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FOREWORD

The United Nations Economic Commission for Europe's (UNECE) programme of environmental performance reviews was launched by the UNECE Committee on Environmental Policy in response to a decision taken at the second Ministerial Conference "Environment for Europe" (April 1993, Lucerne, Switzerland) and reconfirmed at the third Ministerial Conference (October 1995, Sofia, Bulgaria), to extend the system of country environmental performance reviews, developed initially by the Organisation for Economic Cooperation and Development (OECD) for its member countries, to the entire UNECE region.

The main aim of the UNECE review programme is to help countries in transition from a centrally planned to a market economy to improve their individual and collective performance in environmental management, the ultimate challenge being to promote sustainable development and the *convergence* of environmental conditions and policies throughout Europe. The primary goals of this programme are:

- To help individual Governments assess *progress* by establishing baseline conditions, assessing trends, examining policy commitments and institutional arrangements, and appraising their routine capabilities for carrying out national evaluations;
- To promote environmental improvements and a continuous *policy dialogue* among member countries through the transfer of information;

- To stimulate *greater accountability* from Governments towards public opinion;
- To *strengthen country capabilities* for environmental policy-making and management;
- To help *identify top priorities* for Government action at the national and international level.

The UNECE review programme builds on the OECD methodology and approach with due regard to the specificities of countries in transition. Environmental performance is assessed with respect to that country's effort to reduce the overall pollution burden and manage its natural resources, to integrate environmental and economic policies and strengthen cooperation with the international community. It examines the degree of achievement of domestic objectives and international commitments with respect to the environment. The assessment of the environmental performance is placed within the context of historical environmental records, the present state of the environment, the physical endowment of the country in natural resources, its economic conditions and demographic trends.

The conclusions and recommendations of the review report are approved by a UNECE intergovernmental review meeting. Member countries are expected to be reviewed periodically.

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ABBREVIATIONS AND SIGNS

Abbreviations

BOD ₅	Biochemical/biological oxygen demand (measured at 20 degrees Celsius and for a period of five days)
BOD ₇	Biochemical/biological oxygen demand (measured at 20 degrees Celsius and for a period of seven days)
CITES	Convention on International Trade in Endangered Species of Wild Flora and Fauna
CPI	Consumer price index
DM	Deutsche mark
EBRD	European Bank for Reconstruction and Development
EC	European Community
ECE	United Nations Economic Commission for Europe
EIA	Environmental impact assessment
EIC	Environmental Information Centre
EK	Estonian national currency (kroon)
EMEP	Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe
EMP	Environmental Monitoring Programme
EPA	Estonian Privatization Agency
EU	European Union
GDP	Gross domestic product
HELCOM	Helsinki Commission
IFI	International financial institution
IMO	International Maritime Organization
IUCN	World Conservation Union
MARPOL	Convention for the Prevention of Pollution from Ships
MPC	Maximum permitted concentration
NEAP	National environmental action plan
NEFCO	Nordic Environment Finance Corporation
NES	National Environmental Strategy
NGO	Non-governmental organization
NIB	Nordic Investment Bank
OECD	Organisation for Economic Co-Operation and Development
PHARE	Assistance for Economic Restructuring in the Countries of Central and Eastern Europe
UNCED	United Nations Conference on Environment and Development

Country codes

AUT	Austria
BEL	Belgium
BGR	Bulgaria
CAN	Canada
CHE	Switzerland
DNK	Denmark
DEU	Germany
ESP	Spain
EST	Estonia
FIN	Finland
FRA	France
GBR	United Kingdom
GRC	Greece
HUN	Hungary
ISL	Iceland
IRL	Ireland
ITA	Italy
LUX	Luxembourg
NLD	Netherlands
NOR	Norway
POL	Poland
PRT	Portugal
SWE	Sweden
TUR	Turkey
USA	United States

Signs and measures

..	not available
–	nil or negligible
.	decimal point
ha	hectare
t	metric ton
kg	kilogram
mg	milligram
µg	microgram
m ²	square metre
m ³	cubic metre
km	kilometre
km ²	square kilometre
toe	ton oil equivalent
l	litre
min	minute
s	second
PJ	petajoule
GJ	gigajoule
kW _{el}	kilowatt (electric)
kW _{th}	kilowatt (thermal)
MW _{el}	megawatt (electric)
MW _{th}	megawatt (thermal)
TWh	terawatt-hour

Country aggregates

OECD Europe: All European member countries of the OECD, i.e. countries of the European Community (EC) plus Iceland, Norway, Switzerland and Turkey.

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

Currency

Monetary unit: kroon (EK)

Exchange rates: ^{1,2}

Monthly average

Month	1 US\$	1 ECU
Jun-92	12.419	16.394
Dec-92	12.647	15.667

Annual average

Year	1 US\$	1 ECU
1993	13.223	15.470
1994	12.969	15.349

Source: Eesti Pank

¹-The Estonian kroon is pegged to the deutsche mark at a rate of DM 1=EK 8.00.

²-The Estonian kroon was introduced in June 1992.

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INTRODUCTION

This review of Estonia is the first environmental performance review (EPR) carried out under the auspices of the UNECE Committee on Environmental Policy. This pilot UNECE study builds, *inter alia*, on the experience gained in the preparation of pilot environmental performance reviews of Poland and Bulgaria, which were carried out in 1994-1995 by OECD in cooperation with UNECE.

The review of Estonia was carried out by a review team composed of experts from five examining countries (Czech Republic, Finland, France, Germany and Ukraine) and members of the UNECE secretariat and its consultants. Once a detailed review outline had been agreed with the Estonian authorities during the preliminary mission to Tallinn in November 1994 and the required background information had been assembled and analysed, a review mission took place in Estonia on 9-20 May 1995. During the mission, the review team met Estonian officials from different ministries and administrations at various levels, technical and scientific experts, industrial and trade union representatives and non-governmental organizations (NGOs). It is on the basis of these discussions and additional information that the review team has prepared its review report.

The report focuses on capacity building; air, water, waste, and nature management; the integration of environmental and economic policies both generally and more specifically within the energy sector; and cooperation of Estonia with the international community. The review examines the current situation, recent and likely future trends, pressures, policy responses and their effectiveness. The principal conclusions and recommendations for improving Estonia's environmental performance are brought together in the concluding chapter.

The differences between this pilot UNECE environmental performance review and the OECD reviews of its member countries stem from Estonia's specific features as a country in transition from a centrally planned to a market economy. Estonia regained its independence in 1991. It has faced major economic upheavals and structural adjustments. Its

entire legal and institutional system is being transformed.

Ensuring practical compliance with rapidly changing legal requirements is a continuing challenge. A further complication is that the system of property rights is being radically changed in response to new legal provisions for the large-scale privatization of business enterprises and for the restitution of public lands to their former private owners. The privatization of businesses and the restitution of private property rights offer, in the longer term, new opportunities and incentives for resource conservation and environmental protection but, in the short term, they create additional sources of uncertainty. All these changes have important implications for Estonia's environmental performance.

Estonia's specific features are reflected in different chapters of this review. They are particularly notable in chapter 1 (overall context of the review), chapter 2 (legislative and institutional strengthening), chapter 7 (integration of environmental policy into an economy in transition), and chapter 9 (international cooperation).

It should, moreover, be noted that documenting the economic and environmental changes, and the modifications to the policy process which have accompanied them, in a statistical form has been a challenging task. On regaining independence, the arrangements for recording economic and environmental data were modified; statistical needs changed and the institutional capacity to meet these has obviously taken time to develop. Consequently, it has often been difficult to obtain satisfactory time series data going back to before 1991, and in certain cases conflicting measures of particular variables have been published owing to the absence of commonly agreed statistical definitions and methodologies. These difficulties will diminish with time, but, unavoidably, they have restricted the quantity and quality of the statistical data available for this review.

This review of Estonia was revised following the

examination carried out at the Ad Hoc Meeting on the Pilot UNECE Environmental Performance Review of Estonia (Geneva, Switzerland, 16 January 1996), in which a high-level delegation from Estonia, led by the Minister of the Environment, and representatives of other UNECE countries and international organizations took part. The conclusions and recommendations of the report were adopted by the Meeting. The report is published under the authority of the Executive Secretary of UNECE. The Estonian-language version will be published under the sole responsibility of the Estonian Government.

UNECE extends its most sincere gratitude to all those who helped in the course of this review, in

particular the countries which provided support in kind and/or in cash (the Czech Republic, Finland, France, Germany, the Netherlands, Norway, Sweden, Ukraine and the United Kingdom). UNECE is particularly indebted to the Government of Estonia for its cooperation in expediting the provision of information, in organizing the pre-mission and the mission to Estonia and in facilitating contacts with many individuals both inside and outside administrative and governmental bodies.

Chapter 1

THE CONTEXT

1.1. The physical context

The Republic of Estonia covers 45 000 km² to the east of the Baltic Sea, including the two large islands of Saaremaa and Hiiumaa. Its coastline totals about 3,780 km. It is the northern-most of the three Baltic States. In the north and west its overseas neighbours are Finland and Sweden; in the south and east it borders on Latvia and the Russian Federation, respectively. Estonia is a lowland country; its highest point reaches a mere 318 metres. It has a mosaic landscape, with plains (in particular karstic plains with their specific landforms) in the northern and western parts, and hills and numerous lakes in the south-east.

Hydrographically, the whole territory of Estonia lies within the Baltic Sea catchment area. Most of its 420 rivers are short, the longest being the Pärnu River, which is 144 km long. There are some 1,500, mostly small, lakes. The largest, Lake Peipsi, on the eastern border, is the fifth largest in Europe. Rich *mineral water* resources abound in several places and are used for therapy and as drinking-water.

Estonia has a moderate Atlantic-continental *climate* with frequent changes in weather conditions, warm summers and moderately mild winters, and milder temperatures on the islands. South-westerly and southerly winds are typical throughout the year. Annual rainfall averages 500-700 millimetres. The temperature ranges from a monthly average of -6.6° C. in February to +16.3°C. in July; the annual average is 4-6°C. The winter snow cover stays for about three months.

In terms of *land use*, 25% of the country is covered by agricultural lands (grasslands, meadows and natural or semi-natural pastures), while the forest land account for 44%, twice as much as 50 years ago. Mires (fens, bogs, swamps), which cover approximately 20% of the whole territory, are deep; hundreds of bogs have peat layers of more than 5 metres. The extensive system of agriculture has resulted in the preservation of a wide biodiversity (chapter 6). Large glacial stones make farming difficult. The most suitable area for agriculture (cereals and potatoes) is central Estonia.

Estonia is rich in *mineral resources*. The world's largest exploited deposits of oil-shale are located on its northern coast. They provide raw materials for power production and the chemical industry. Over the last years mining has been reduced; based on the current exploitation level, oil-shale reserves cover the needs for the next 50 years. Other mineral resources of high quality, such as phosphorite, limestone and dolomite, are abundant. Estonia is also rich in sand, gravel and clay. Peat is extracted and used as fuel.

1.2. The human context

Population

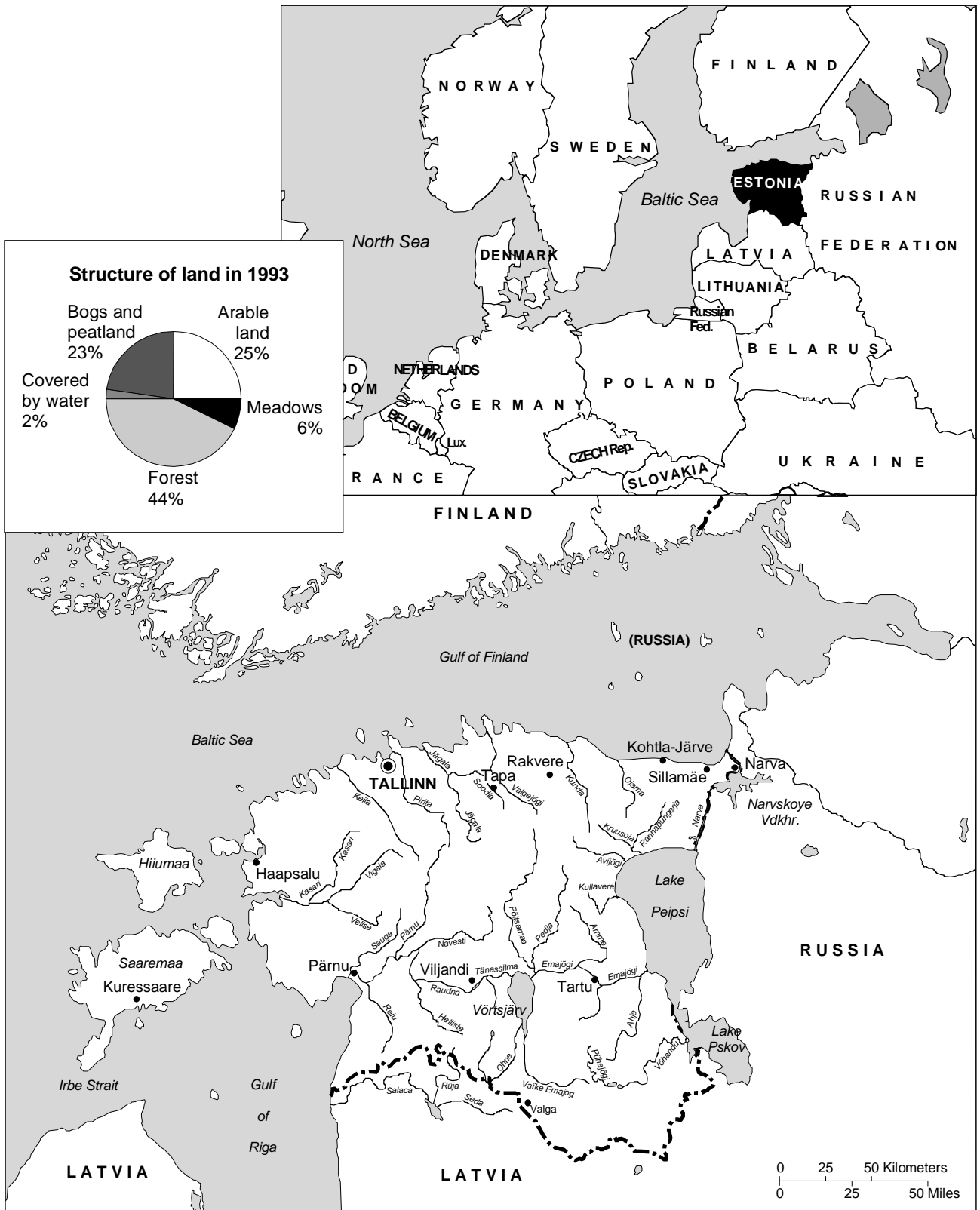
In 1994, Estonia, which is the smallest of the Baltic countries, had a *population of 1.5 million inhabitants*. Recently, the population has diminished because of the outward migration of some Russian-speaking people during 1990-1993 and due to the negative net population growth. In 1989, ethnic Estonians constituted 61.5% of the population, Russians 30.3% and other nationalities 8.2%. The average *population density* is 34.5 persons/km², which is below the European average. As over 70% of the population is concentrated in urban zones, the population density in the rural south is less than 6 persons/km². The capital, Tallinn, with its surroundings, counts more than 550,000 inhabitants. It produces more than 60% of Estonia's gross domestic product (GDP).

