions (50 mg/l).
CIMAR Marrakech	Cement	Installation of a 3rd field of electric filters and a sleeve filter.	8,203,524	1. Reduction of cement losses. 2. Compliance with the legislation for atmospheric emissions (50 mg/l).
LAFARGE	Cement	Installation of a sleeve filter.		1. Reduction of cement losses. 2. Compliance with the legislation for atmospheric emissions (50 mg/l).
Agrid evco	Olive preserves	Study and installation of a treatment plant for wastewater by means of evaporation tanks.	631,750	Compliance with the liquid waste legislation specific to the business sector.
Betomar	Quarry	Installation of a sleeve filter.	1,047,087.5	1. Reduction of cement losses. 2. Compliance with the legislation for atmospheric emissions (50 mg/l).

Source: FODEP Management Body (State Secretariat for the Environment).

In the case of certain equipment, exemption from customs duty is considered and/or a tax deduction for the corresponding investment codes.

6.15 Slovenia

The agents responsible for CP in this country have carried out the following activities:

6.15.1 Chamber of Commerce and Industry of Slovenia

Slovenia maintains a dialogue between industry and the government, as well as with the industrial sector on control measures, before these are adopted by the government or the ministries.

Slovenia also intends to create a database on the environmental soundness of its industry and of those businesses that already have the ISO 14000 Certification or those that have introduced CP or the Best Available Technology (BAT), and to promote its business sector through the internet, publications, workshops, etc. The Chamber of Commerce has already started its activities inside industry, so that it will be prepared for the transposition of the IPPC Directive (introduction of the BAT).

6.15.2 Environmental Development Fund of the Republic of Slovenia (Eco Fund)

Since 1995, and on an annual basis, the "Eco Fund" has presented proposals for local infrastructure project loans, granted to municipalities or public utility companies.

The funding is intended for:

- The substitution of the drinking water supply, due to the contamination of the water supply.
- Municipal wastewater and rainwater drainage and treatment.
- Municipal wastewater treatment.
- Public sanitation and cleaning of public areas.
- Public roads, pedestrian areas and lawn maintenance projects.
- Inspection, control and cleanliness of the fire fighting systems, smoke ducts and air vents for controlling atmospheric pollution.
- District heating system, using biomass as an energy source.
- Gas or hot water distribution systems.

- The purchase of urban and suburban public transport vehicles with air and noise emission levels lower than those defined by EU directives.

Similarly, loans are offered to private enterprise (industries). The target investments for industry are environmental protection equipment (end-of-pipe technology), technologies and products that respect the environment, (preferably the BAT) and the development of environmental recovery programmes.

On the other hand, in co-operation with the Chamber of Commerce and Industry of Slovenia and the Ministry of the Environment and Territorial Planning, the Eco Fund was involved in the implementation of the Ozone-Depleting Substances Phase-out Project in Slovenia.

The purpose of the project was to help companies upgrade their technological processes so as to phase out ozone-depleting substances from their production.

Eco Fund was designated as the financial mediator. To help implement the project, a contract was signed between the Republic of Slovenia and the World Bank-IBRD in November 1995, to allocate approximately SIT 1.023 billion (nearly US$ 6 million) in grant funding from the Global Environment Facility Trust Fund (GETF).

The project was successfully completed in June 1998, but the efforts to protect the ozone layer did not finish there. Thanks to the help granted by the Ministry of the Environment and Territorial Planning, the Chamber of Commerce and Industry of Slovenia and the Eco Fund, the company LTH Skofja Loka decided to take part in a project to set up a collection centre for coolant regeneration and recovery that could cover the needs of the entire Slovene territory.

6.15.3 Environmental Management Systems Activities, ISO 14001 and ecological labelling

The ISO 14001 certification has already been granted to 34 companies, belonging to different business sectors (chemical, metal, electronics, electric, etc.). Some 50 companies are preparing to introduce the environmental management system and they have developed products that fulfil the criteria of the ecological label (for example, the EU ecological label and the German blue angel), exporting products that comply with the criteria of the EU.

6.16 Spain

The activities and tools developed in Spain are:

6.16.1 The Centre per a l'Empresa i el Medi Ambient (CEMA)

With the objective of promoting the adoption of cleaner and environmentally efficient production practices and technologies by companies, the CEMA has carried out different activities and has developed instruments which are available to companies and have been extended as the companies needed increasing support and advisory services.

As recognition of the work carried out, on October 3rd, 2000, the centre was awarded the "III Prize Company and Environment" within the "*Best Public Support Initiative for Companies*". These prizes were awarded by the economic newspaper "Expansión", the consultancy group Garrigues-Andersen and the Instituto de Estudios Superiores de la Empresa (IESE) and were given by the Minister of the Environment.

Among the activities and tools of the CEMA worth noting, are:

Dissemination actions

From the beginning of its activity, the CEMA has participated in over 160 training courses, conferences and presentations, with more than 45 appearances in the press and other media, with the objective of promoting pollution prevention at source and stimulating ecologically efficient activities in companies.

Publications

As well as making available the website http://www.cema-sa.org, publishing articles in technical and business magazines and publishing a presentation brochure on the Centre, the CEMA prepares and distributes Cleaner Production case studies with actual examples of industrial companies in Catalonia that, through the adoption of technically and economically viable, organisational and operational measures, have achieved a reduction in the quantity and/or the hazardousness of their industrial waste, the pollutant load discharged, etc. Up until now it has published 56 case studies, which are distributed free of charge to companies and institutions. It is interesting to note the demand and use that is made of these in training activities, university faculties, etc.

With regard to specific publications, the CEMA has published the Guide and the leaflet on the Minimisation Opportunities Environmental Diagnosis

(MOED), the Manual on the Design and Development of a Programme for Good Housekeeping Practices within the company and the procedures of the 2nd International Conference on Waste Minimisation and Cleaner Production. At present, the CEMA is extending these specific publications with studies and leaflets on pollution prevention in various industrial sectors.

The Minimisation Opportunities Environmental Diagnosis (MOED)

The MOED is a tool available to companies which consists in an assessment, carried out by an expert, of an industrial activity or process to determine the possible opportunities for preventing and reducing pollution at source within a technical and economically viable framework.

Up until now, more than 300 MOEDs have been carried out by independent experts, chosen by mutual agreement between the company and the CEMA, under the management and supervision of the technical team of the CEMA.

Work groups

Work Groups are a tool that allows for the study of alternatives for reducing pollution at source in an industrial sector or geographic area, based on the preparation of individual MOEDs in each company and the holding of regular meetings to deal with specific pollution prevention matters.

Up until now 8 work groups have been set up with 61 participant companies from business sectors such as the treatment of surfaces, textiles, paints, printing and metallurgy.

Databases

With the aim of offering its service and support to companies, the CEMA has developed a database of cleaner technologies and a database of possible CP experts suppliers of environmental goods and services for providing a cleaner production environment.

Studies

Upon request from the different units of the Ministry of the Environment of the Government of Catalonia, the CEMA carries out studies in different fields relating to cleaner technology.

Pilot campaigns and demonstration projects

Regarding pilot projects, the CEMA has co-ordinated, together with the Directorate General for Environmental Planning of the Ministry of the Environment of the Government of Catalonia, the carrying out of a Pilot Programme on Good Housekeeping Practices, with the objective of testing the Good Housekeeping Practices training materials and subsequently be able to apply them in the rest of the interested companies. At present, the Good Housekeeping Practices Programme is being distributed throughout the Catalan industrial sector.

In addition, the Centre has promoted different demonstration projects such as: substitution of dry cleaning with solvents, by a water-based system, a system for recycling at source in the process stages of aluminium anodisation, cleaner technologies in the leather tanning sector (within the framework of a LIFE project of the EU), etc.

Information and advisory service to companies and institutions

The CEMA answers technical inquiries, on the prevention and reduction of pollution at source, on fiscal help, etc. from industries, goods and services providers, institutions, universities, etc.

Support to other units of the Ministry of the Environment of the Government of Catalonia

The CEMA supports other units by carrying out regular, timely tasks, such as: the technical assessment of grants, tax deductions in aspects related to pollution prevention at source, co-operating with the Waste Agency in preparing the Programme for Industrial Waste Management of Catalonia (2001-2008), etc.

Promotion and signing of agreements with industrial sectors to promote environmental improvements

The CEMA promotes the signing of agreements between the Ministry of the Environment of the Government of Catalonia and the Catalan industrial sectors and it is empowered to sign agreements with Catalan industrial companies and sectors in order to promote improvements in these industries.

International Activities

For the carrying out of activities outside Catalonia, in addition to the activities carried out by the CEMA due to its status as the RAC/CP, the CEMA

maintains contact with environmental institutions (research centres, Administrations, etc.) to exchange information and participate in projects of common interest.

As an example, the CEMA co-operates with different countries of South America through co-operation agreements and has given advice to candidate countries wishing to join the European Union on their environmental obligations and on the best method for adapting to them.

With regard to international projects, amongst others, the CEMA has participated in the MADAME Project, which is a co-operative project between Sweden and Catalonia for developing an expert system for assessing the environmental impact of surface treatment processes and the LIFE Project of the EU MedDelta 2000 Eco-efficiency in companies, the aim of which is to promote eco-efficiency in the countries of the Maghreb and Machrek.

6.16.2 The Regional Activity Centre for Cleaner Production (RAC/CP)

The activities developed by the RAC/CP are proposed twice a year, during the meetings of the National Focal Points of the RAC/CP. These proposals are submitted for approval to the Contracting Parties of the Barcelona Convention and the Bilateral Follow-up Commission, which is integrated by representatives of the Spanish and Catalan governments. Once approved, the Spanish Ministry of the Environment (MIMAM) finances the activities carried out by the RAC/CP.

Tools used by RAC/CP to promote CP, are the following:

Informative actions

The RAC/CP has participated in over 40 meetings, training workshops, seminars, etc. following requests by the institutions and organisms of the countries in the Mediterranean Action Plan to promote pollution prevention in the Mediterranean industries.

Publications

In addition to having the website http://www.cema-sa.org and publishing articles in Mediterranean magazines (Cleaner Production in the Mediterranean Region-ECOMED/UNEP, MEDWAVES-Co-ordinating Unit of the Mediterranean Action Plan, Cleaner Production; Industry and Environment-UNEP) and publishing the information brochure of the centre, the RAC/CP publishes a series of publications, some of them on a regular basis:

CPNews: general news bulletin on cleaner production topics in the MAP countries. It is published in English and French and is distributed free of charge to the National Focal Points (NFP) and environmental institutions in the Region. So far, 9 CPNews bulletins have been published.

MedClean: real case studies of pollution prevention in the Mediterranean industries. They are published in Spanish, English and French and distributed to the NFP and the Mediterranean institutions. So far, 32 MedClean case studies have been published.

Videos and leaflets: the RAC/CP has issued two videos in Spanish, English and French: on the prevention of pollution in olive oil production and the prevention of pollution in the surface treatment industry, as well as leaflets on these sectors and on the food canning sector. A leaflet on the MOED has also been published in English, Spanish, French and Arabic.

Annual technical publication: information exchange system between Mediterranean experts with technical articles related to industry and pollution prevention at source in the countries of the Mediterranean Action Plan.

Studies

The RAC/CP publishes studies in several languages (English, Spanish, French) available in paper copy and on CD-ROM and intended for experts and industrial managers with the objective of presenting pollution protection opportunities that may be implemented in Mediterranean industries. These studies are a support tool for companies in the decision-making process when adopting environmental criteria in their business management. Examples are the studies carried out in the surface treatment sector, olive oil production, food canning industry and the possibilities for recycling and re-use of used oils.

In addition to the studies, the RAC/CP has also published manuals and guides such as the Minimisation Opportunities Environmental Diagnosis Guide (in English, Spanish, French and Arabic) and the Manual for the Implementation of a Good Housekeeping Practice Programme in Industry.

Database

With the aim of making the Mediterranean experts who work on cleaner production matters available to institutions and international organisms, the RAC/CP has prepared a database with the following information: training, speciality, experience, etc. from more than 100 experts.

Meetings of National Focal Points (NFP), Meetings of Experts and Training Workshops

As has been mentioned before, and with the aim of proposing activities to be carried out by the RAC/CP, this entity organises meetings of the NFP twice a year. In addition, it organises meetings between Mediterranean experts in which experiences and information are exchanged on opportunities for preventing pollution in industry. For example, it has held meetings on the surface treatment, leather tanning, olive oil production and food canning sectors. In the training workshops organised by the RAC/CP, the methods and practical case studies of MOED, have been presented. The centre has also organised other meetings within the framework of the Mediterranean Action Plan and the Mediterranean Commission for Sustainable Development.

Projects

The RAC/CP prepares projects in co-operation with other Mediterranean institutions with the aim of enabling initiatives aimed at preventing pollution at source, in Mediterranean industry. One example is the GEF Project associated with the LBS Protocol, which is co-ordinated by MEDPOL within the framework of the MAP. In addition, the RAC/CP offers support, an advisory service and participates in the projects related to cleaner production, proposed by the countries of the MAP.

6.16.3 The IHOBE

The IHOBE participates in different CP activities in the Basque Country, which are summarised below:

- Direct management of special waste.
- The solving of high priority cases of soil pollution.
- Preventing the generation of new polluted soil in the Basque Country.
- CP industrial projects: IHOBE is responsible for promoting the introduction of CP policy in Basque industry. To this effect, the agency carries out the following activities:
    - Research in its own laboratories to process environmental problems that are specific to the region.
    - Know-how transfer through the Documentation Service. This activity is carried out through co-operation agreements with associations, universities, etc. and through regular publications distributed in business sectors (Orekan).
    - The direct management of waste.

IHOBE owns part of the share capital of the private company Recypilas, which provides solutions to specific environmental problems arising in the Basque Country from new and used batteries.

The tools used by the IHOBE are the following:

CP Orientation

The IHOBE offers companies practical guidance on the reduction of waste and financial savings, with a view to:

- Pollution prevention.
- Improvement of working conditions.
- Increased economic profits.
- The obtaining of a greater competitive edge.

Over 200 CP experiences have been undertaken in different sectors of Basque industry.

Support tool for environmental management within Basque industries

IHOBE activates and promotes environmental management within Basque industries. The services it renders are:

- "Talde ISO 14": The implementation of ISO 14001 in groups of companies.
- "Ekosean": continued environmental enhancement in small and medium-sized companies.
- Environmental Indicators Bank: the creation of environmental yardsticks.
- Environmental management workshops.

Basque companies have the opportunity of applying these proven, highly-effective products through the "Promotional Programme of Environmental Management".

IHOBE Line 900 15 08 64 answers environmental questions

This toll-free service for Basque companies offers:

- Up-to-date information on regulations, cleaner technologies, subsidies, waste minimisation, etc.
- Practical recommendations on environmental problems specific to a particular company.

- Technical publications of interest, including the free Bulletin: OREKAN which offers the latest news on CP.
- Experts for small and medium-sized companies.

On the Net

Thanks to the work done through the Net, IHOBE provides Basque companies, mainly small and medium-sized companies, with:

- Optimal environmental experiences of European companies.
- Individual or multi-sector technical newsgroups.
- A network for technological co-operation.
- Direct co-operation with industrial associations or organisations.

High priority CP issues to be developed:

- Promotional control elements.
- Improved inspection policy.
- Definition of BAT.
- Innovation based on efficient and cleaner technologies.

6.16.4 Other agents

As was explained in chapter IV, there are agents within the Autonomous Communities that carry out activities for promoting CP, as part of their task of protecting the environment.