Estonia is a unified State, divided administratively into *15 counties*. There are *45 towns*, *209 rural municipalities* (also referred to as "vald" in Estonian) and *4 small towns* (referred to as "alev" in Estonian).

Environmental awareness

Public awareness and concern for the protection of the environment have, in particular during the last several years, played a substantial role in the political process in Estonia. Environmental issues have been a contributory stimulus to arouse the national consciousness in the process of restoring the country's independence. There are *several environmental non-*

Figure 1.1: Map of Estonia



Note: The boundaries of these maps do not imply official endorsement or acceptance by the United Nations.

governmental organizations, the biggest and most active of which are the Estonian Nature Conservation Society and the Green Movement. The public has traditionally been very aware of nature conservation issues. For instance, under public pressure the production of phosphorite was stopped in early 1991. However, the environmental movement has waned over these last years as the severe economic problems are riveting people's attention.

1.3. The economic context and the transition to a market economy

The legacy

When Estonia regained its independence in 1991, agricultural production mainly took place on large State farms. Pesticides were used intensively on cultivated lands, meadows were neglected and naturally replaced by woodlands, and the drainage network, although vital for such a predominantly flat country, was not properly maintained. Industry was material-, energy- and transport-intensive and its technology was out of date. It produced mainly low-quality goods, and generated *considerable pollution* mostly in north-east Estonia and in the Tallinn area. The military bases of the former Soviet army caused severe soil and groundwater pollution.

The transition to a market economy

Before regaining its independence in August 1991, Estonia had formed an integral part of the former Soviet economic, political, and security system, and did not have control over its national economy. The Soviet Union was the major market for its products. Estonia did not possess its own institutions, such as a central bank, to handle basic economic functions within the country. Estonia has recently initiated *major political and economic reforms* toward a market economy, and has re-established the essential structures of an independent country.

The economic reform was set in motion with *price liberalization*, commencing in December 1989. During the first years after regaining its independence, Estonia's consumer price index (CPI) rose steeply as the distorted Soviet pricing system was progressively dismantled (table 1.1). Estonia faced adjustment shocks resulting from these high inflation rates and the collapse of its traditional export trade with other former Soviet republics. Manufacturing and trade output fell sharply in 1992 and the real structural adjustment crisis began.

Concomitantly, GDP plummeted. In June 1992, Estonia reintroduced a *national currency* (the *Estonian kroon, EK*) pegged to the deutsche mark (DM), and left the Russian rouble zone. This was a decisive step toward stabilization. The inflation rate has since dropped considerably. The growth of GDP during the first two quarters of 1995 indicates that the economy is recovering.

Tighter fiscal and monetary policy pushed inflation (in terms of CPI) down to 47.6% in 1994, i.e. 22.6 times lower than in 1992. This is a major achievement for Estonia, even if by European standards this rate remains high. The commercial banks, expecting inflation to go down further, reduced their lending rates (22-24% in 1994).

The official unemployment rate was 2.9% in 1994 (table 1.1). However, the apparently small number of officially registered unemployed hides existing underemployment, short working weeks, involuntary leave and wage arrears. As people do not expect to receive significant social security benefits (which are very low), they do not systematically register with the employment offices.

GDP and industrial output (table 1.1) declined till the end of 1994. GDP increased by 1.7% and 0.8% in the first and second quarters of 1995 respectively. Compared with other countries in transition, Estonia has a higher level of GDP per capita (fig. 1.2). Many of the industrial processes use out-of-date technologies, which cannot compete successfully in an open market environment. Consequently, old industrial plants either survive through State subsidies or are being closed down, while the potentially more valuable units are being privatized. At the same time, new small manufacturing and service enterprises are being created. Also, a number of western firms are moving some of their more labour-intensive technological processes to Estonia, where labour is cheaper. However, the privatization of large State-owned enterprises is proceeding slowly.

Today, Estonia's *foreign trade policy* could be characterized as liberal and open, as trade restrictions have been abolished. The tariff policy changes developed under the Baltic free trade agreement of September 1993 and under the association agreement with the European Union and its member States of May 1995 serve as a basis for open market development.

Table 1.1: Economic trends, 1991-1994
(% change from previous year)

	1991	1992	1993	1994
Output				
GDP	-11	-14.2	-8.6	-3.2
Industrial output	-7.2	-38.9	-27.7	-5.7
Agricultural output	-20.7	-21.1	-27.2	-3.0
Inflation				
Consumer price index	232.0	1076.0	89.8	47.6
Producer price index	208.3	1208.0	75.0	36.1
Deflator	89.8	112.3	83.5	75.8
Employment				
Unemployment rate ¹	0.1	1.9	2.6	2.9

Sources:

Statistical Yearbook 1994, Statistical Office of Estonia, Tallinn 1994

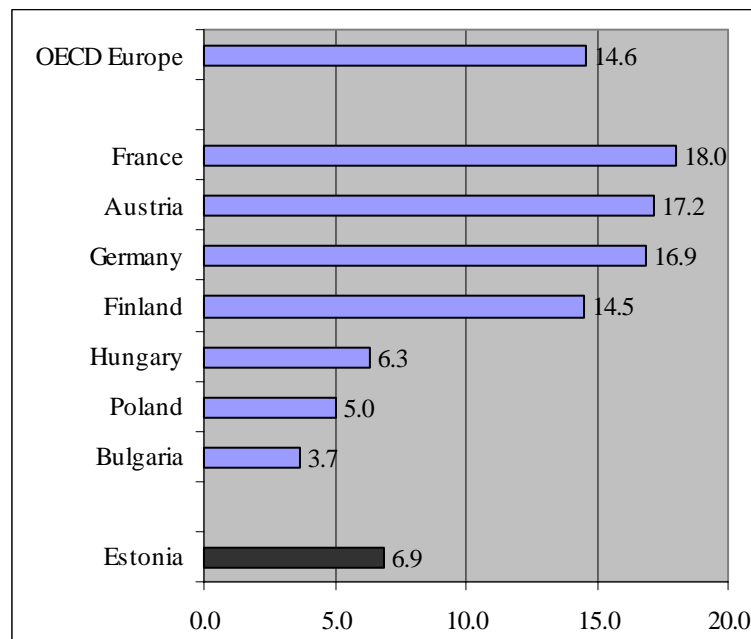
Statistical Yearbook 1995, Statistical Office of Estonia, Tallinn 1995

Economic Survey of Europe in 1994-1995, UNECE, New York and Geneva, 1995

Footnote:

1/ - only unemployed receiving benefits; percentage of labour force at year-end.

Figure 1.2: GDP¹ per capita, 1993
(US\$ 1,000/capita)



Sources: OECD; World Bank Atlas (1995)

Footnote ¹ GDP at 1991 prices and purchasing power parities, defined as the number of units of the country's currency required to buy the same amount of goods and services in the domestic market as one dollar would buy in the United States.

1.4 The administrative and legislative context

In September 1991, Estonia was accepted as a Member State of the United Nations. Since then several important events have confirmed its independent statehood. In June 1992, a new democratic constitution was adopted by referendum which set the legal preconditions for the protection of property rights and economic freedom. The Constitution recognizes the separation and balance of powers, and the independence of the courts, and guarantees fundamental human and civic rights and liberties. Estonia is now a *democratic parliamentary republic*. In May 1993, Estonia became a member of the Council of Europe.

In September 1992, the first free presidential and parliamentary elections were held since the restoration of independence. The Parliament (Riigikogu), comprising 101 members, is the main legislative institution. The President of the Republic, elected by the Parliament for a five-year term, is the head of State and the Supreme Commander of Estonia's national defence. The Parliament confirms the Prime Minister and his cabinet in their functions. The President approves their appointment. *There are 15 ministries in the cabinet of the Prime Minister, including the Ministry of the Environment.* The Government has the executive power. It implements the domestic and foreign policies of the State, issues orders and regulations, and submits laws for adoption and international treaties for ratification to the Parliament.

The restoration of the *local self-governing system* started in 1989. In 1993, the Parliament passed a new Local Government Act to replace the two-tier local self-governing system (county, municipality) by a single-tier system (district level represented by 15 counties plus the two large towns of Tallinn and Narva). The local governments are responsible for resolving and regulating local issues independently and in accordance with the law.

The *legislation currently in force in Estonia* consists of a great variety of legislative acts of different origin and background. Some of these acts are based on legislation of the Republic of Estonia which was in force before 1940. Others have been mostly based on acts and regulations of the former Soviet Union. Regulations of the former Soviet Union are still in force in many areas provided they do not conflict with the Constitution or other Estonian laws. Currently, legislation in Estonia is being adapted to the changes in ownership and the economic transition. These ongoing changes are of high importance for all environmental activities, as most issues are closely related to ownership and property matters.

PART I: BUILDING CAPACITY

Chapter 2

LEGISLATIVE AND INSTITUTIONAL STRENGTHENING

2.1 Administrative and legislative framework

Administrative framework

In Estonia the responsibility at the national level for the *management* of mineral resources, the environment, nature conservation and physical planning lies with the Ministry of the Environment, originally set up in 1989. Its nine departments, together with the Forest Board the Board of Fisheries and the Land Board, which are also subordinated to the Minister (fig. 2.1), form the policy level of the system responsible for preparing legislation, information systems, regulation and control. The implementation of environmental monitoring and control also involves the Regional Environmental Departments in 15 counties and the towns of Tallinn and Narva, the Meteorological and Hydrological Institute, the four environmental laboratories, the Environmental and Nature Protection Inspectorate, the State Marine Inspectorate and the Environmental Information Centre.

The *Ministry of the Environment* is responsible for, inter alia, developing legislation and setting standards related to environmental conditions; setting environmental priorities; developing policies and strategies; coordinating the management of natural resources, environmental protection activities and related scientific research; organizing the monitoring of the state of the environment; assessing the environmental impact of projects of national importance; and coordinating international environmental cooperation. In 1995, there were 105 professional staff employed in the Ministry of the Environment.

The *Board of Fisheries* carries out government policy on fishing and the use and protection of fish resources. Its main tasks include the development of fisheries policy, and maintenance and protection of fish resources. The *Forest Board* is responsible for forest management planning in both State forests and privatized woodland. The *Ministry of Agriculture* also has some responsibility for privatized woodland under its farm development policies. The main tasks of the Land Board are organizing land reform and mapping. It is responsible for the development and implementation

of the Land Reform Act, the Land Cadaster Act and other legislation related to land survey. The *Ministry of Social Affairs*, which is responsible for health issues, sets health standards including those for noise, drinking-water and water quality along beaches.

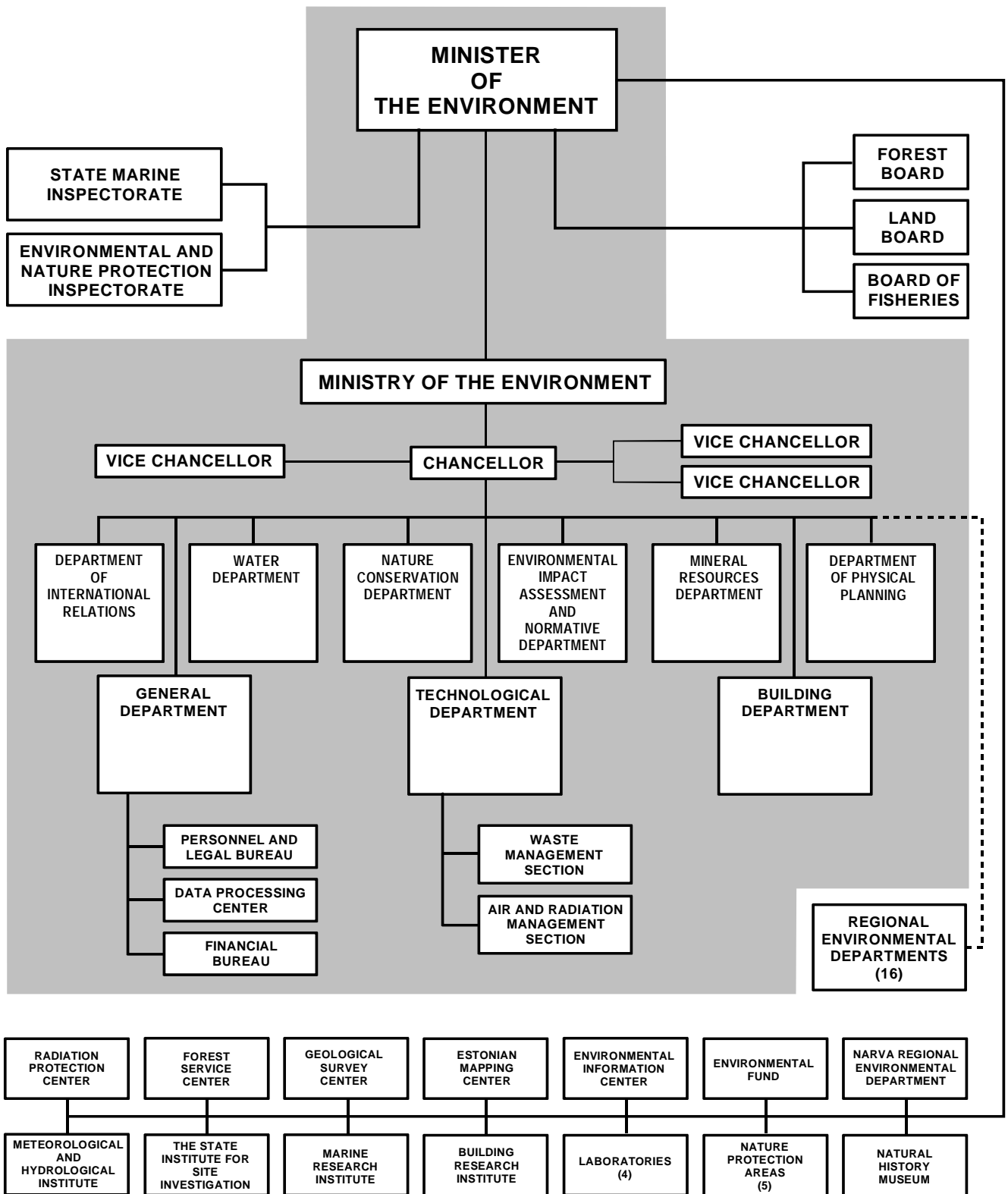
Legislative framework

The new *Constitution of the Republic of Estonia*, approved in 1992, states that ‘everyone shall be obliged to preserve the human and natural environment and to compensate for the damage caused by him or her to the environment. The procedures for compensation shall be determined by law’.