Examples of the tools and activities destined to promote CP and environmental protection used by these agents are:

- The creation of labelling systems (such as the Environmental Quality Guarantee Logo for Products and Services of Catalonia). On the one hand, the label provides consumers and users with greater and more reliable information and, on the other, it promotes the design, production, marketing, use and consumption of products and services, which surpass by far the minimum standards established by current legislation.
- Environmental education and awareness campaigns, for example, for promoting the adoption of good housekeeping practices.
- Systems for the exchange of by-products between companies, to promote reuse and recycling. In some Autonomous Communities, this waste exchange operates through a system of totally confidential advertisements, so that the identity of the companies will never be made public to the authorities.

- Grants for the adoption of cleaner technologies and the implementation of environmental management systems
- Technical seminars on the minimisation of waste and the implementation of environmental management systems.

6.17 Syria

Among the top-priority key matters to be developed, the raising of awareness and the transfer of technology and experience to the entire Syrian industrial sector is recommended. It is to be expected that the technological modernisation will bring environmental dividends and also improve commercial productivity and the working environment.

6.17.1 Ministry of the Environment

Below, some of the initiatives included in the CP concept, are presented.

- The carrying out of several environmental audits in different industrial activities and proposing pollution prevention and control measures such as for tanneries in Damascus, tanneries in Aleppo, Adra Cement Factory in Damascus, the textile industry in Syria, the fertiliser plant in Homs.
- Reduction and the end of the use of CFCs in Syria.
- Preparing the EIA procedures and manuals for eight main Syrian industries (cement, textiles, waste treatment plants, iron processing, food processing, petroleum and refineries).
- The consolidation of the co-operation with the Chamber of Industry in Damascus through the following activities:
    - Holding a workshop on industry and the environment.
    - Introducing the concept of eco-efficiency into Syria through the DELTA Network through which industrialists may obtain information, experiences and tools that may offer "win-win" options. Two workshops were organised in Damascus on Good Housekeeping practices.
- The application of the IPPC module programme, which includes the carrying out of a study on the existing industries in Syria and has resulted in a database in each of the environmental directorates.
- The proposal of an Environmental action plan for Syria that offers many projects and proposals to improve environmental quality and stop degradation and pollution.

The Government has also managed other related projects, with different levels of importance and implementation. These projects, as illustrated in the Country Profile published in 1997, are:

Project	Level of importance	Level of implementation
Prior environmental impact assessment study, systematic observation, and follow-up of the main projects in coastal areas	High	Poorly covered
Promoting cleaner technologies and sustainable practices in marine and coastal areas	High	Not covered
Primary treatment of municipal sewage discharges into rivers, estuaries and the sea	High	Well covered
Regulating and monitoring programmes to control effluent discharge	Very important	Well covered
Promoting risk and EIAs to help ensure an acceptable level of environmental quality	High	Well covered
Steps and procedures to eliminate emissions of organohalogen compounds into the marine environment	High	Not covered
Promoting the use of environmentally less harmful pesticides and fertilisers and alternative methods for pest control	High	Poorly covered

6.17.2 Syrian Environmental Technologies (SET-Envirotech Syria)

The major tools Envirotech is using to promote Cleaner Production and to encourage its application is the Industrial Facility Programme (IFP), which is a programme providing cleaner production options tailored to the needs of the selected facility. The IFP intends to introduce new practices in environmental management into the industrial sector, aimed at reducing waste flows and increasing the efficiency of production.

Planned activities in Syria

- Introducing the concept of Good Housekeeping Practices to industrialists in all Syrian Directorates in co-operation with the DELTA Network, operating regionally. There is a proposal to implement the Good Housekeeping Practices in 10 selected industries in Damascus.
- Regular follow-up of current activities concerned with cleaner production, especially those related to close monitoring and supervision of heavy industries. According to information provided by the Basle Convention Secretariat (1996), no accidents have occurred in Syria due to the transfer or disposal of hazardous waste. Syria has proposed the establishment of a regional Centre for Training and Technology Transfer in Egypt so that expertise can be shared among member countries in the region.

Co-operation with UNIDO, which has resulted in several different projects where the total investments reached more than US$ 4 million. Among these projects, the following are noteworthy:

- Progressive elimination of CFC-11 in Walid and Nabil Rankousi, Ltd., in 1997 and progressive elimination of DDF-AA in Abdul Karim Sbei, 1997.
- High-Level Technical Advisory Service to introduce a Pharmaceutical Quality-Management System into the Pharmaceutical Industry, 1996 and Urgent High-Level Consultancy for establishing an Agrochemical Formulation Plant in Syria, 1996.
- Phasing out of CFC-11 at the Dakkak Company Flexible Polyurethane Foam Plant, 1996.
- Preparation of an investment project for the aerosol business, 1996.
- Assistance in modernising the national metrology calibration system, 1995 and the preparation for the phasing out of CFC-11 in the manufacturing of refrigerators at Karayem Int. Co. 1995.
- Study of industrial policies/strategies, 1994.
- Preparation of Investment Project Proposals to phase out CFC-11 and CFC-12 from the Domestic Refrigerator Industry, 1993.
- Technical Consultancy for the General Company for Printing Industries, 1992.
- Preparatory Assistance in the treatment of tannery waste in the Zablatani-Damascus Industrial Area, 1992.

6.18 Tunisia

In Tunisia the Promotion Programme for Environmental Management in Companies is being applied to seven small and medium-sized companies in the textile, chemical, building materials, leather, porcelain and printing plant industries, where studies are being carried out to identify the needs of the companies (technological and management techniques) for adopting the EMAS.

On the other hand, and under the activities planned by the National Capacity Building for Cleaner Production Programme, 12 days were assigned to capacity building, 3 workshops and 23 days were destined to practical applications in 11 different industries. A seminar was subsequently scheduled to make the results and recommendations of the workshops known.

In addition, Tunisia is a member country of the DELTA Network. Nevertheless, the activities and practices prepared by DELTA, relating to the concept of cleaner production and eco-efficiency, are not widespread among Tunisian industries yet. Consequently, great efforts should be made to introduce the Good Housekeeping Guide and for its implementation.

Tools applied in Tunisia

The tools for applying CP in Tunisia are the environmental management systems (currently being developed for SMEs), environmental diagnoses, workgroups, ecological labelling, life-cycle analysis, Environmental Impact Assessment, The Industrial Pollution Fund (FODEP) and associations, especially with internationally experienced entities.

The tools pertaining to the use of best available technologies and clean technologies are diversified. However, there are some initiatives and encouraging incentives from the Tunisian Government to improve these practices, such as the importing, validation and activation of new technologies that are environmentally friendly.

The application of cleaner technologies is promoted by the Ministry of the Environment, which gives awards to companies that respect the applicable rules. This compliance is usually verified in enterprises by staff appointed by the National Agency for the Protection of the Environment.

6.18.1 Tools used to disseminate CP

The tools used to disseminate CP are publications and other means of oral dissemination such as training courses, workshops, seminars, etc.

6.18.2 Tools used for the application/promotion of CP

- The International Centre for Environmental Technologies of Tunisia (CITET) assists industries and guides them in adopting the practices of cleaner production.
- The Industrial Pollution Fund (FODEP) is a financial tool with the objective of:
    - Assisting industrialists in investing in equipment and processes aimed at reducing or eliminating pollution resulting from their industrial activities.
    - Encourage entrepreneurs to create waste collection and recycling units on their premises.

      FODEP provides up to 20% of the equipment costs. Another 50% may be secured by bank loans designed for environmentally safe activities.
- Three years ago, Tunisia started a rehabilitation programme designed for small and medium-sized companies, with a view to opening up towards the European market. This programme consists of providing assistance for establishing environmental management programmes on the premises of these enterprises (EMAS and ISO 14000).

6.19 Turkey

The main tools used to promote Cleaner Production are the carrying out of environmental diagnoses, non-financial incentives (such as awards for improving the image of the company) and technical advisory services.

The application of CP through environmental diagnoses is very common in different industries especially large and multinational companies. These diagnoses are paid for by the companies and are not carried out as a result of a promotion by an organisation. The main reason the majority of these plants wish to apply CP is the pressure exerted by clients and the work carried out to establish their environmental management system and obtain ISO 14001 certification. There is no organised approach to its application in small and medium-sized companies.