The framework for environmental legislation is provided by the *1990 Nature Protection Act*, which lays down the main principles. Other specific laws were prepared according to the environmental priorities. After the re-establishment of the Republic of Estonia, a number of environmental acts and regulations were adopted by the Parliament, others are in the pipeline. A list of selected environmental legislation can be found in table 2.1. Recent laws include the *Act on Sustainable Development* (chapter 7), the first of its kind in the UNECE region.

Currently, the *environmental standards and regulations* which are applicable in Estonia are mostly those of the former Soviet Union, including environmental, sanitary and construction standards. The Ministry of the Environment does not consider their application to be realistic however. In many cases the concentrations given in the regulations and standards can only be treated as guidance values due to (i) the lack of capacity and technology to monitor all these components, and (ii) the unrealistic number of components (over 1300) to monitor and enforce. The setting of new environmental standards and regulations started after Estonia regained its independence and they have been introduced step by step. Important

Figure 2.1 Environmental administrative structure



regulations and standards set during the last few years include:

- Hazardous substances concentration in exhaust gas from motor vehicles;
- Permissible concentration limits for pollutants in ambient air;
- Limitation of the use of ozone-depleting substances;
- Regulations on health protection;
- Regulations on health protection for beaches;
- Drinking-water standards;
- Preliminary environmental quality objectives for soil and groundwater;
- Regulations for waste-water discharges.

Efforts are under way to develop legislation and criteria which would correspond to those used within the European Union. The laws that are presently enacted are *chiefly framework laws* which require subsidiary legislation to bring them into full operation. The speed at which laws are adopted in Estonia creates a situation in which it is not always possible to consider the effects of one law on another; the risk of contradictions or gaps is serious. An inventory of all environmental laws is under preparation for submission to the *Ministers* of the Environment and of Justice with proposals for streamlining the legal environmental system in the country.

2.2. Institutional capacity

The transformations which have taken place since 1989 impose important responsibilities on the Ministry of the Environment, the Boards and other organizations involved in the management of resources, as well as their counterparts in district and municipal administrations. The Government has initiated a number of *institutional changes* aimed at improving organizations' response to the transformations and coordination between them.

In 1993, following the restructuring and reduction in the number of ministries, several changes in the administrative structure of the Government took place. As a result, policy areas such as physical planning, building and land use now fall under the Ministry of the Environment. An Environmental Impact Assessment (EIA) and Normative Department was also established in August 1993, as EIA will be playing a significant role in Estonian environmental protection in the future. Another new department, the Technological Department, was established in August 1994, to promote the integration of environmental considerations into economic sectors. In the last three years, *the*

Ministry has strengthened its position within the Government.

Since 1993, when the Local Government Management Act, which mainly deals with physical planning measures, was adopted, some of the *responsibilities of local self-government* bodies, as determined by this Act, have indirectly included the coordination of environmental protection, the control of enterprises located in their administrative territory, and the supervision of the use of land and natural resources.

The *Regional Environmental Departments*, which form part of the district governments, have been independent from the Ministry of the Environment since 1991. Since 1993, they have been financed by the local budget. These departments provide the Ministry with data describing the environmental situation (water, waste, etc.) in their respective regions, some of them also voluntary report on actions that they have taken in this respect. They are responsible for issuing licences and permits for the use of natural resources and pollution discharges, imposing and collecting emission charges, organizing international cooperation at the local level, and managing the environmental impact assessment of projects within their administrative area.

Cooperation and integration

Changes in the national administrative structure have been made recently to give responsibility for the management of forest, land and fisheries to the Minister of the Environment. It is hoped that, in this way, the concept of environmental responsibility and sustainability can be better integrated into the policy, regulatory and economic activities of relevant sectors. It should facilitate unified accounting, supervision and regulation of the use of natural resources and environmental protection in accordance with the principles of sustainable development, as defined by the 1995 Act on Sustainable Development.

In order to promote the *integration of environmental considerations* in other spheres of human activity, the Ministry of the Environment collaborates with other authorities such as the Ministries of Economy, Agriculture, Finance and Social Affairs, and with local governments. It cooperates with several non-governmental organizations (e.g. the Estonian Nature Conservation Society, the Estonian Nature Fund and the Green Movement) and several academic

Table 2.1 A list of selected environmental legislation

23.02.1990	Nature Protection Act (to be amended in 1995)
13.12.1990	Regulation concerning the air pollution charges application
21.01.1991	Regulation to issue the air pollution permits
27.03.1991	Act Concerning the Lahemaa National Park
17.10.1991	Land Reform Act
18.11.1991	Regulation concerning the ambient air pollution standards
21.11.1991	Fishing Act
14.04.1992	Coast protection regulation
19.06.1992	Regulation limiting the use of ozone-depleting substances
08.10.1992	Regulation on the toxic substances content and norms for motor vehicle exhaust gases
13.11.1992	Regulation for environmental impact assessment studies
13.11.1992	Regulation to issue waste permits
14.11.1992	Waste Act (amended in 1994)
17.11.1992	Animal Protection Act
15.02.1993	Act Concerning the Rights for Using Natural Resources
06.05.1993	Land Taxation Act
31.05.1993	Act on Privatization (amended in 1994 and 1995)
20.10.1993	Forest Act
08.12.1993	Regulation on the formation of Soomaa, Vilsandi and Karula National Parks
15.12.1993	Act on Compensation for Pollution Damage
12.01.1994	Act on the Environmental Fund
08.02.1994	Regulation on pollution damage compensation rates
15.02.1994	Regulation on the prices for using natural resources
28.02.1994	Regulation to issue water permits
23.03.1994	Plant Protection Act
05.04.1994	Hunting Arrangement Act
20.04.1994	Land Reclamation Act
11.05.1994	Water Act
01.06.1994	Act on Protected Natural Objects
15.12.1994	Regulation concerning requirements on waste-water discharge to the water bodies and ground
30.12.1994	Government Decree on the import, export and transit movements of hazardous and other wastes
09.02.1995	Food Act
22.02.1995	Act on Sustainable Development
22.02.1995	Act on the Protection of Marine and Freshwater Coasts, Shores and Banks
11.04.1995	Regulation on preliminary environmental quality objectives for soil and groundwater
03.05.1995	Act on Packaging
31.05.1994	Regulation concerning pollution damage compensation calculations and payments for waste water and pollution substances discharged to the water bodies, groundwater and ground
14.06.1995	Act on Planning and Construction

institutions. Different environmental programmes and projects are discussed in ad hoc committees, working groups, round tables and commissions in cooperation with other ministries and institutions. A governmental *Commission on Sustainable Development* was established in early 1995. It includes representatives from several ministries, the Estonian Parliament, and the science community. The tasks of this Commission have yet to be finalized. The work on the environment in the Parliament is done through the Parliament's Environmental Commission.

Public information and participation

In Estonia, the Government has the obligation to circulate public information for general use with the exception of information that is classified by law and information intended for internal use only. The ministries, departments, local government and enterprises have to inform the public about the environmental impact of the activities that they plan.

Current legislation gives a person the right of access to information and obliges the authorities to inform people. The Order on Environmental Impact Assessment of 1992 includes general provisions on public access to information regarding new economic activities and states that the environmental authorities will have to take comments from citizens into account. However, as yet there are *no procedures or requirements for consultation*. The Order also requires that the EIA proceedings should be made public by the competent authority, which (i) determines how the relevant people will be informed, (ii) announces the venue and time of consultations and discussions, and (iii) determines how information will be gathered and forwarded to the competent office.

The 1990 Nature Protection Act generally provides for information on the environment to be made available to the public. However, there are *no specific or detailed provisions on access to information*. No clauses are included in the laws concerning the grounds on which the Government can classify information as confidential (i.e. not accessible to the public) or what kind of information is considered confidential. No procedures are foreseen for the public to obtain relevant information or participate in the decision-making process. As access of the public to information is not regulated in the legislative acts, the practicalities depend largely on the individual officials in charge. In general, all written requests for information have to be answered

within a month. When access to information is refused, the only option is to appeal to a higher official or authority. However, no procedures have been established to deal with such aspects.

No clear procedures have been established for public consultations on the development of new legislation. The Government has an obligation to respond to all written requests, appeals and comments, but it has no obligation to inform the public on whether it has taken these communications into consideration in decisions.

Nevertheless, the Ministry of the Environment currently provides the media with information on major events. There is regular reporting of such events through newspapers. An agreement exists whereby the Ministry of the Environment provides the press agencies with environmental news concerning specific actions, accidents, and general information. Television channels also use this information for their broadcasts. The radio broadcasts environmental news provided by the Ministry of the Environment twice a week.

Compliance, enforcement and permitting

The authority responsible for the enforcement of environmental legislation is the *Chief Inspector's Office* (the Environmental and Nature Protection Inspectorate). However, many of the day-to-day enforcement tasks are delegated to the Regional Environmental Departments. The main duty of the Chief Inspector's Office is to inspect and arbitrate the decisions of the district authorities. The Chief Inspector has the right to close down enterprises or levy fines according to the Estonian Administrative Violation Code. The Chief Inspector has been appointed by the Parliament for a seven-year term.

Similar functions dealing with the sea are fulfilled by the *State Marine Inspectorate*. It is responsible for exercising surveillance over the state of the aquatic environment in the coastal and territorial sea areas, within the economic zone and in Lake Peipsi-Pihkva, and for protecting the marine environment and fish stocks. At present, all matters related to sea inspection, including oil pollution control, are dealt with by this Inspectorate. It also carries out inspections related to environmental regulations of the marine environment and inspects the merchant fleet, including passenger vessels and the fishing fleet. It is also in charge of environmental matters related to shipping and navigation in the context of the Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea Area and the International Convention for the Prevention of

Pollution from Ships (MARPOL), including the establishment of proper oil spill contingency planning.

Environmental permits by media (air, water, waste) are currently required in Estonia for the operation of industrial and commercial facilities. Environmental permitting is linked to the environmental standards and norms. Estonia is considering opportunities for introducing an integrated permitting system in the future. Approval of the EIA often provides the basis for the environmental permits for air, water and waste, as appropriate, based on information presented by the enterprise. Permits are issued for one to five years.

The EIA process currently predicts whether a planned activity will remain within the pollution norm, before permission to proceed is granted. The Ministry of the Environment and the local government have power to withhold permission for a planned activity, if norms cannot be met. One of the preconditions for successful compliance and enforcement is the *availability of reliable data* on pollution loads discharged into the environment. Such information is collected by some permit-holders and spot checks are performed by the authorities.

Monitoring and reporting

In 1993, the legal ground for monitoring was laid with the approval of the Concept of State Environmental Monitoring. The leading and *coordinating office for State monitoring* is the Environmental Information Centre (EIC). A monitoring board, created in 1993, was given the task to select contractors to carry out this monitoring. The actual contracts were awarded by EIC. The contractors have to guarantee the collection, primary processing and preservation of the data. In 1994, all monitoring carried out according to the state monitoring programme was funded by the State budget.

The main purpose of the Estonian Environmental Monitoring Programme (EMP) is to monitor the *long-term and large-scale changes* in the environment, thus identifying problems and helping to find solutions.

The general *objectives of the monitoring programme* are:

- To provide data for determining the current state of the environment and to update them for short-term reporting;

- To monitor long-term and large-scale trends in the environment, thus identifying the problems which may require research or direct countermeasures;
- To keep track of transboundary pollution flows by estimating Estonia's contribution to and role in the regional pollution load, making comparisons with other countries and compiling national budgets of transboundary pollution; and
- To develop and continuously improve the system of environmental indicators for generating information for EMP.

The EMP includes four main programmes - meteorological, physico-chemical, biological and integrated monitoring. There are four *levels of monitoring*: State, county, local and industry. Nature conservation areas are monitored but not in a coordinated fashion. A working group, led by the Estonian Central Environmental Research Laboratory Ltd., was formed to coordinate the work on the sampling, analysis and intercalibration of the laboratories and methodologies.

The main *priorities of the Government for monitoring* include (i) developing the data communication network and unifying data exchange protocols among institutions; (ii) developing a meta-database of EMP and introducing geographical information system principles in data management; (iii) intercalibrating the analysis methodology and establishing the laboratory system for the systematic follow-up of the analysis results; (iv) improving field sampling techniques and related equipment; and (v) automation of measurement result transfer from international monitoring stations.

The EIC has already produced several reports and summary documents concerning the state of the environment, air pollution, water pollution and water quality in Estonia. The *state-of-the-environment report*, published yearly since 1990, not only includes information collected by the Ministry but also consolidates information provided by the Regional Environmental Departments in the form of regional environmental reports.

Role of the scientific community and NGOs

In Estonia, several *State institutes* provide the State authorities with data and assist in the development of environmental policy. Examples of these institutes are the Institute of Fisheries Research, the

Meteorological and Hydrological Institute, Tartu University, Tallinn Technical University and the Estonian Agricultural University.

In Estonia, a significant number of traditional *non-governmental organizations* deal with environmental protection. Some are extensions or subdivisions of north or west European NGOs. Estonian NGOs have serious financial problems, which hamper their activities. The Estonian NGOs get financial support from northern and western European countries for some projects, in particular those which may result in a decrease in the transboundary environmental pollution from Estonia. The Estonian Nature Conservation Society managed to establish close cooperation with Finland in the 1970s, which became an important channel for the flow of environmental information in both directions.

Decision-making authorities are not obliged to take the decisions and opinions of NGOs into consideration. At the same time, however, these *organizations play an important role* in undertaking studies and influencing the political attitudes towards environmental issues and sustainable development.

Training and education

Many *education and training programmes* on the environment have taken place in Estonia in the last few years. In 1991-93, several specialists participated in seminars or courses on water protection, legislation, water management, and environmental impact assessment. In 1993, to better coordinate and direct the education process, the Ministry of the Environment created a post for a specialist responsible for organizing further training for environmental specialists and for promoting contacts with other ministries, schools, and the media.