6.19.1 The Marmara Research Centre (MRC-TUBITAK)

MRC has been involved in numerous international R&D projects carried out together with various industrial companies, universities and institutes. Many

projects are also supported by international organisations such as UNESCO, UNIDO, NATO, the World Bank, etc.

There are several modes of co-operation with the Institutes at MRC. A contract in a specific project is straightforward, based on a well-defined work plan, deadlines, management guidelines and a budget. Another partnership arrangement would be a consortium where MRC and a foreign industrial entity would bid for a project.

A more permanent arrangement could be the formation of a joint venture between an industrial entity and either MRC-TUBITAK or the Foundation for Scientific and Technological Research.

In July 1997, a two-year project to promote the application of CP in textile manufacturing plants was started.

During the project "Promotion of CP in the Turkish Textile Industry", the Danish Technological Institute was chosen as the consultancy firm to give training to the scientists of MRC-TUBITAK and co-operate in the projects to introduce Cleaner Production into the textile industry. They also helped in making it possible for MRC-TUBITAK to establish the mechanisms and main services for introducing CP into the textile industry.

Eight CP experts from the Textile Institute and one senior expert from the Energy Systems and Environmental Research Institute were trained on the job by the Danish consultants applying the CP assessment in 6 textile-manufacturing plants. The project group for each plant was made up of 3 experts: one Project Manager with expertise in cleaner production from the Technical Institute, one employee from the technical staff of the plant and an expert on CP from the Danish Technological Institute.

The project was financed by the World Bank, with a contribution of US$ 1.2 million and US$ 1.4 million from the State budget.

The prioritised CP alternatives in the textile industry can be summarised as follows:

- The reduction of water consumption in the regeneration processes.
- Recovery of heat from effluents, which is directly drawn off the boiler in the plant for treating wastewater.
- Reuse of treated wastewater in certain processes, such as the pre-washing of printing screens etc.

6.19.2 *Textile Institute*

Main Fields

- To apply CP technologies in the textile sector.
- The approval of a certification system through eko-tex laboratory accreditation that establishes compliance with EN 45000.
- The organising of scientific and technical meetings such as symposia, seminars, congresses, conferences and workshops on subjects falling within the scope of the Institute's fields of activity and the publishing of these works.
- The carrying out of studies on matters required by the companies and organisations in the relevant sectors, determining high-priority matters, from the point of view of the type of processes, relating to the needs of Turkey and the international situation, with the objective of improving products, processes, methods and existing systems in industry in compliance with national and international standards and rules.
- Development of analytical methods in compliance with national and international standards for the characteristics of the products involved, the carrying out of these analyses and the forming of a network with a view to fulfilling the needs for analysis of the organisations and businesses active in the relevant sector, by determining the other institutions and organisations with sufficient capacity to conduct such analyses.
- Giving help in the implementation of the results of the investigations carried out on products and technologies that are respectful with the environment in the relevant business sectors and keeping industry informed.

Current Strategy

According to the working areas mentioned above, current strategies are given below.

- To carry out quality control, performance and environmental tests and analyses based on the sectors' needs
- From the project carried out with the financing obtained from the TDF and the World Bank:
    - To introduce and disseminate cleaner production technologies.
    - To set up a central laboratory with modern equipment and specialised technicians, to analyse the control parameters of raw materials, production processes and products so that the end products comply with international environmental and quality standards.

  - To obtain accreditation for this laboratory and create a laboratory to provide certification that complies with international standards.
- To organise symposia, seminars, congresses, conferences and workshops on subjects falling within the scope of the Institute's fields of activity.
- To set up this kind of laboratory at the different textile industry centres.

6.19.3 Istanbul Chamber of Industry and Chemical Manufacturers Association

They act jointly in environmental matters, among which the promotion of CP is included in their annual programme, by the awarding of prizes to the best environmental action including CP. This committee evaluates the applications and chooses 3-4 companies, which are awarded a medal. This prize gives marketing points and has been awarded for 5 years.

6.20 Conclusions

Although not all countries have implemented CP to the same degree, it would seem that they are all actively working on incorporating the concepts of pollution prevention and eco-efficiency into their industries.

The tools used in virtually all countries by the agents responsible for CP, are the dissemination of CP by organising conferences and through non-presence instruments, such as publications and web pages, and the capacity building of those responsible for CP in the administrative bodies and companies through training courses and practical workshops.

The majority of the countries also help companies introduce CP into their environmental management by preparing Guides for Good Housekeeping and Environmental Management (ISO 14000 and EMAS) and giving technical assistance for correct implementation.

In some countries diagnoses and audits of the industrial sectors are carried out, as well as pilot and demonstration projects in specific companies, to detect the opportunities for pollution prevention and to be able to apply them to all the companies of the country, developing specific in financial tools for the implementation of CP (for example: ECOFUND, FODEP), which allow companies to be helped in acquiring new equipment and processes.

For both the carrying out of diagnoses, and the creation of financial funding, this often depends on the help of international institutions.

From the information given in this chapter it can be seen that, without a doubt, it is essential to demonstrate the economic and competitive benefits that the implementation of CP brings with it in industry, to be successfully developed.

In fact, the large companies mainly, have implemented environmental management and cleaner technologies systems without needing the Administration to promote these practices.

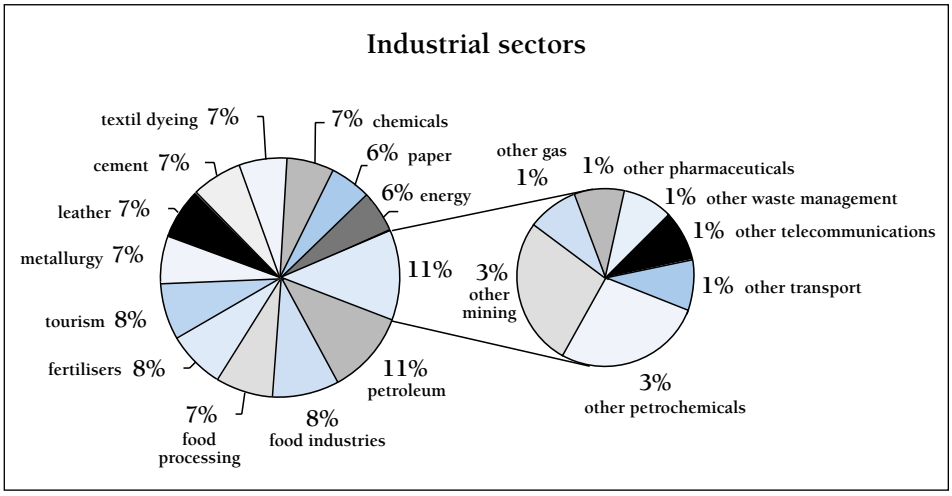
7. Conclusions

The Mediterranean region is characterised by heterogeneity, contrast and limited natural resources. The countries around the Mediterranean coastline have different levels of development and also diverse environmental characteristics (climate, water shortages, etc.).

The industrial structure is likewise heterogeneous in terms of sectors and size of enterprise. The sectors stretch from extraction activities, iron and steel, cement works and petrochemicals to agricultural activities, leather, paper and agribusiness. At the same time, within this diversity there are large, mostly public enterprises side by side with micro, family or traditional craft businesses that in many cases do not use very modern production methods.

Industry frequently coexists with tourism along the coastal areas of the region, together with coastal overpopulation and proximity to large cities. Industry is even frequently located within the actual urban nuclei.

All of these factors, and this situation in general, mean that industrial activities need to be carried out in a way that respects the environment.



The conclusions of this report are based on five analytical axes that have been extracted from the study and appraisal of the preceding chapters:

1. Awareness, information and capacity building.
2. The setting up of institutions and plans.
3. The reinforcement of the legal framework.
4. CP tools at the service of enterprises.
5. The availability of economic instruments.

A series of categories have been defined for each of these axes according to the level of the different MAP countries. The same country can sometimes find itself in various categories of one specific axis simultaneously.