The training courses cover a wide range of environmental topics, including the development of legislation and standards, environmental policy, EIA, project preparation and management, compliance and enforcement, the reduction of agricultural pollution, waste-water treatment, water protection, and issues related to oil-shale mining. To improve the knowledge of chemical laboratory workers, several education programmes have been provided. They covered modern apparatus and methods of analyses combined with practical work. Most of the courses have been made possible through *foreign assistance*. Training has been provided to staff members of the Ministry of the Environment, the Regional Environmental Departments and other ministries, and industry. Within the Ministry of the Environment,

each department is responsible for transferring the knowledge to the district level.

Environmental programmes have been introduced in *universities*. They cover a wide range of issues, including environmental management, protection, monitoring and assessment. Opportunities for post-graduates to attend courses at foreign universities have also opened up. Many firms work in close cooperation with universities. The universities are responsible for the theoretical teaching; practical training is given by consultancy firms, such as the Tartu Ecological Centre.

The Estonian Water Company offered and organized training programmes on water management issues. They covered such issues as waste-water networks and treatment technology. The Estonian Management Institute has arranged *continuing education* courses in environmental protection in cooperation with the Ministry of the Environment. The Ministry calls on experts from universities and from abroad, but the leading experts within the Ministry also teach the courses.

2.3 Environmental performance

Legislation

In recent years, Estonia has been *remarkably successful in developing environmental legislation* and in introducing the concept of sustainable development into its national policies. A noteworthy achievement, unique within the UNECE region, has been the adoption of the Act on Sustainable Development.

Environmental legislation in Estonia has changed considerably since the reintroduction of independence. Much of the former legislation has been repealed and replaced, in an attempt to reflect the concerns about resource management and sustainable development. *Most new laws are derived from western European legislation*.

Considering the large number of environmental laws that has been adopted since 1990 and the framework nature of many of them, the *main concern is the ability of the Government to implement them*. There are problems associated with the *lack of follow-up regulations and of government capacity (at both national and district levels) to monitor compliance*. The framework laws are rarely supported by adequate regulations governing their implementation, because of a lack of time and/or manpower to draft such

regulations. The recent Act on Sustainable Development lays down requirements for both environmental impact assessment and environmental audits. However, the framework law does not go into any detail, and laws on both EIAs and environmental audits now need to be finalized and pushed through the legislative process (chapter 7). The current *gaps in Estonia's environmental legislation* include, inter alia: legislation on noise, radiation, EIA and environmental audits; regulations regarding hazardous chemicals; ambient quality goals (for water, soils and air particularly); quality standards for specific uses of water (e.g. bathing, drinking); access to information; emergency response, e.g. similar to the EC Seveso Directive; and the remediation of contaminated land.

The efficient implementation and enforcement of environmental legislation *require: the redefinition of certain relationships between the various environmental authorities (horizontal and vertical); and the strengthening of national and district environmental authorities* in a consistent manner. New legislation is placing administrative obligations on district and municipal authorities which may not possess adequate capacities, in terms of staff and/or overall capabilities, to meet these. Such obligations are often poorly understood at this level, which with the lack of effective administrative regulations, inconsistencies and overlaps can cause considerable problems.

As Estonia has signed an *Association Agreement with EU*, gaps in relation to EU legislation need to be clearly identified and resolved. The current situation in Estonian legislation is quite complicated. Repealing old and passing new legislation takes time. Taking into account the prospect of entering the European Union, Estonia has to develop its legislation in line with the policy systems accepted in Europe, keeping in mind the principles and methods which support prevention, control and reduction of environmental pollution.

Institutional capacity

The Ministry of the Environment has been *successful in creating mechanisms for interministerial cooperation*, such as informal working groups between ministries. The fact that the Forest, Fisheries and Land Boards report to the Minister of the Environment, and the adoption of the concept of sustainable development within the Government, are major steps in ensuring that environmental concerns are integrated into sectoral activities.

However, *major ministries have yet to develop national programmes based on sustainable development*, in particular for the sectors that depend heavily on natural resources such as energy. Nor are there mechanisms for sectoral ministries to report to the Government and the public on their efforts to integrate environmental concerns in their activities. There is a need to examine how the governmental *Commission on Sustainable Development can play a major role in environmental planning*. Not only other ministries and academics, but also representatives from district authorities, NGOs and industry should be involved in its activities.

The Ministry of the Environment also *needs more expertise, for instance in economics*, to help it fulfil its integrative role. During the transition period, it is often difficult to recruit and retain staff with specific skills in engineering and economic analysis because of the competition from the private sectors. Consultants made available to the Ministry through foreign assistance have helped compensate for the reduced capacity.

Compliance and enforcement

The *Government has little leverage to enforce the laws at the moment*, inter alia, because (i) the technology to meet environmental standards is not available in many Estonian enterprises and upgrading or changing their current technology would require major investments; (ii) the capacity of local authorities to monitor compliance is almost non-existent. There is a need for major investment in new technology that only foreign assistance could provide at the moment. What currently drives enterprises to comply with legislation is the fact that otherwise they cannot do business with western countries, especially the European Union member countries. The *enforcement needs to be strengthened* through improved compliance monitoring and an integrated permitting system. The Ministry should also study the feasibility of *creating a subordinate agency in charge of, inter alia, compliance and monitoring*.

Because Estonia is a small country and the Government's current resources are limited, cooperation between the national, regional and local authorities, and industry is all the more important. The lack of capacity within the Government could be compensated by, for example, *establishing self-monitoring and reporting requirements for enterprises* when issuing permits. The full implementation of such a scheme would require time and resources from the private sector to upgrade or acquire monitoring capacity.

Monitoring and reporting

Substantial efforts have been made in the last few years to *upgrade the monitoring capacity*, in particular in terms of monitoring longer-term and large-scale changes in the environment. Consequently, good basic information is disseminated to the public through a number of mechanisms. *Annual reviews on the state of the environment are prepared* at the national and regional level. The Environmental Information Centre publishes the national annual reviews as well as air pollution and water pollution reports. Local newspapers publish information on major environmental events and the radio broadcasts environmental news. However, the disseminated information would further improve if leaflets or pamphlets were published on specific environmental issues or five-yearly monographs were issued to analyse the environmental trends, for instance.

Involvement of informal sectors

The Ministry of the Environment involves various informal groups, such as academics and, to a much lesser extent, NGOs, industry and the general public, in its environmental activities. *Public access to information*, not only government information but also environmental information produced by industry, *is inadequate*, however. Being a small country, in terms of both size and population, Estonia would

particularly benefit from improved communication and cooperation on environmental issues among different sectors of society. Informal sectors (e.g. academics, environmental NGOs, and business and industry) could be used as an extension of the Government in some aspects, especially data collection, monitoring and analysis, and research.

Municipalities could also play an important role in those aspects. *Procedures for access to information need to be clearly defined*. Moreover, environmental NGOs and other informal sector organizations have to play a more active role in environmental decision-making, including in the drawing-up of new legislation, strategies, policies, plans and programmes, as well as in project proposals of relevance to the environment. Specific mechanisms and procedures need to be worked out. Clear procedures to improve public access to environmental information are of particular importance.

Training

Legislative training has been provided to the management of the Ministry of the Environment and to specialists of Regional Environmental Departments. Environmental training courses should now be repeated, updated and continued by the Estonians themselves. The training programme should be revised to *strengthen the capabilities of district and municipal authorities* so that they can cope with their increasing environmental responsibilities.

***PART II: MANAGEMENT OF POLLUTION AND
NATURAL RESOURCES***

Chapter 3

AIR MANAGEMENT

3.1 Air quality and pressures

Air emissions and quality

Estonia has *high emissions of air pollutants* from its energy-related industries. It is heavily reliant on the combustion of oil-shale and other fossil fuels for electricity production and heating, and its energy consumption per capita is high. In 1993, emissions of sulphur dioxide (SO₂) per unit of GDP and per capita, while comparable to those of Poland and Hungary, were much higher than the average in European OECD countries. Carbon dioxide (CO₂) emissions per capita were also much higher than the average for OECD Europe, Bulgaria, Hungary and Poland. Per unit of GDP, these emissions, which are similar to those of Poland, were four times those of OECD Europe. Per capita emissions of nitrogen oxides (NO_x) were slightly lower than the average in OECD Europe, Bulgaria and Poland, while per unit of GDP, emissions in Estonia were more than 70 per cent higher than the average for OECD Europe (fig. 3.1).

For the four main energy-related substances, emissions in Estonia *decreased substantially between 1991 and 1994*. Emissions of SO₂ dropped by 39 per cent, particulates by 42 per cent, NO_x emissions by 30 per cent and CO emissions by 45 per cent (table 3.1). Most of the air pollution occurs in the north-east, where the highly polluting oil-shale related industries are located. During the same period, heat and electricity production (in particular at the two big power plants) and other oil-shale based production decreased considerably due to the economic recession, resulting in a cut in national air pollutant emissions.

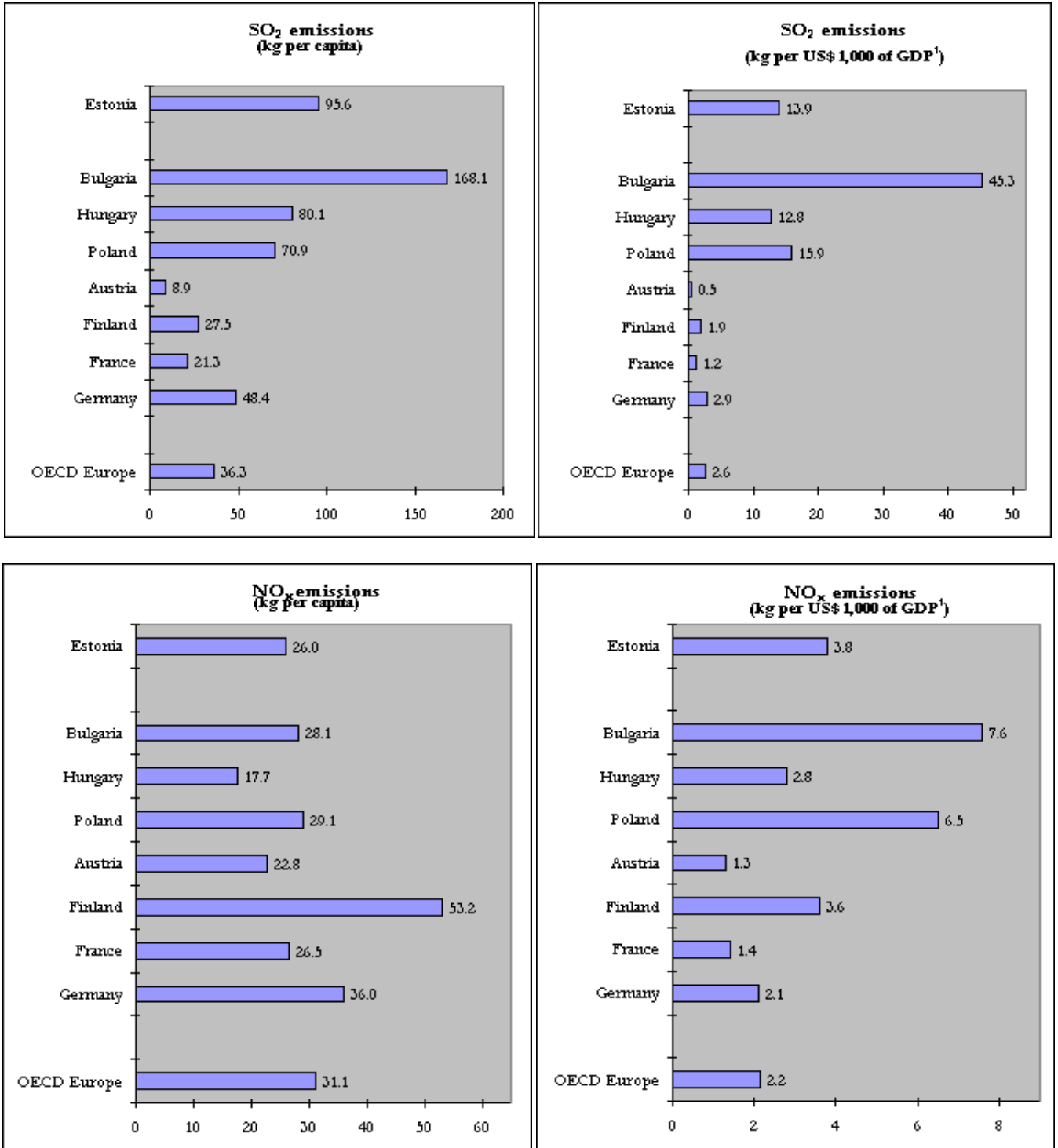
After a sharp fall between 1991 and 1992, *emissions from the transport sector* have increased along with the rise in the number of transport vehicles. In 1994, road traffic emitted some 264,000 tons of carbon monoxide, some 28,000 tons of nitrogen oxides and some 48,000 tons of hydrocarbons. However, the history of mobile sources of emissions is not well documented, so any trends should be interpreted with care.

There are few data on short-term concentrations. Ambient air concentrations are measured in five cities of north-eastern Estonia as well as in three measuring stations in Tallinn. Overall, the air quality is considered to be relatively good in Estonia. Nevertheless, the air quality standards, which are rather stringent (see table 3.2), were exceeded in three cities in 1994 (Narva, Kiviõli and Jõhvi). In Tallinn, the 24-hour standard for nitrogen dioxide of 40 µg/m³ was exceeded almost daily. Furthermore, a one-hour peak concentration higher than 600 µg/m³ was measured in 1994. Although no in-depth health studies are available (except for the health impact study of the Kunda cement plant which was not followed by concrete actions), local air quality may pose some risks to human health in such areas as Kunda, the Narva region and other localities with oil-shale based industries and high traffic concentration. Rural concentrations are monitored in two EMEP stations and one other station. Estonia *imports and exports much air pollution* (see chapter 9 for further details).

Pressures on air quality

In Estonia, *energy-related activities*, in particular those associated with electricity and thermal power production, are the major contributors to air pollution, boosted by outdated production technology and inadequate energy conservation methods. Emissions from fossil fuel combustion comprise the vast majority of those energy-related emissions. Activities associated with the production, transmission, storage and distribution of fuels also contribute to some extent to the emissions. Over 600 energy and industry-related enterprises report their emissions yearly. Three of these enterprises are the major contributors to air pollution: the Baltic and Estonian power plants in the Narva region and the Kunda Nordic cement plant in Kunda (fig. 3.2). All are located in north-eastern Estonia. In 1994, emissions from these three plants totalled over 100,000 tons of SO₂, 9,300 tons of NO_x and over 140,000 tons of particulates. In terms of total emissions by pollutant from stationary sources, the two power plants are responsible for

Figure 3.1: Air pollutant emissions, 1993



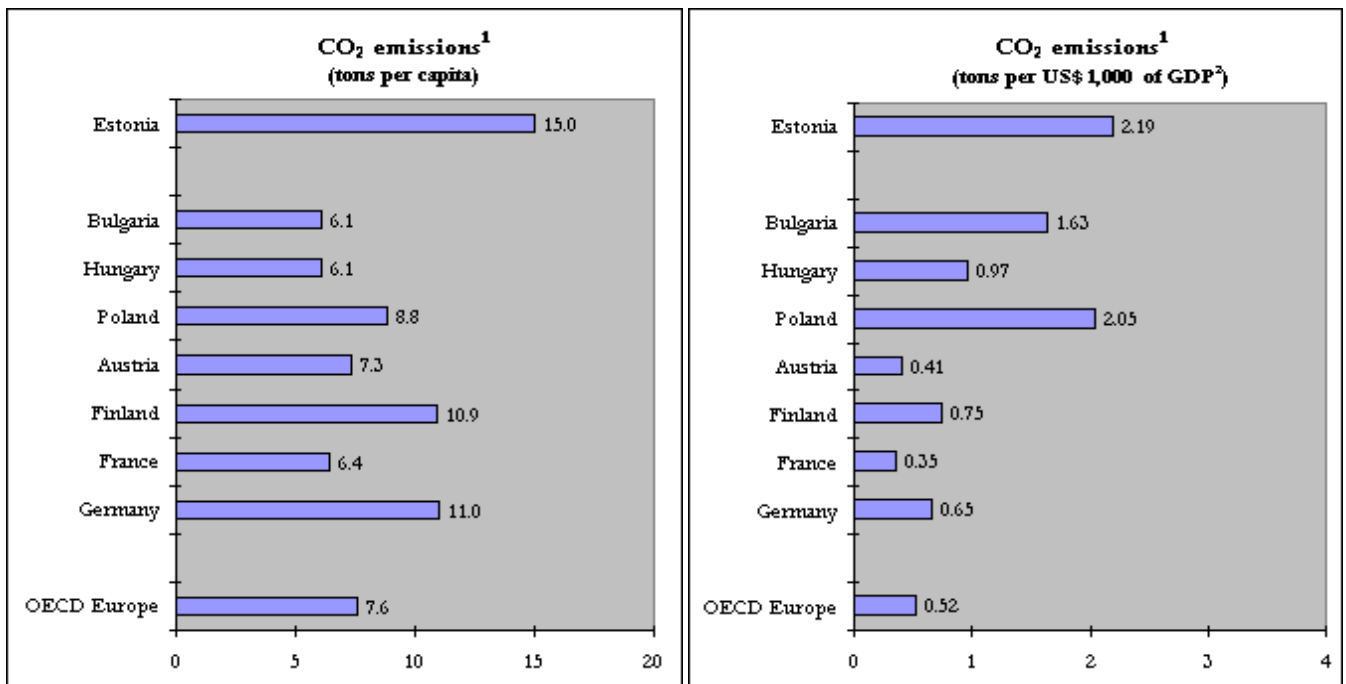
Sources:

Estonian Ministry of the Environment
 Estonian Statistical Office
 OECD

Footnote:

¹ - in US dollars at 1991 purchasing power parity's exchange rates.

Figure 3.1: Air pollutant emissions, 1993 (continued)

**Sources:**

Estonian Ministry of the Environment
 Estonian Statistical Office
 OECD
 Renewable Energy TAASEN

Footnotes:

¹ - data for Estonia refer to 1992.
² - in US dollars at 1991 purchasing power parity's exchange rates.

Table 3.1: Emissions of selected air pollutants

from stationary sources, 1991-1994 (thousand tons)				
	1991	1992	1993	1994
Particulates	278.1	240.7	189.0	161.3
SO ₂	232.6	177.3	145.0	140.8
NO _x	20.8	14.8	12.0	14.6
CO	56.8	32.4	27.8	31.5

Source:

Estonian Ministry of the Environment

from mobile sources, 1991-1994 (thousand tons)				
	1991	1992	1993	1994
NO _x	38.5	24.1	27.4	27.9
CO	317.8	167.7	188.5	264.1
Pb	0.13	0.06	0.07	0.12
CnHm	59.9	33.1	37.3	48.1

Source:

Estonian Ministry of the Environment

Table 3.2: Ambient air quality standards for selected pollutants

Pollutant	MPC (µg/m ³)		Class of toxicity
	20-min	24-hours	
Sulphur dioxide	500	50	3
Nitrogen dioxide	100	40	2
Sulphuric acid	300	100	2
Ammonia	200	40	4
Hydrogen sulphide	80	80	2
Hydrogen fluoride	20	5	2
Ozone	100	30	1
Soot (C)	150	50	3
Cement dust	300	100	4
Particulates	500	150	3
Oil-shale flue ash	300	100	3
Carbon monoxide	5000	3000	4
Phenol	50	3	3
Nitrogen monoxide	100	40	3
Lead and its compounds	1	0.3	1

Source:

Estonian Ministry of the Environment

Figure 3.2: Location of major air pollution emitters



Note: The boundaries shown on this map do not imply official endorsement or acceptance by the United Nations.

approximately 70% per cent of SO_2 emissions, 40% of NO_x and 50% of particulates. The Kunda cement plant is responsible for over 30% of particulate emissions. A strong correlation exists between the volume-growth deficit of local spruce and pine forests and the plant's dust emissions. In northern Estonia the soil is not sensitive to acidification, as the buffering capacity is good. Therefore, the damage to forests is most probably caused by the direct effect of air pollutants. Similarly, correlations can be established between plant emissions and the levels of local agricultural production. Other industrial enterprises influence local air quality to a lesser extent.

The *transport sector* has an increasing impact on air quality. The number of vehicles is rising rapidly and reached 398,000 in 1994. The number of private cars rose by more than 60% between 1991 and 1994 to 337,000. In 1993, Estonia had 21 passenger cars per 100 inhabitants, which is still much lower than the average for European OECD countries (fig. 3.3). Many cars now brought into Estonia have lower carbon monoxide emissions than the old car fleet. However, they often have bigger engines, which consume more fuel, and they do not have modern air pollution control technology to reduce NO_x emissions. Old imported buses, which need to be modernized significantly, continue to be a problem.

Since falling steeply at the beginning of the 1990s, the *total consumption of petrol has been increasing*. Nevertheless, in 1994 it was still lower than in 1990. Reliable statistics on the consumption of transport fuels are not available. However, both reformulated petrol producing low emissions and traditional leaded petrol are consumed. The Ministry of the Environment estimates that the statistics on emissions from mobile sources, e.g. nitrogen oxides, carbon monoxide and hydrocarbons, from previous years are not comparable with the new figures (1994 and beyond) or with the estimates for emissions from stationary sources because the method of estimation has changed.

3.2 Responses

Policy objectives

Even though *no general plans to cut emissions at a national level or from specific major sources* have yet been drawn up in Estonia, the Governments of Estonia and Finland have signed a treaty in which they agree to restrict emissions of NO_x to the level of 1987 by 1994, reduce their SO₂ emissions by 50% from the 1980 level by 1997, and draw up plans to reduce SO₂ emissions by 80% based on 1980 levels by 2005 at the latest. Currently the air quality targets, in particular for SO₂, can often be achieved for instance because of high stacks built in the past, which disperse emissions over a wide area, reducing the impact on local air quality but increasing the transboundary fluxes from Estonia to neighbouring countries. Further solutions to air pollution problems should not only address local air pollution but also substantially contribute to reducing transboundary pollution.

The *modernization of existing oil-shale fired energy production facilities* to reduce SO₂ and CO₂ emissions and fly ash discharges into the atmosphere was often mentioned by the Estonian authorities as one of their first goals. Several studies have been conducted to find the best tools to reduce these emissions. One clear message is that this goal will need major modernization investments. The introduction of sulphur content standards for fuel oil is also under discussion, as its use contributes greatly to the sulphur emissions.

Estonia has ratified the Framework Convention on Climate Change, but it has not acceded to the Convention on Long-range Transboundary Air Pollution and its related protocols.

The 1992 *Energy Conservation Programme* stressed energy-saving schemes, including the updating of the heat production and distribution facilities and the installation of heat meters (see chapter 8 on energy).

Measures to prevent and control air pollution

The *Ministry of the Environment* is responsible, inter alia, for developing air management policies, drafting air pollution legislation and, through the Regional Environment Departments, enforcing air pollution legislation. Air pollution permits are usually granted by the Ministry when stacks are higher than 100 metres. Other sources are licensed by the district authorities as well as by the cities of Tallinn and Narva. Other ministries also have an important role: the Ministry of Economy is in charge of industrial and energy policies, and the Ministry of Transport and Communications is responsible for transport policies. In general, human resources for air pollution issues at both the national and regional levels and in industry are limited.

Regulatory instruments

The *main law on air*, which regulates the management and control of air pollution in Estonia, dates back to 1981. The law stipulates that the protection of air quality is conducted State-wide by the national and county authorities. Typical of the Soviet period, the provisions were presented as declarations containing demands for equipment to control emissions and clean the air. To date it has been impossible for enterprises to fulfil many of these provisions for technical and economic reasons. Moreover, the violation of air quality standards has been common practice in many communities in the past. Consequently, the implementation, including the compliance and enforcement, of air quality targets may be difficult to achieve in the future.

Activities are taking place within the Ministry to *fill the present legislative gaps* to make air pollution control policies more effective. An air pollution control act which includes requirements for permit holding, reporting, monitoring and inspection, and a framework to establish emission standards has been drafted, but not yet adopted. A draft energy law also exists; it could potentially be used to impose further restrictions on air pollution emissions from the energy sector.

Figure 3.3: Number of vehicles, 1991-1994

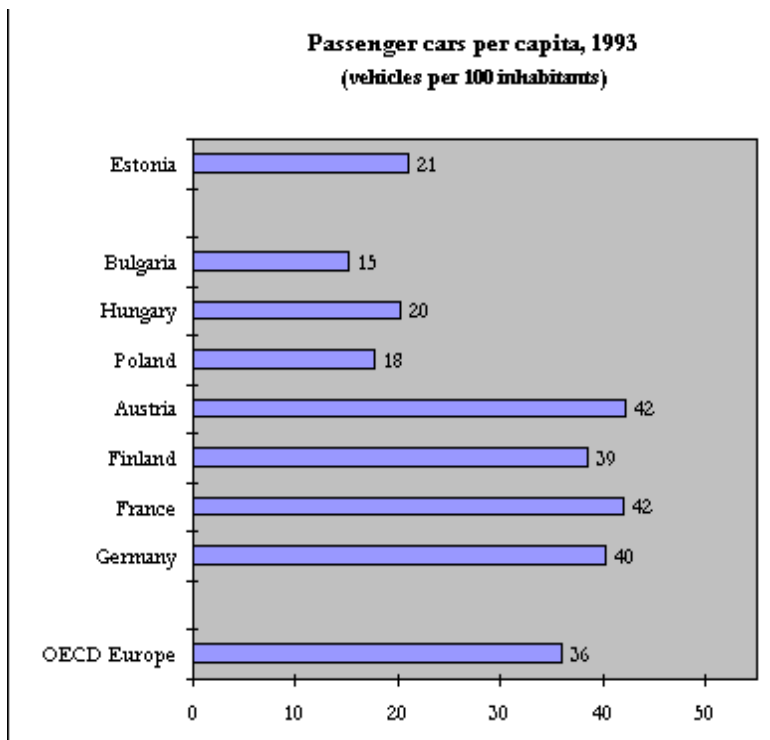
Number of	1991	1992	1993	1994
Private cars	206928	233556	284728	337196
% change from previous year	..	+13%	+22%	+18%
Passenger cars	261086	283469	317425	337812
% change from previous year	..	+9%	+12%	+6%
Buses	8628	8400	8663	6340
% change from previous year	..	-3%	+3%	-27%
Trucks	64937	62728	62971	53733
% change from previous year	..	-3%	+0.4%	-15%
Total	334651	354608	389059	397885
% change from previous year	..	+6%	+10%	+2%

Source:

Estonian Ministry of Transport

Footnote:

.. Data are missing.

**Sources:**

ECE: Annual Bulletin of Transport Statistics, 1995

OECD

Ambient air quality standards play a central role in the present air management system. Standards used during the Soviet period have been revised. In December 1994, the Ministry of the Environment decided to reduce the number of standards. The authorities are gradually developing the air quality standards to include only the most common air pollutants. The current list of standards consists of 140 pollutants divided into four classes of toxicity. Some of these standards are given in table 3.2. These standards are still too numerous and partly too strict to allow for any effective and realistic implementation and monitoring.

Air pollution emission and control requirements for stationary sources are derived from the air quality standards and are specified in a permit. *Compliance with operating permit* requirements is achieved by either reducing emissions or because of existing high stacks. The authorities can close a production unit, if the requirements are severely breached. The emission requirements are also used to calculate pollution charges, which are substantially higher if permit conditions are not met. The operating permits are reviewed every five years.

The possibility also exists of regulating the composition of products or fuels. The Ministry of the Environment has promulgated a regulation restricting the use of ozone-depleting substances. Standards for the sulphur content in fuel oil are under preparation.

Economic instruments

Polluting enterprises are required to *pay charges based on the volume of emissions* of major regulated pollutants (e.g. SO₂, NO_x, CO and particulates). In 1994, over 20 per cent of the Environmental Fund's income came from air emission charges (chapter 7). In case of non-compliance with the permit conditions, the charges are increased by a factor of 5, 50 or 500 depending on the pollutant in question and the level of non-compliance. The *import tax for vehicles* over 13 years old is 50% higher than that for newer ones. The tax, however, is rather low, only EK 4,000. Furthermore, the taxation of vehicle fuels is still negligible. There is no differentiation according to fuel quality; leaded petrol is actually cheaper than unleaded fuel.

Expenditure

The production of industry having decreased, *there has not been much domestic investment*, particularly in air pollution control technology. However, in industry, some plants have made initial investments.

In the Kunda Nordic cement plant, investments have begun, especially in air pollution control. After the explosion of the electric filter in 1994, the dust emissions from this cement plant were so high that, according to the 1981 legislation, it should have been closed by the authorities. However, the plant was kept open for social reasons. It is now being modernized. EK 100 million will be invested to significantly reduce energy consumption and emissions. The plant has been exempted from paying pollution charges, which amount to EK 28 million per year, as long as 25% of this sum is invested in environmental protection. It is expected that dust emissions will be cut to less than 10,000 tons in 1997, which would be tantamount to a reduction of over 90% at the full production capacity of 900,000 tons of cement.