Data for the analysis of the level of CP implementation in the region are not available for all of the MAP countries. The values that are given for each category may therefore not be exact. Nevertheless, these data do serve as a starting point for establishing a definition of some indicators of the state of CP in the MAP countries that will enable the results of this study to be systematised and monitored in a semi-quantitative way.

Establishing these indicators will also provide conclusions that correspond more with the facts, for here they have been made according to information that is sometimes insufficiently defined or incomplete, which means that the results given below may represent a situation in the countries of the Mediterranean that is really quite different from the real one.

A series of possible indicators is proposed at the end of this chapter.

7.1 Awareness, information and capacity building

The concept of CP and its benefits appear to be clear for the great majority of the countries (5% of them still do not know the exact meaning of CP) although an incipient incorporation of cleaner production in industry is only occurring in half of the countries and approximately 15% is disseminating the advantages of applying it in business.

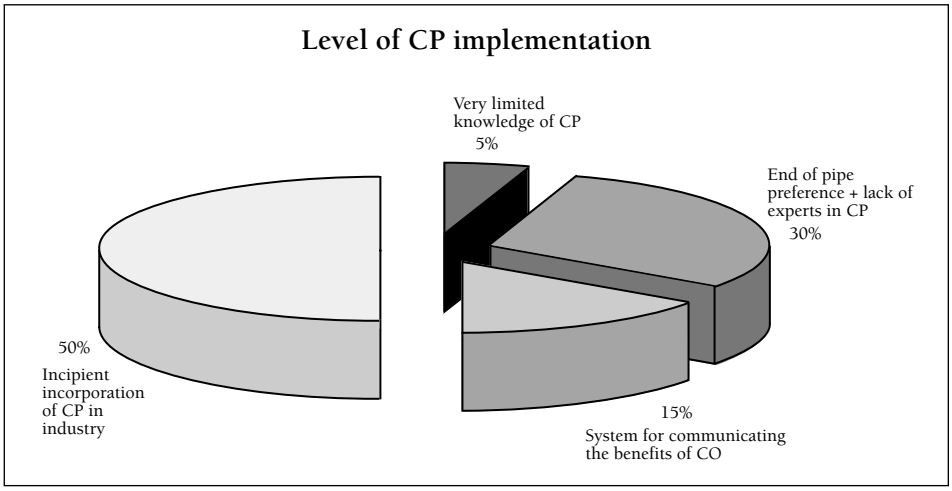
In this respect, there is a unanimous response when it comes to defining the strategy for introducing CP in industry, i.e. it is necessary for company managers to understand the economic profit that results from applying CP to processes and activities. Numerous studies have demonstrated the efficiency of this strategy compared to mere strict legislative controls.

It has been seen throughout this study that government authority lines of action appear to be undergoing a process of change and that help provided by government authorities to business is present to a greater or lesser degree in all of the MAP countries.

The different extent to which CP is implemented in the MAP countries can be classified in the following way:

– A. Very limited knowledge of the principles and advantages of CP.
B. A preference for end of pipe technologies and the belief that CP always needs large investments and that it does not provide any economic profit. A lack of experts.
C. Development of systems for communicating the concept of CP and its advantages and increasing interest on the part of society.
+ D. Incipient incorporation of CP in some industries.

The diagram below shows the level of CP implementation that has been achieved in the Region up to the present time, according to data provided for the study by the National Focal Points of the RAC/CP.



The main problems for implementing CP in countries are the lack of economic, technical and human resources. Human resources are sometimes available but they are lacking the necessary training. For this reason, training in CP is highly important in countries, together with the transfer of knowledge and experience between countries.

The structure of the MAP is a potential source of information transfer that is already being used at the present time and which could be enhanced even more by benchmarking in an organised way. Up until now, this has been fos-

tered within the context of the MAP by the network of National Focal Points of the RAC/CP and other international institutions such as UNEP, UNIDO, etc. that sometimes have a wider scope of application than just the Mediterranean.

These institutions carry out the highly important work of transferring information, for example, through the publication of practical examples of CP carried out in enterprises in the Mediterranean region, the dissemination of the principles and advantages of CP by way of lectures, training workshops, demonstration projects, etc.

In order for a systematic benchmarking to be made, a series of environmental indicators for the different industrial sectors needs to be defined in order to compare the level of CP implementation in business and industry in the different countries and to make the most of the information from actions already carried out.

It is also important for the different institutions to collaborate by combining synergies, by using the available resources in a more effective way and by defining a common language to facilitate the exchange of experiences.

It would appear that an important number of the MAP countries still understands CP to be a step that follows the application of end-of-pipe technologies. The fact that there is a lack of experts (government authorities, NGOs, etc.) who demonstrate the advantages of CP to enterprises means that investment is made almost exclusively in end-of-pipe technologies, which are technically sometimes more complicated and undoubtedly more costly in the long term. For this reason, it would be of great help for countries with more experience in applying CP in business to transfer this to the other countries.

Another aspect detected throughout the study is that it appears that, in countries where CP has begun to be implemented, it has been carried out mostly in the large industries. SMEs do not have the same resources and therefore need more help for it to be introduced.

7.2 The setting up of institutions and plans[1]

Approximately eight of the 20 MAP countries have specific CP centres and, according to the information gathered, there are bodies that are partially res-

[1] Information from 19 countries has been used in the analysis of the data in this section (no information was available for Monaco).

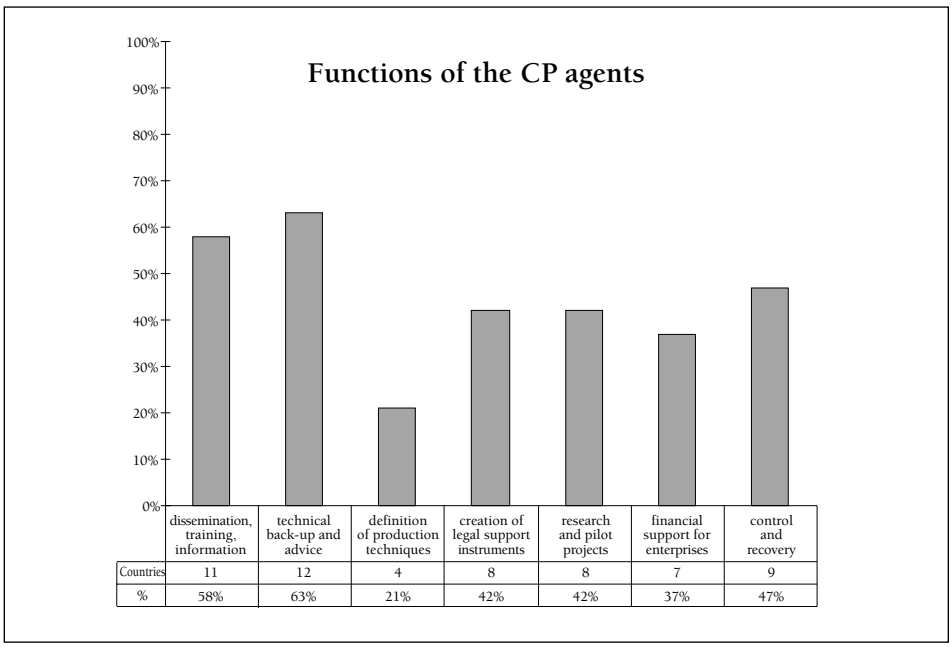
ponsible for applying CP in all of the countries, amongst other environmental protection functions that they may have.

One interesting aspect that stands out is that the agents in charge of CP are diverse in character where no specific centre exists and include ministries, private companies, business associations, chambers of commerce, NGOs, etc.

With regard to the functions of the CP agents, the MAP countries can be classified in the following way:

A. The agents in charge of the environment are confined to controlling the state of the environment and they do not have the necessary authority within the government to act in CP matters.
B. There are various agents in charge of the environment although they are uncoordinated and their assignments are poorly planned.
C. There are specific agents in charge of CP although they lack economic and/or human resources.
D. The agents in charge of CP are powerful and have the necessary resources for carrying out their plans and programmes.

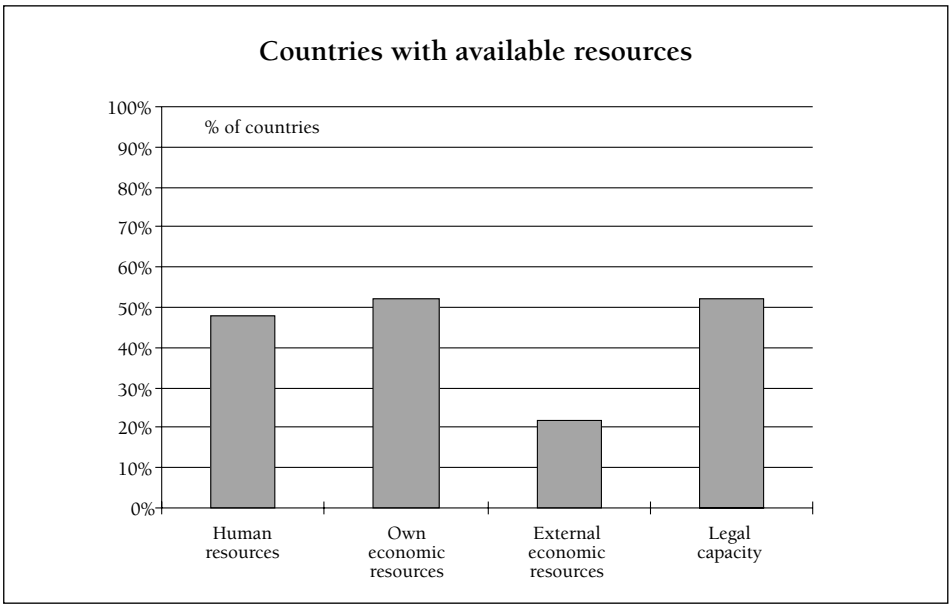
The two graphs that appear below show the current situation of the CP agents in the MAP countries regarding this classification. In most cases, the functions of each agent are multiple; from an analysis of the information made



	dissemination, training, information	technical back-up and advice	definition of production techniques	creation of legal support instruments	research and pilot projects	financial support for enterprises	control and recovery
Countries	11	12	4	8	8	7	9
%	58%	63%	21%	42%	42%	37%	47%

on the basis of this study, however, it appears that more than half of the countries devote themselves mainly to disseminating CP and providing expert advice to enterprises, although control still plays an important role in their functions.

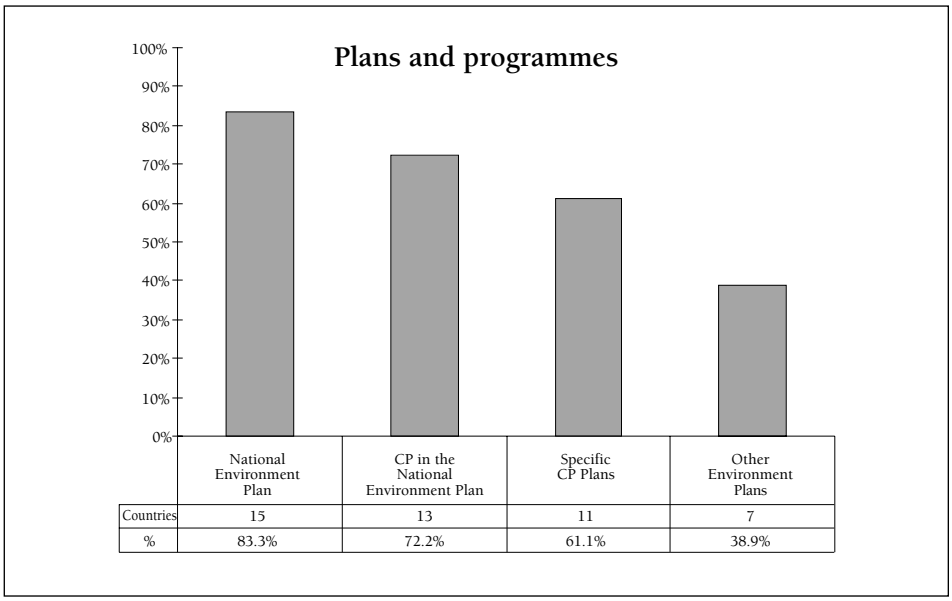
As for the availability of economic, technical and human resources and their legal capacity to act, these are non-existent or scarce in half of the MAP countries, as can be seen from the "Available Resources" graph. This graph shows that, according to the data provided by the National Focal Points, only half of them have an assigned budget that totally or partially covers CP implementation activities and little more than 20% receive foreign aid. (The graph gives an approximation of the percentage of countries and not the percentage of resources obtained).



The extent of the plans and programmes regarding CP that the authorities of the MAP countries put into practice can be classified as follows:

A. Programmes and plans are non-existent and there is no information on pollution produced by industry.
B. There is a national environment plan.
C. Specific environment plans have been developed (according to vectors: water, air, etc.).
D. There are specific CP plans for industry, including continual improvement amongst their objectives.

The graph below shows the countries included in each category. In many cases, the same country belongs to various categories (e.g. it has a national environment plan and at the same time has developed specific plans).



	National Environment Plan	CP in the National Environment Plan	Specific CP Plans	Other Environment Plans
Countries	15	13	11	7
%	83.3%	72.2%	61.1%	38.9%

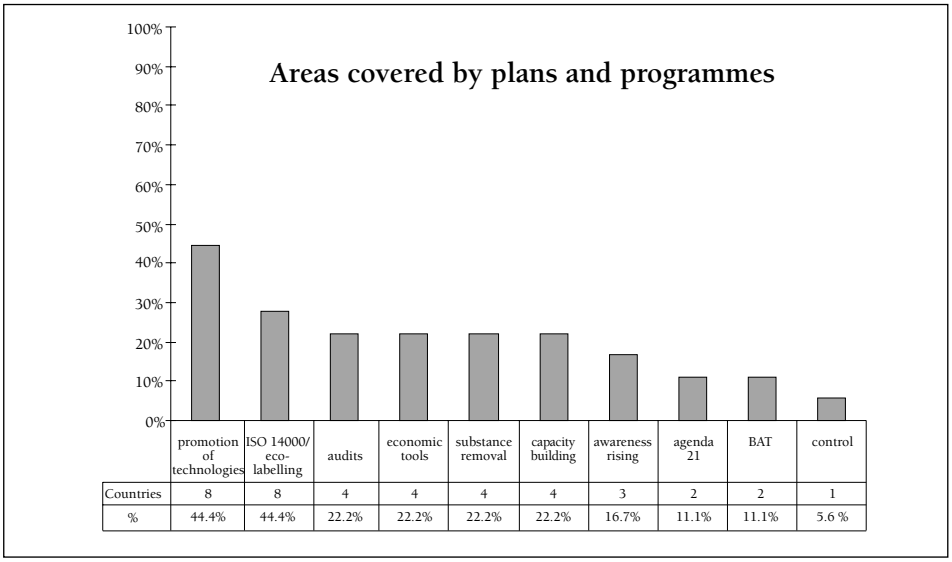
From the data provided by the countries, it can be deduced that practically all of the countries with a National Environment Plan have included the concept of CP in the preparation of the Plan and 11 of the 18 countries studied[2] have drawn up or intend to draw up specific CP Plans. Some countries are still in the prior stage of identifying the activities that pollute the most to be able to go on and design the necessary plan of action.

As for specific CP plans, a considerable number of countries still deal with the environment in terms of vectors (water, waste, etc.), with the danger that this can involve the transfer of pollution from one medium to another if thorough controls are not applied.

Nevertheless, there are some CP programmes that cover a complete geographical area (e.g. the New Industrial Cities Programme in Egypt and the Lebanese Programme for grouping industrial activities to improve the management of resources and exert greater control over pollution).