With foreign assistance (from Finland), one unit of the *Iru power plant in Tallinn was retrofitted* with modern control systems and other equipment to enable the company to use sulphur-free natural gas. However, the power station has, whenever possible, used heavy fuel oil with a high sulphur content, because it was cheaper. The company, which produces heat and electricity, cannot afford environmental investments, as the prices for heat and electricity are too low, the cost of production exceeds what consumers can pay and many consumers do not pay their bills.

Plans to retrofit the major oil-shale fired power plants are on the drawing-board. The second phase of the feasibility study on the further development of oil-shale utilization will be finalized in 1995 in cooperation with international banks and the Finnish authorities and enterprises.

Total environmental expenditure for air pollution control is not known. Most of the assistance has come either from the Environmental Fund (EK 1.26 million in 1994 or 4% of the Fund's total expenditure) or from foreign donors.

Monitoring

Air quality is monitored in: Jõhvi, Kiviõli, Kohtla-Järve, Narva, Narva-Jõesuu and Tallinn. Three stations monitor the long-range transport of air pollutants, two of these are EMEP stations. Systematic monitoring in Tallinn and Kohtla-Järve have been ongoing since 1970 with old methods, which are not very sensitive. In 1994, the construction of an air quality monitoring network in Tallinn began. Modern measuring instruments, in particular optical methods, are now in use in Kiviõli

and Tallinn. In the future, the system will provide air quality information for the city and for traffic planning activities.

In 1994, new portable emission measurement devices were made available at the Ministry of the Environment. The Ministry's staff were trained in the use of these devices in Finland. Since then, few measurements have been taken because it is difficult to find enough financial support for a mobile monitoring unit. *Furthermore, most operating permits do not request the holder to monitor specific air pollutants.*

3.3 Environmental performance

Emissions and air quality

Emissions of air pollutants have fallen significantly since 1991. The decline is mainly the result of economic problems, in particular in the oil-shale and energy-related sectors of industry. The industries, which relied on very cheap energy and other raw materials, have lost their traditional markets in Russia. At the same time the price of imported energy has risen rapidly. So it is not surprising that emissions from stationary sources are much lower than in 1991. Overall emissions of SO₂ and particulates remain fairly high and further reductions are necessary to improve local air quality.

In urban areas, such as Tallinn, the *sharp increase in the number of road vehicles is a problem* that will grow in the future. The increase in traffic and in the number of vehicles on the road will undoubtedly become a major source of NO_x emissions in cities. Careful planning, more stringent fuel standards and further air emissions standards for vehicles will be necessary. For the main polluters, the oil-shale based and cement industries, some initial studies and investments have taken place. However, in order to meet national ambient air quality standards, major investments in environmental protection will be required. Attention should be given to the retrofitting projects, where oil-fired boilers are switching to solid fuels, in order to guarantee effective combustion and sufficient dust removal. Specific emissions can also be reduced by *improving energy efficiency*, for which there is a considerable potential.

Air management

The Ministry of the Environment is working to improve the legislative base for the better management and control of air pollution. The draft air pollution act, once adopted, will be a major step

forward. It should provide for better emission standards and stricter control over permit, monitoring and inspection requirements. The ambient air quality standards have been modified twice in the past. Although they now include fewer compounds to monitor, there are nevertheless too many to realistically monitor them all. It remains to be seen whether these standards can be achieved in some major urban centres and in areas close to oil-shale based industries. *Air quality monitoring has improved* since 1991. The system now provides for better information on the state of the environment. However, progress remains to be made in compliance monitoring.

In Estonia, specific plans for air pollution control and management do not yet exist. In addition to the major investments needed in industry, *national and regional plans for air pollution management are needed* to identify and carry out specific action to improve air quality, in particular, in the north-east. Such plans need to be integrated with an energy programme, including energy supply schemes to reduce sulphur emissions and energy efficiency programmes, and with a transport restructuring programme. A step-by-step approach is also required to narrow the gap between the target levels for ambient air quality and the level that can possibly be achieved given the current economic situation and technology.

The country could *accede to the Convention on Long-range Transboundary Air Pollution* and the EMEP Protocol on international cost-sharing (chapter 9). It already has two EMEP stations operating. However, acceding to the protocols on volatile organic compounds (1991) and sulphur (1994) would have major economic implications. The economic possibilities for the investments needed to implement these protocols should be studied. Nevertheless, ratification of the protocols could be an objective within the country's overall environmental strategy. Following accession to the Convention, Estonia should be encouraged to take an active part in the envisaged preparations of further protocols on nitrogen and related substances, persistent organic pollutants and heavy metals.

Stationary sources

Air pollution control in Estonia has concentrated on stationary sources and local air quality issues and is based on a permit system for which *compliance monitoring is weak*. Monitoring schemes need to be developed, incorporating, in the permit requirements,

regular self-monitoring and reporting by permit holders and regular inspections by district authorities based on the level of compliance of the permit holders. In the long term, ensuring enforcement and compliance will require improved cooperation between the two levels of government and between industry and the authorities. *Greater integration between environmental and energy policies* is needed. Environmental requirements in the draft energy law are a first step. Reducing the energy industry's high air pollution will depend on new investments and a long-term energy programme, including choices in fuels.

Mobile sources

Progress in the area of air pollution from mobile sources includes the preparation of a *regulation to*

restrict sulphur content in fuel oils. The growth in car numbers and its increasing contribution to air pollution emissions suggest that further efforts will be needed to limit motor vehicle emissions in cities such as Tallinn. Environmental concerns need to be integrated into the transport sector. The potential for fuel savings and reducing vehicle emissions will depend on how the regulations and taxation of cars and fuels are developed. Policies promoting efficient public transport could contribute to large oil savings by restraining the growth in private car use. Increased public awareness could also contribute to a more efficient use of transport. The price differentiation between leaded and unleaded petrol needs to be reversed and unleaded petrol made cheaper.

Chapter 4

WATER MANAGEMENT

4.1 State of and pressures on water resources

Current situation and trends

Quantity and availability

Estonia is rich in ground and surface water resources. Mean annual precipitation amounts to 650-670 mm. Evaporation accounts for 470 to 480 mm and the remaining part forms the run-off of rivers and groundwater recharge. Between 1991 and 1994, total abstraction of water fell by 35% (fig. 4.1), following a drop in economic activity. Of the 1.7 billion m³ of water consumed in 1994, 79% was used for cooling, 4% for processing in industry, 9% for fisheries, 1% for agriculture; domestic uses accounted for 5%. Water abstraction per capita as well as the intensity of use are still relatively high compared to other European countries (fig. 4.2).

Surface water: rivers and lakes

Mean run-off is 8.2 l/s/km² or 11.7 billion m³ per year. In Estonia, there are *some 1,500 lakes, the largest being Lake Peipsi*, and 7,400 rivers, brooks and main drains, of which only 10 are longer than 100 km. Estonia's rivers are divided into four watersheds: the Narva-Peipsi basin, the Gulf of Finland basin, the Gulf of Riga basin and the islands watersheds. Only 15 rivers have a catchment area exceeding 1,000 km². Of the total flow, 23% runs to the Gulf of Finland, 43.6% into the Gulf of Riga, 33% to Lake Peipsi and to the Narva river, and 0.4% to Latvia and the Russian Federation. *There are few abundant rivers in Estonia.* Only 13 rivers have an annual mean run-off over 10 m³/s. The Emajõgi and the Pärnu rivers follow the Narva in terms of abundance. North and north-east Estonia are relatively poorly endowed with water resources, yet most of the country's industry is concentrated there.

Groundwater

Estonia is well endowed with groundwater resources. Its groundwater abstraction was 343 millions m³ in 1994, 26 % down on 1991 (464 millions m³) because

of the recession. Groundwater is one of the most important natural resources in Estonia as it *provides two thirds of the drinking-water supply.* It is the drinking-water source for most of Estonia's towns and settlements, except Tallinn and Narva where groundwater resources are limited and surface water is therefore mainly used.

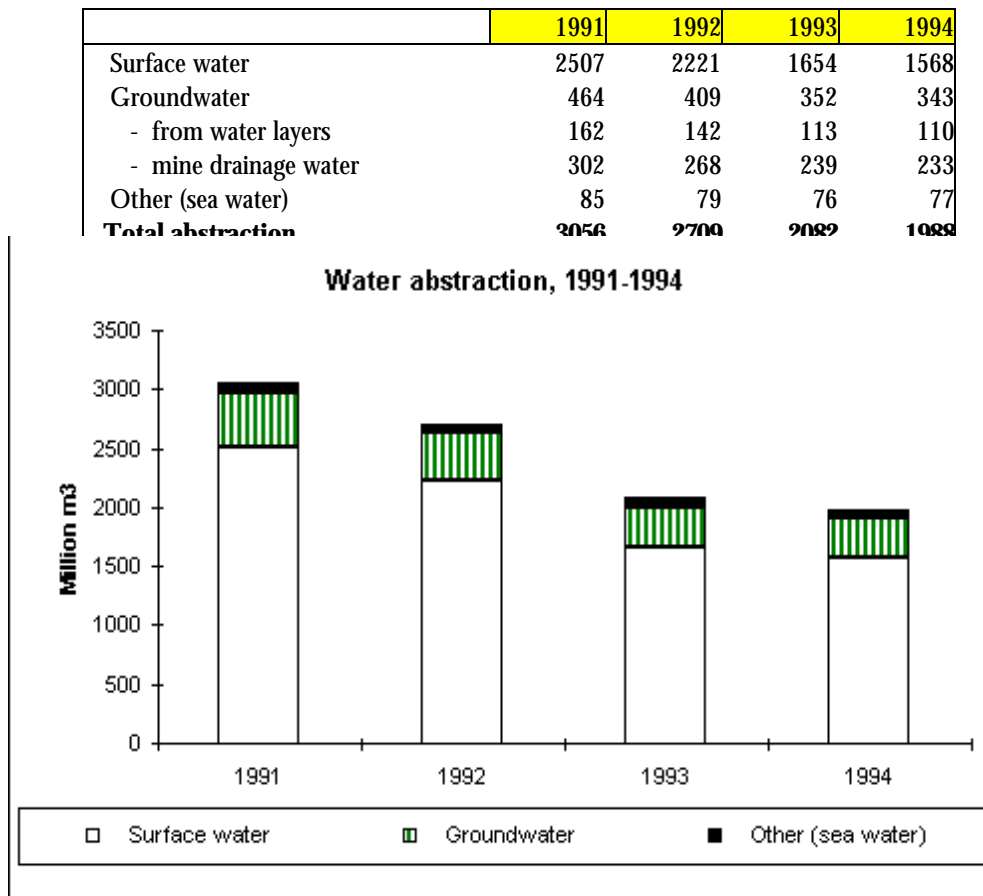
Fresh and marine water

Quality

Since Estonia lies entirely within the Baltic Sea catchment area, all pollutants and their transformation products reaching its water bodies will inevitably end up in this semi-closed sea. To monitor the quality of marine and freshwaters, the Ministry of the Environment has reorganized Estonia's environmental monitoring programme (chapter 2).

Surface water quality is monitored by laboratories according to the Water Monitoring Programme adopted by the Ministry of the Environment. Although a monitoring system and laboratory network existed in Soviet times, the system was not complete and the required analyses did not help to accurately describe the environmental situation. Therefore, *it is difficult to assess the long-term trends in water quality.* The average monitored values of Estonia's main rivers during the past three years do however show a slight improvement in quality (fig. 4.3). The pollution load carried by the main rivers in 1994 was significantly lower than in the previous years due to the economic recession (table 4.1). A map of the river water quality is established yearly on the basis of the monitoring results. Clean and slightly polluted sections represent 70% and 16% respectively; polluted sections, 13%; and very polluted sections, 1%. But Estonia does not have a classification system for river quality nor quality objectives for rivers.

Figure 4.1: Trends in water abstraction, 1991-1994
(million m³)



Source: Estonian Ministry of the Environment

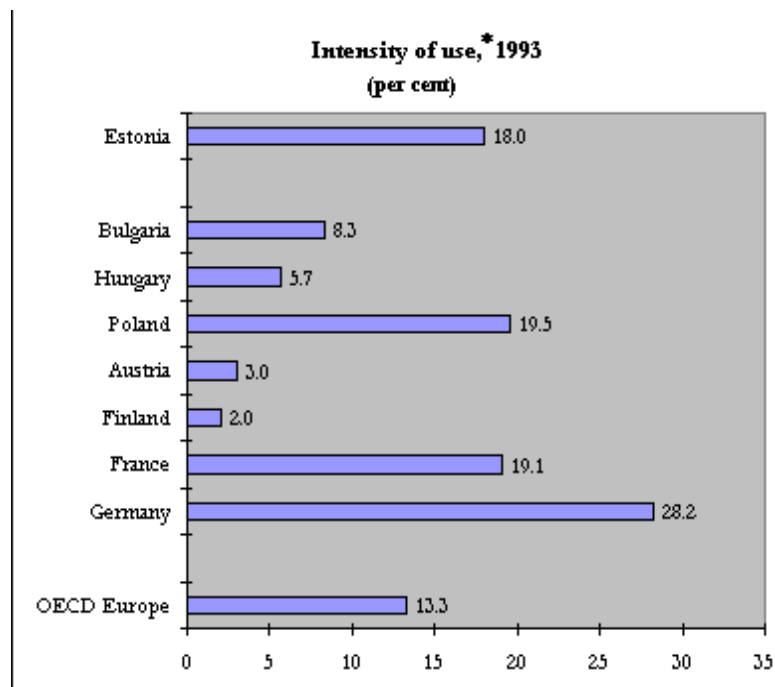
Groundwater quality is mainly monitored by the Geological Survey Centre. The quality of drinking-water from *deeper groundwater layers meets the existing drinking-water regulations*. Nevertheless, in many regions, *upper groundwater layers are polluted* with nitrogen compounds and, in some places, also with oil products. Since the early 1990s, due to a significant decrease in mineral fertilizer consumption, concentrations of nitrates have decreased sharply in some regions. The former Soviet army military bases, and especially their fuel tanks, are one of several serious sources of groundwater pollution (chapter 5). Boiler houses are another serious danger and have caused groundwater pollution in Paldiski, Kärđla, and Aruküla.