The aspects considered in the preparation of action plans for implementing CP are given below:

[2] Data are not available for Monaco and Libya.



	promotion of technologies	ISO 14000/ eco-labelling	audits	economic tools	substance removal	capacity building	awareness rising	agenda 21	BAT	control
Countries	8	8	4	4	4	4	3	2	2	1
%	44.4%	44.4%	22.2%	22.2%	22.2%	22.2%	16.7%	11.1%	11.1%	5.6 %

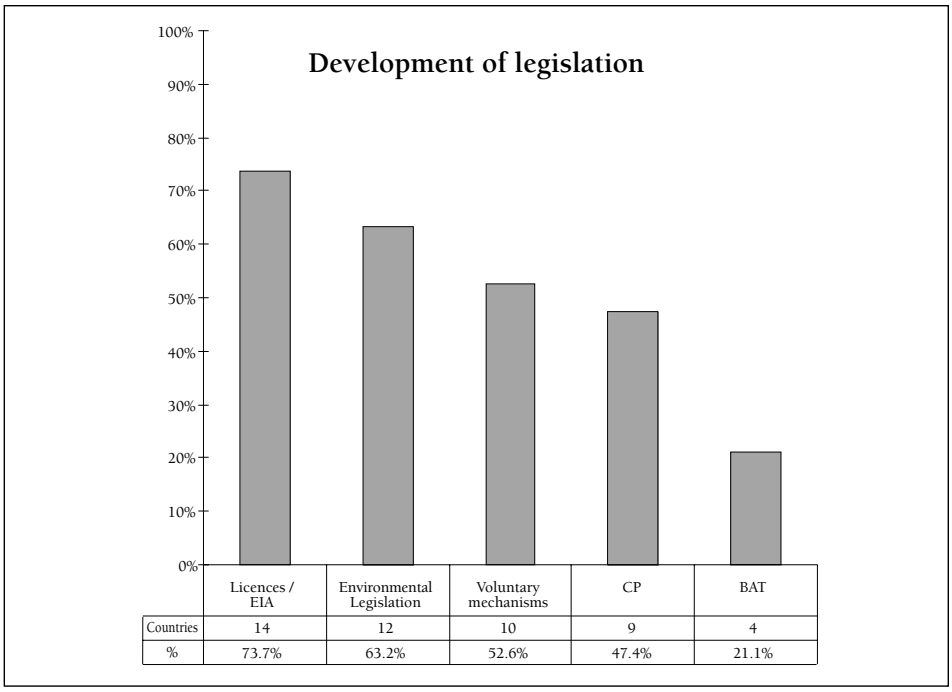
It should be emphasised that the aspects that are most taken into account in the preparation of programmes, as the countries themselves have pointed out, are those that involve working more directly with industry (cleaner technologies, ISO, audits, financial aid, etc.) and that the control of installations is no longer priority in the latest plans and programmes. This does not mean that controls are not carried out, for this is one of the areas where resources are most concentrated (as can be seen from the "Functions of the CP Agents" graph); in many cases, it is considered to be an issue that is already implemented and it is therefore not included as being of high priority in future action plans. From an analysis of the data extracted from the study, there appears to be a clear indication of a trend for governments of the MAP countries to adopt a spirit of collaboration with the industrial sector.

Likewise, the fact that new tools are beginning to emerge, like the study of BATs as a result of the EU IPPC Directive and the application of Agenda 21, is confirmed.

7.3 The reinforcement of the legal framework

All of the countries have developed environmental legislation to a greater or lesser extent. In some countries, this is obsolete or has never been correctly applied because it does not conform to the real life situation or there are no resources to implement it. The situation of the different countries can be classified according to the following categories:

A. Legislation does not correspond to the current problems. There are very few human and technical resources for applying the legislation. The legislation has not been adapted to international regulations.
B. Basic, up-to-date environmental legislation does exist.
C. Specific legislation that considers environmental protection in terms of vectors has been developed.
D. There is legislation that deals with environmental protection and the granting of licences in an integrated way.



	Licences / EIA	Environmental Legislation	Voluntary mechanisms	CP	BAT
Countries	14	12	10	9	4
%	73.7%	63.2%	52.6%	47.4%	21.1%

As for the incorporating of aspects concerning CP, the area most covered by legislation is the granting of licences for setting up new activities. 14 of the 19 countries studied[3] have drawn up laws for the granting of licences and the carrying out of environmental impact studies prior to licences being granted. This enables CP to be introduced in new installations and cleaner technologies to be adopted in existing industries.

Half of the countries state that they have considered CP criteria when developing specific laws on issues such waste management, environmental mana-

[3] No information was available for Monaco.

gement systems, packaging, etc., although the regulations developed are not always put into practice.

According to the information provided, there are still only a few countries that have a statutory scheme that regulates the granting of subsidies and grants for incorporating CP in industry.

Lastly, half of the countries state that they use voluntary regulation mechanisms for achieving reductions in pollution on a national scale, and agreements are reached between industrial sectors and the authorities and at international level via the ratification of agreements and protocols. Some sectors have also joined national and international agreements by private enterprise care for the environment; "Responsible Care" agreement by the chemical industry is the one most frequently used.

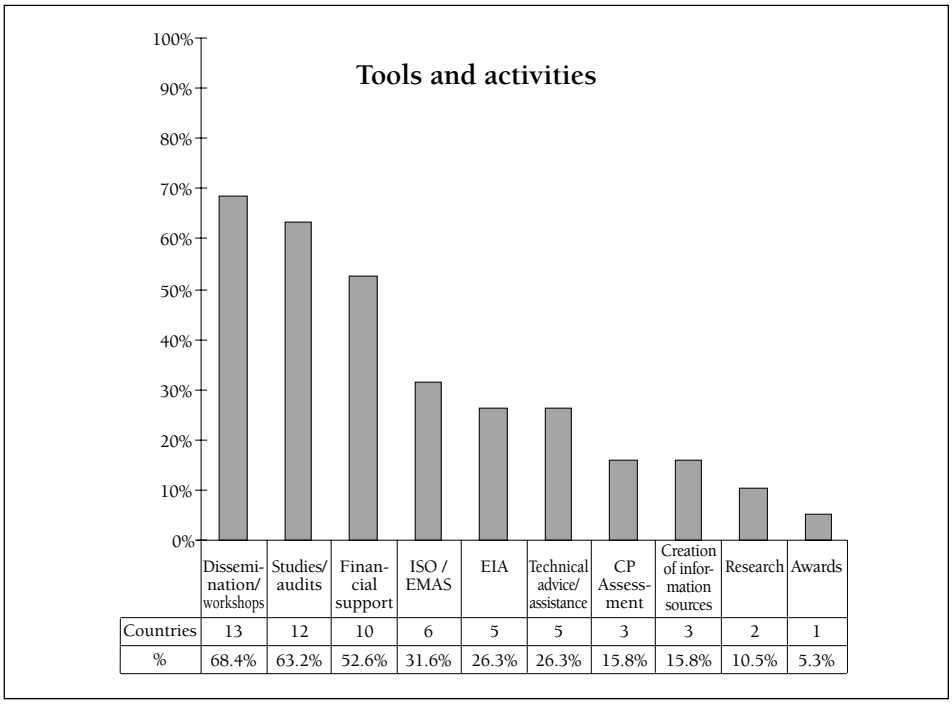
7.4 CP tools at the service of enterprise

The tools developed by the MAP countries to introduce and apply CP are highly diverse. In order to be studied, they have been grouped into the following categories:

- *Dissemination and workshops:* Included under this category are all of the activities involving dissemination, training, information and journals, along with workshops and demonstration projects carried out in specific industries.
- *Studies and audits:* This comprises all of the theoretical studies and sectoral audits carried out by government authorities or some other type of institution, not aimed at specific companies.
- *Financial aid:* all of the tools developed to economically support CP initiatives.
- *ISO and EMAS:* Tools used by government authorities to foment environmental management systems in enterprise and subsequent certification (guides to environmental management and technical back up).
- *EIA:* Environmental impact assessments (in most cases prior to the granting of a licence).
- *Technical advice and back up:* Technical back up provided by institutions and government authorities to industry (cleaner technologies, the search for experts, etc.) and to governments to help them define environmental policies.
- *CP assessment:* Development of methodologies and guides for diagnosing businesses and detecting the possibilities for implementing CP in a specific enterprise.

- *Setting up of information sources:* Technology databases, LCA, suppliers, etc. for providing access to information.
- *Research:* Research studies on new CP technologies and BATs.
- *Awards:* The recognition of enterprises that implement CP.

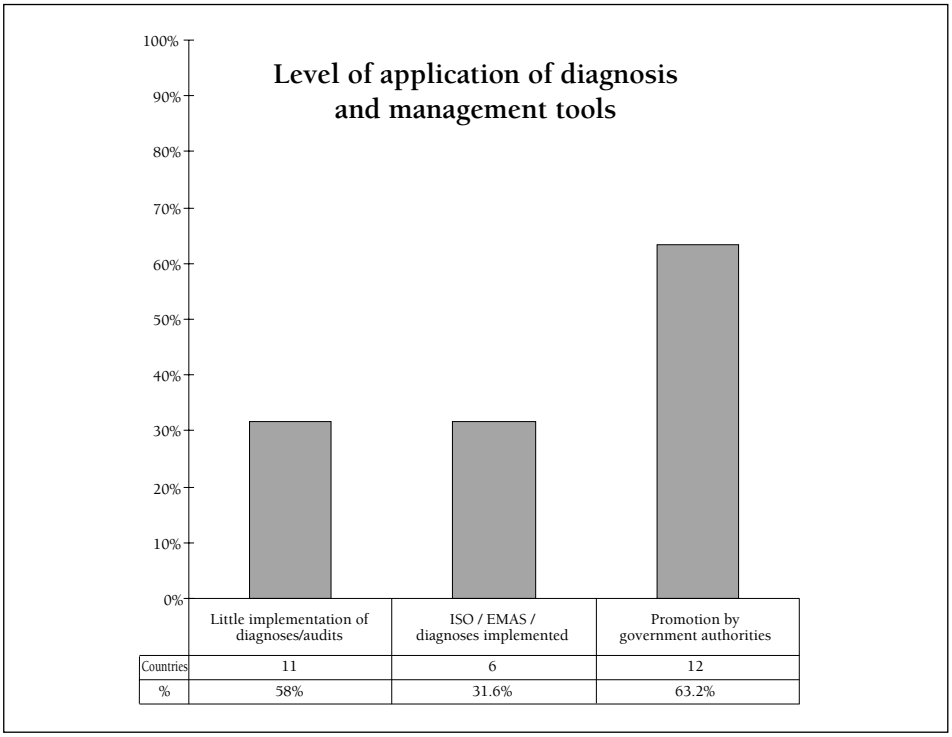
The graph below shows the tools that are most implemented in the MAP countries.



	Dissemination/ workshops	Studies/ audits	Financial support	ISO / EMAS	EIA	Technical advice/ assistance	CP Assessment	Creation of information sources	Research	Awards
Countries	13	12	10	6	5	5	3	3	2	1
%	68.4%	63.2%	52.6%	31.6%	26.3%	26.3%	15.8%	15.8%	10.5%	5.3%

The following categories can be defined according to how many CP tools have been developed:

A. Environmental diagnoses, audits, and environmental management systems (EMAS, ISO 14001) are rarely carried out.
B. The institutions promote environmental diagnoses and they have standard procedures for carrying them out. They carry out demonstration projects to introduce CP.
C. Diagnoses and management tools for enterprises are well-known tools and they have been implemented in some enterprises.



From the information provided by the National Focal Points, 63% of the countries carry out diagnoses and audits of the industrial sectors, together with pilot and demonstration projects in specific enterprises, which enable pollution prevention opportunities to be detected in each sector studied and for them to be applied in enterprises at the national level. Manuals on the correct way to implement CP in industry have also been developed in some countries.

Some large enterprises are implementing environmental management systems and introducing cleaner technologies in their production processes at the present time due to the fact that they have verified the increase in competitiveness of their business that results from good environmental conduct.

Both the carrying out of diagnoses and the setting up of financial funds often depend on aid from international institutions.

7.5 The availability of economic instruments

In terms of the availability of financial support and the development of economic instruments for supporting actions aimed at implementing CP, two main categories can be distinguished:

A. Financial support comes mainly from external donors and there is no sustainable base. There are no financial mechanisms or incentive systems.
B. Fiscal instruments, based on the development of a tax system, are available. Systems of economic support (deductions, loans, subsidies, etc.) have been developed.

Half of the countries have set up economic instruments. These are the countries that have an internal system of financing obtained from budgets granted by governments for environmental protection and sometimes revenue from specific taxes (water consumption, refuse, etc.). Aid granted by the Government goes mainly to equipment and installations that enable reductions of pollution at source to be made.

The other half is not capable of self-financing these initiatives and it depends on aid from international organisations or private donors to be able to grant specific aid for CP implementation.

7.6 The future of CP in the MAP countries

The contacts established between all of the countries in the Mediterranean Basin through the MAP provide an excellent opportunity for exchanging information and the support of some countries to others in applying CP.

In this respect, all of the tools that can be easily adapted from one country to another play an important role, for example, manuals for implementing CP and environmental management systems in business, methodologies for carrying out audits, and sectoral publications. Encouraging the dissemination of these tools in the different countries will help the process of CP implementation to move forward at a faster rate and to use the human and economic resources more efficiently.

In this sense, it would be highly convenient to develop CP indicators for each industrial sector, which would enable countries to define their current situation and learn from other countries where there are already cases of CP having been applied in industry. In this respect, it could help adapt BATs to the Mediterranean context.

Another important aspect for developing these indicators is the voluntary mechanisms and agreements between the authorities and industrial sectors in order to obtain the help of industry in providing data.

A series of categories has been defined for each analytical axis in the conclusions of this study and the situation in each country has been assessed for each of the defined axes. This has been carried out in an approximate way either because sufficient information was not available in all cases or it was not sufficiently accurate. It would be advisable to define a series of indicators on the state of CP implementation in the MAP countries that enables the monitoring of progress in these countries to be made from now onwards.

The *list of indicators of sustainable development* drawn up by the United Nations Commission for Sustainable Development could be taken as the basis, especially those referred to in the chapters on the environment category and the institution category of Programme 21, such as, for example:

- The percentage of GDP assigned to environmental protection.
- The number of prohibited or highly-restricted chemical products.
- The number of environmental impact assessments carried out.
- National councils for sustainable development.
- Scientists and engineers specialising in research and development activities per million inhabitants.
- Ratification of global agreements and their application, etc.

And more specifically, in the Mediterranean, the MAP Blue Plan indicators:

- Minimisation of waste production.
- Emission of greenhouse effect gases.
- Emission of ozone-depleting compounds.
- Number of associations connected with the environment and/or sustainable development, etc.

These indicators will need to verify the CP concept in order for this study to be followed up.

The following could also be added:

- CP centres.
- Human resources dedicated to CP.
- The number of countries with CP agents with legal powers.
- The number of countries with CP plans and programmes.
- The number of countries that include CP criteria in their legal framework.
- The number of enterprises that have implemented CP.
- The number of enterprises that have implemented an EMS.
- The economic resources assigned to CP implementation.

Special attention also needs to be paid to changes and developments that occur to the tools that are used.

To sum up, it would be advisable to define tools that can easily be adapted to the situation in different countries in order to save resources and to be able to provide help to countries that need it the most, in a more efficient way and in each particular case and, on the other hand, to establish indicators that enable a reliable follow-up to be made of CP development in the MAP countries.

The aim of the Study on the State of Cleaner Production in the MAP Countries is to gather information and analyse the current situation, with regard to the adoption and promotion of principles and strategies which give priority to pollution prevention at source and waste minimisation in the industries of the Mediterranean Region.

For this purpose, this study focuses on the agents operating in the Region, the legal framework and the plans and programmes that have been drawn up, along with the tools and activities introduced.

This publication is a first edition: due to the characteristics of change and evolution inherent in the Region and given that the study can be improved upon, the aim is that it be revised and updated in future editions.