A survey of Estonia's marine water quality (physico-chemical and biological monitoring) was carried out by the Estonian Meteorological and Hydrological Institute, the Estonian Marine Research Institute and Tallinn Technical University in 1993, and financed by the Nordic Council of Ministers. Annual reports

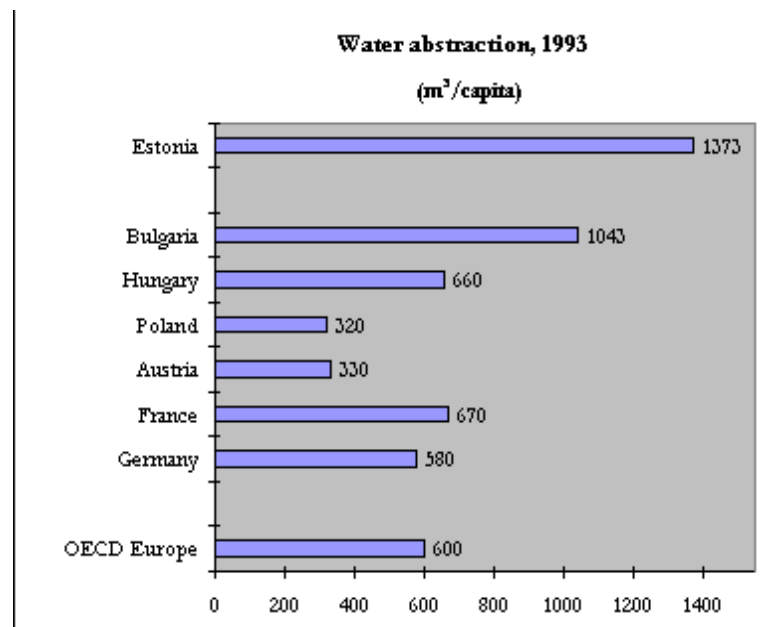
were prepared in 1993 and 1994, as required under the Convention on the Protection of the Marine Environment of the Baltic Sea Area, and financed from the State budget. Though Estonia is a small, sparsely populated country, it brings a *noticeable polluting flow into the sensitive ecosystem of the Baltic Sea*, and contributes to the high trophic level of the Gulf of Finland and the Gulf of Riga (table 4.1). In 1992, 54,400 tons of organic matter (expressed in terms of biochemical oxygen demand in 7 days (BOD₇)), 48,600 tons of N and 1,400 tons of P reached the Baltic Sea via rivers. According to the Estonian Environmental Information Centre, these amounts were reduced in 1994 to 35,650 tons of organic matter, 27,590 tons of N and 1,200 tons of P.

Due to the anthropogenic pollution and the inflow of nutrients via rivers, the concentrations are typically higher in the coastal waters of the oil-shale region, and in Tallinn Bay and Pärnu Bay. The presence of heterotrophic bacteria and phytoplankton is the result of eutrophication of the sea waters.

Figure 4.2: Use of water resources, 1993



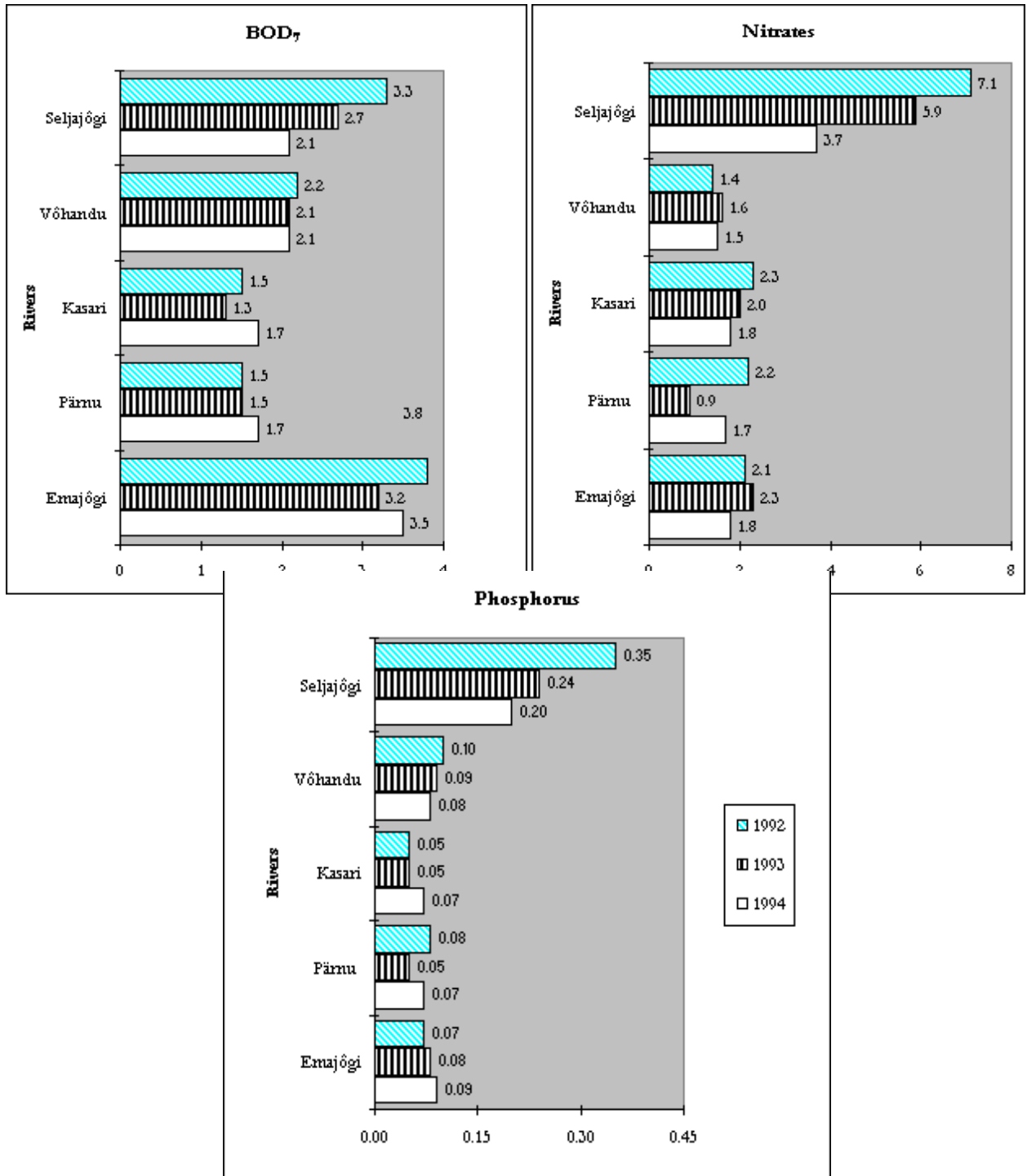
* - abstractions as a percentage of gross annual availability.



Sources: Estonian Ministry of the Environment, OECD

Figure 4.3: Water quality in Estonian rivers, 1992-1994

Mean concentration of pollutants
(mg/l)



Source: Estonian Ministry of the Environment

The main impact of this pollution is the *eutrophication of the inland and coastal water bodies*, which limits bathing, fishing and recreational activities. The drastic fall in economic activity since 1989 and the new waste-water treatment plants have considerably decreased the pollution load into the Baltic Sea. The comparison between 1988 and 1993 shows that in 1993 the *organic pollution load* (expressed as total BOD) was seven or eight times smaller than in 1988, and nitrogen and phosphorus load two times smaller. The main problems are the Tallinn, Pärnu and Narva areas for eutrophication, and Tallinn and Narva for heavy metals.

Pressures on water resources

During recent years changes have taken place in water use and consumption resulting in an overall reduction in water consumption (fig 4.4).

Regarding domestic use, the situation in water-supply and sewerage is bleak, although the percentage of the population that is served by public waste-water treatment appears high (85% - annex I). Drinking-water quality is a problem in some towns and counties, including Tallinn, where the situation worsened in 1993, and in Hiiumaa and in Sõmeru, where hepatitis-A broke out (545 people infected). Leakage in the water-supply network and inefficient waste-water treatment plants may explain this situation. The total capacity of the existing 1,150 biological waste-water treatment plants is 160 million m³ per year. More than 30 treatment facilities have a hydraulic load of over 1,000 m³/day, including 9 exceeding 10,000 m³/day. *Many waste-water treatment plants need to be rebuilt or modernized.* In addition, there is a general breakdown in the maintenance and operation of municipal sewerage facilities and in the domestic and industrial waste-water treatment plants. Because of complications in the privatization process, it is sometimes not clear who actually owns the waterworks and sewage systems.

Water use in industry has fallen significantly over the last years (a 56%-decrease between 1991 and 1994). This has been caused by the structural reforms and by the recession. The activity of some branches has decreased considerably (e.g. food industry), some big plants have stopped their activity altogether (e.g. pulp and paper production, with the exception of the Kehra sulphate mill, which has recently been restarted without new environmental investments). The drainage water pumped out of oil-shale mines and pits, which

contains sulphates, nitrates and suspended solids, is discharged into surface water bodies (chapter 8). Solid and liquid wastes from industry and power plants (ash fields) are discharged into dumping sites, where leaching pollutes water bodies and groundwater (chapter 8). The resumption of industrial activities will mean an increase in water consumption and waste-water discharges, unless new, closed-loop and low-waste technology is introduced.

Non-point pollution (phosphorus and nitrogen pollution) *from agriculture reaches surface water* (rivers and lakes) *as well as groundwater*, and finally the Baltic Sea, causing eutrophication problems. Since the large State farms, which used fertilizers and pesticides intensively, have disappeared, the related polluting pressure has diminished significantly (fig. 4.5), as has the amount of water used for agricultural activities (7.6% less water in 1994 than in 1991). However, if private agricultural activity recovers, it is likely that this pollution will resume.

The *quality of recreational waters on Estonia's beaches is endangered* in some places by the urban and industrial polluting waste waters which are discharged to the sea without adequate treatment. As a result, the Health Service closed a number of beaches in 1993. In 1994 and 1995 several of them were re-opened, in particular the Pärnu beach after a waste-water treatment unit was started up in Pärnu.

4.2 Responses

Water management policy objectives and goals

The main goals of water management are to save and protect ground and surface water resources, to provide all users with an appropriate water-supply, and treat waste water efficiently. The aim in the near future is at least to preserve the achievements in rural regions, to fulfil the international obligations in particular under the Baltic Sea Programme, to abate the adverse effects of pollution sources and to improve the quality of drinking-water and of waste-water treatment.

The targets defined by the Baltic Marine Environment Commission (HELCOM), the 1988 Declaration of Prime Ministers of the Baltic Sea and other international agreements, and taken over by Estonia are:

- To reduce the discharges of dangerous substances (heavy metals, nutrients, toxic compounds) into water bodies by at least 50% by 1996 compared to 1987;
- To ensure a biological (or equally effective) waste water treatment efficient enough to comply with the HELCOM recommendations ($BOD_5 < 15 \text{ mg/l}$; $P \text{ total} < 1.5 \text{ mg/l}$) by the end of 1988 in settlements with a population of over 10,000;
- To cut agricultural pollution at least by half by 1996 compared to 1987;
- To limit the use by industry of high-quality groundwater in favour of its use for the drinking-water supply;
- To implement progressively and systematically best available technologies in industry to diminish the pollution pressure.

To achieve the above-mentioned targets, the Government of Estonia *has drawn up and started to implement a legal framework* (acts, regulations, norms and standards) derived from international agreements, and introduced economic incentives.

Table 4.1: Pollution load from the main rivers, 1995

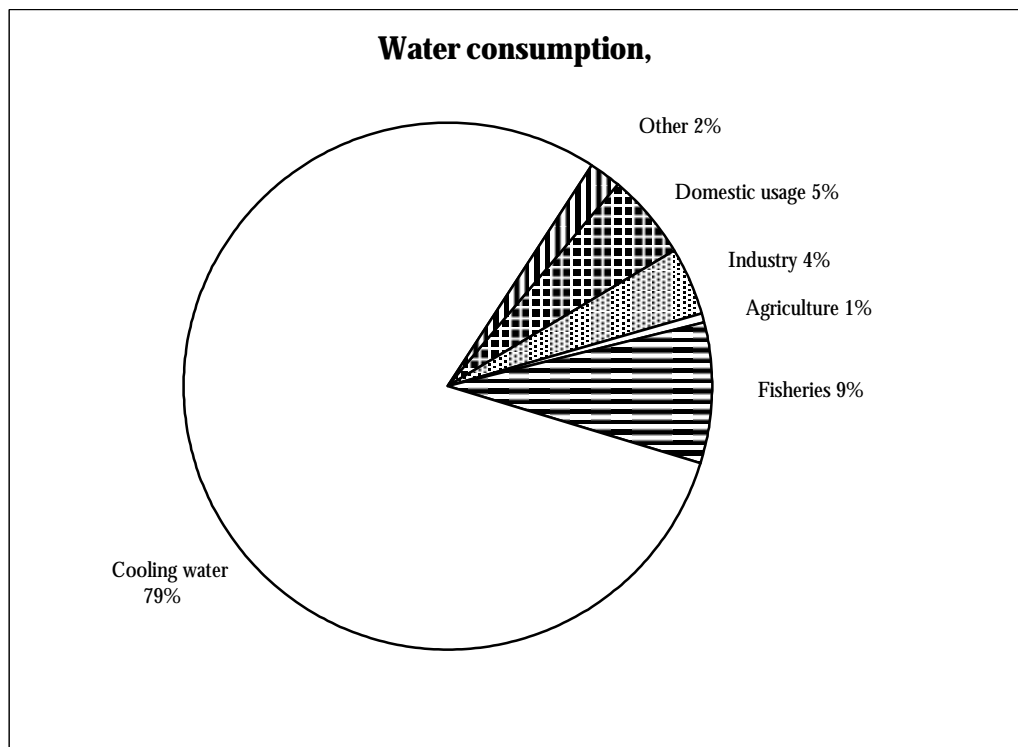
River	Flow rate (m ³ /s)	Pollution loads (tons)		
		BOD ₇	N total	P total
Lake Peipsi and Narva River basin				
Narva	385.0	253	572	34
Võhandu	8.1	38	36	7
Lake Peipsi				
Emajõgi	56.0	1222	301	67
Gulf of Finland basin				
Jägala	7.4	25	13	3
Keila	6.0	47	26	3
Kunda	4.4	18	6	1
Purtse	6.6	279	205	1
Seljajõgi	2.5	158	43	11
Vääna	2.1	13	4	1
Valgejõgi	3.5	122	11	3
Puhajõgi	1.8	442	122	21
Gulf of Riga basin				
Kasari	24.7	50	31	5
Pärnu	48.4	240	97	23

Source: Ministry of the Environment

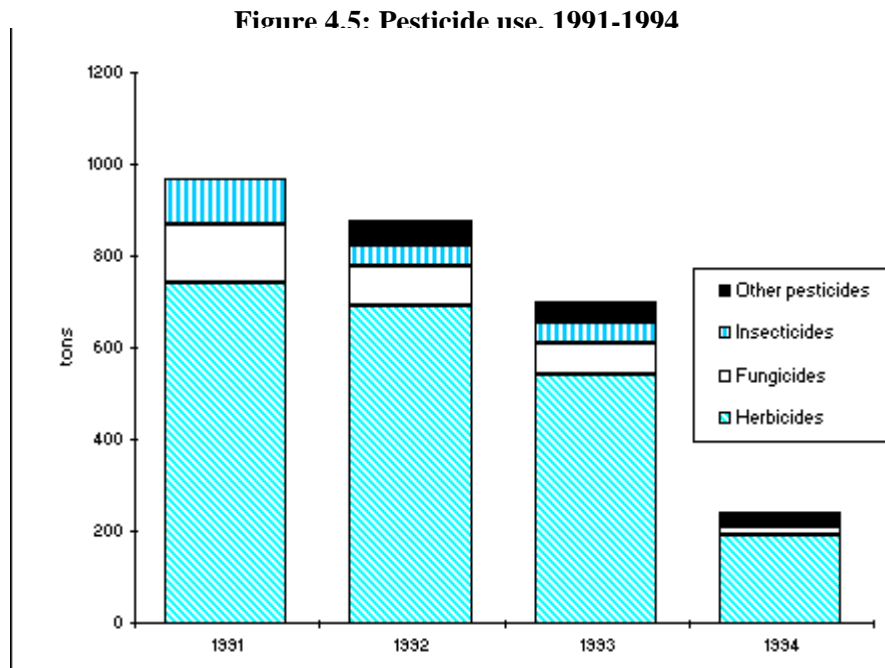
Figure 4.4: Water consumption patterns, 1991-1994

Water users	1991	1992	1993	1994	% change 1991-1994
	(million m3)				
Cooling water	2227	1985	1441	1372	-38.4
Domestic usage	107	104	99	92	-14.0
Industry	158	125	75	69	-56.3
Agriculture	41	30	13	10	-75.6
Fisheries	206	151	156	149	-27.7
Other	24	45	30	33	40.4
Total water consumption	2763	2440	1814	1725	-37.6

Source: Estonian Ministry of the Environment



Source: Estonian Ministry of the Environment



Source: Estonian Ministry of the Environment

The respective functions of central and municipal organizations involved in water management have been clarified to improve their performance. The Government is now *taking action to complete, extend and improve municipal water-supply and sewerage systems* as well as industrial waste-water treatment facilities. It is also working to improve the efficiency and management of municipal water-supply and sewerage services.

The Government is *drafting the water use and protection norms for industry and agriculture*, based on best available technology and cost-effectiveness. It is also defining the priorities for fundamental and applied research work in water management. It has taken measures to develop the monitoring system for the water environment that corresponds to international requirements, and to provide the users with the necessary information.

A *Water Protection Programme for the period 1995-2000* was adopted by the Minister of the Environment. This programme includes the goals and targets imposed by the Convention on the Protection of the Marine Environment of the Baltic Sea Area, the water management investments from 1995 to 1998, and provisions for financing water management. The investment part is updated every year.

To ensure that bodies of water are clean and that inhabitants have safe drinking-water in the near future, it is estimated that the *central authorities and*

municipalities will have to invest close to EK 2 billion. The bulk of this sum is needed to further modernize Tallinn's water management (roughly EK 700 million). To carry out these measures, foreign loans and aid are indispensable, because neither national nor municipal budgets can fully cover such large expenses in the short term.

The institutional, legal and regulatory framework

Institutional aspects

The Estonian *Ministry of the Environment* is responsible for developing water legislation, setting water standards, developing measures to improve ground and surface water resource management and water use management. The *Regional Environmental Departments* at the county level are in charge of the implementation of the water resource management policy in close cooperation with the *local governments* (municipalities and settlements), which are responsible for water-supply and sewerage. Checking the quality of drinking-water is the responsibility of the *Health Service under the Ministry of Social Affairs*. The distribution of water management functions in Estonia is given in table 4.2.

Legal requirements

The Water Act (1994), complemented by provisions of the 1990 Nature Protection Act and the 1993 Act on Compensation for Pollution Damage, provides the

basic framework for water legislation. Requirements concerning the discharge of waste water were introduced by the Regulation concerning requirements on waste-water discharge to the water bodies and ground (1994), amended by the Regulation on restriction of requirements on waste-water discharge to water bodies and ground (1994). It was complemented in 1995 by a regulation establishing pollution damage compensation rates, which set up the related economic instruments and taxation system.

The *Water Act* specifies the ownership of ground and surface water and the ecological balance to be achieved in water bodies, and regulates the management, conservation and use of water resources, and the relations among water users. Groundwater belongs to the State, while water bodies can be the property of private individuals, municipalities or the State. In 1995, the *Act on the Protection of Marine and Freshwater Coasts, Shores and Banks* was approved.

The authority of local governments, which covers a substantial part of water management, is currently regulated by no more than a few sentences in the statute books, especially the *Act on Local Governments adopted in 1990*.

The situation concerning the siting of water facilities and the sanitary conditions for their operation is expected to improve with the recent adoption of the *Act on Planning and Construction* and the upcoming approval of the *Act on Health Protection*. These acts lay down provisions for the construction, operation and maintenance of water-supply and sewerage systems.

The regulatory system

The current policy for water management in Estonia is a balanced system based on command and control (emission standards, permits for water use and discharge, State inspection) and on economic instruments (water-use and pollution charges, threshold levels, differential charge rates, fines/subsidies, grants and soft loans).

In 1994 a regulation was adopted for the establishment of water permits generally issued for five years. All *ground and surface water use (abstraction and discharge)* requires a permit delivered by the Regional Environmental Department (and signed by the Governor). This permit specifies the water rights of the user: every town, settlement and enterprise using more than 30 m³/day of surface water or more than 5 m³/day of groundwater must

have a water-use permit. The permit determines the volume of raw water that can be used and also the amount of pollutants that can be discharged. For large quantities, the specific requirements listed in the Convention on the Protection of the Marine Environment of the Baltic Sea Area are followed. The permit also defines the rate of the two fees (abstraction and pollution charges) that the user has to pay. Over the permissible limits the polluter has to pay five times more. When issuing the pollution permits, the real conditions of the enterprise or municipal waste-water treatment plant are taken into account. For old industrial plants, higher pollution volumes can temporarily be tolerated. At the same time, for new industrial plants, rehabilitated ones and new municipal waste-water treatment facilities stricter rules in line with European Union and HELCOM standards are applied. However, *at present, Regional Environmental Departments are not able to efficiently implement and enforce this permitting system*. They lack staff and expertise. In addition, the Environmental and Nature Protection Inspectorate, which is in charge of monitoring and checking compliance with the permitting system at the central level, lacks the capacity and the necessary coordination with the regional offices and the permit holders.

Environmental impact assessment and land-use regulations (zoning) play an important role in addressing and managing both ground and surface water problems (pollution, erosion, drainage, etc.).

Economic instruments and expenditure

The water permits establish two environmental charges: an abstraction charge and a pollution charge. The charge rates, as laid down in the 1994 ministerial regulation, which are the same for the whole territory, are set somewhat arbitrarily by environmental experts without reference either to the economic situation or to public debate. The *charge on water consumption* (use of natural resources), which currently goes to the State budget, will go to the Environmental Fund in 1996. Fifty per cent of the *pollution charge* is directed to the national Estonian Environmental Fund and the other fifty is channelled to the Regional Environmental Departments in the counties. In 1994 the income of the Environmental Fund from waste water amounted to EK 7.2 million (23% of the Fund's total income). The rates of these charges are still too low to have a visible incentive effect on the consumers and polluters. These rates should be substantially higher to fully cover investment, maintenance and operating costs. However, the payments help fund the investments in municipal

Table 4.2: Water management: distribution of functions at the central and local administrative levels

A. Functions of the Estonian Ministry of the Environment:

1. Formulation of general water management policy
2. Planning of measures for water use and protection, general directions and objects of State importance
3. Technical control of the water-supply and sewerage systems and development of regulatory measures
4. Organizing and developing programmes
5. Water cadastre
6. Statistics
7. Drafting of legislation and control on implementation
8. International agreements, State level cooperation projects
9. Coordinating of applied research
10. Organizing training
11. Monitoring and checking compliance with the water permit
12. Issuing water permits (if so determined by law)

B. State functions at the local level:

At the county level:

1. Implementation of water protection and use policy
2. Planning of use and protection of water resources and implementation of State control according to legislation
3. Data system on water resources' quantity and quality, water use and waste-water discharge
4. Water resources' use planning
5. Issuing discharge permits
6. Development of the water management development programmes for counties
7. Organizing water monitoring programmes at the county level
8. Organizing water monitoring at the municipal (local) level
9. Cooperation with local governments, consulting them about water management problems
10. Regulation of water relations between local governments
11. International cooperation at the county level

At the municipal level:

1. Implementation of State policy at the local level
2. Water-use permits
3. Administration of water bodies belonging to municipalities
4. Combating accidents
5. Water-supply and sewerage
6. Public awareness and discussion of water-related projects
7. International cooperation at the local level

sewerage and industrial waste-water treatment plants.

Since 1992, EK 71.6 million have been invested in water protection from the State budget and EK 59.6 million from local budgets. In 1994, EK 14.5 million from the Environmental Fund was spent on waste-water management. Foreign investments amounted to EK 45.0 million from 1992 to 1994, including EK 40 million in 1994 (table 4.3).

The main current water projects

Estonia's main priority today is urban sewerage and industrial waste-water treatment. Most of the 13 Estonian "hot spots" identified by HELCOM (chapter 9) entail water investments (mostly combined industrial and municipal waste-water treatment), which are too large to be entirely financed by Estonian funding in the short term.

Several important programmes are being implemented with the support of multilateral (World Bank, European Bank for Reconstruction and Development (EBRD)), subregional (Nordic Investment Bank (NIB), Nordic Environment Finance Corporation (NEFCO)) and bilateral institutions and arrangements:

- The Tallinn project for the reduction of waste-water discharge, the most important project relating to water, and the first EBRD investment in environmental infrastructure (along with PHARE and Finnish funds), where the waste-water and the water-supply systems are to be comprehensively modernized (EK 700 million). The first step is already achieved and the second has recently been accepted by Parliament. It will make it possible to meet the objectives under the 1992 Convention on the Protection of the Marine Environment of the Baltic Sea Area;
- The two projects on the renowned health and recreation resorts Haapsalu and Matsalu Bays, listed in the Ramsar Convention, where the World Bank is considering the improvement of water-treatment plants. The present mechanical waste-water treatment at Haapsalu will be upgraded with a biological process, partly financed by foreign loans (chapter 9);
- The Small Municipalities Environmental Project, which is an EBRD initiative also supported by several countries and NEFCO, will restructure water-supply and sewerage

services and upgrade the water and waste-water facilities in 11 municipalities with different sizes, locations and problems: Tartu, Narva, Pärnu, Rakvere, Tamsalu, Sillamae, Keila, Rapla, Kuressaare, Elva and Kallaste (around 320,000 inhabitants in all).

4.3 Environmental performance

Water resource management

The *mixed approach* of command and control combined with economic instruments, recently adopted by Estonia to improve its management of water, is being progressively implemented. The *legal and regulatory framework* for water resource management exists, but important laws still remain to be passed for municipal water-supply and sewerage services and for land uses which have major consequences for water resource management.

Ground and surface water bodies are regularly *monitored and assessed*. Nevertheless, because of inadequate monitoring, the database on river and groundwater quality is not yet completed or fully reliable. A comprehensive monitoring and information system is under development. It still needs to be completed, in particular for coastal and marine waters. The Ministry of the Environment is finalizing a comprehensive national environmental monitoring strategy, including fresh waters and marine waters. Existing monitoring networks and methods are being analysed to see if there is scope for improvement. Physico-chemical and biological monitoring of water quality and water discharge will be covered through the four main sub-programmes of the Estonian Environmental Monitoring Programme (EMP) throughout the country.

Overall *water quality* has improved during recent years mainly because of the recession, and in coastal and Tallinn areas also as a result of investments in some waste-water treatment plants following the HELCOM recommendations. Now that the economic trend is improving, the challenge for Estonia is to keep improving its water environment, using its diversified tools more and more efficiently: technical, command and control, and economic instruments.

With its large water resources and its fairly flat land, Estonia also *needs to pay attention to drainage*. New investments may be needed for the rehabilitation, operation and maintenance of the existing drainage systems.

Municipal water-supply and sewerage

Very positive steps have already been accomplished in this sector, which is quite essential for each and every inhabitant of Estonia:

- Transfer of the assets, operation and maintenance of the facilities to the local level;
- Implementation of a number of projects, mainly to improve drinking-water and sewerage treatment facilities, with the support of a variety of external funding agencies.

Nevertheless, some *important gaps remain to be filled urgently* in order to achieve sustainable and efficient development and to prevent problems that may appear in the more complex context of a new market economy:

- There is neither a legal framework nor a specific entity officially in charge of the overall policy and strategy for municipal water-supply and sewerage, drainage aspects and the industrial use of water. So far emissions are not always properly monitored and self-monitoring by enterprises should be improved. Moreover, the consequences of

introducing a permitting system have not been comprehensively analysed;

- For municipal water-supply and sewerage, the role and respective responsibilities of the partners at the local level need to be clearly defined (legal, regulatory, institutional and financial) to care for small municipalities, villages and rural settlements, which are numerous;
- With the decentralization of water management, water investments as well as the operation and maintenance of water-supply and sewerage facilities are now to be ensured at the local level. Consequently, a sound funding system is required at the municipal level, where earmarked financing and co-financing can flow in a sustainable manner in order to meet the needs;
- As in most other parts of the Estonian economy, the private sector could play a stronger role in water-supply and sewerage activities, by participating in funding, operating and maintaining the public facilities.

Table 4.3: Expenditure on water protection, 1992-1994

	1992	1993	1994
State expenditure (on investments)	0.4	19.5	51.7
including			
(a) water-supply	0.0	1.5	7.9
(b) waste water (sewage and treatment)	0.4	18.0	43.8
Regional and municipal expenditure (on maintenance, operation, and investments)		59.6	..
of which			
(a) water-supply	0.0	31.4	..
(b) waste water (sewage and treatment)	0.0	28.2	..
Environmental Fund	3.5	8.6	14.5
including			
(a) national level	1.2	3.3	6.8
(b) regional level	2.3	5.3	7.7
International assistance (grants)	1.7	3.3	40.0
Enterprises' expenditure	93.5	165.0	..

Source: Estonian Ministry of the Environment
Footnote: .. – data are not available.

Water uses in industry and the energy sector

Water uses in industry and the energy sector are very important in Estonia: their water consumption is by far the largest. They are also major sources of pollution which may be dangerous because it involves toxic components, heavy metals, radioactivity, etc. Even though the industrial pollution load discharged in water bodies has significantly decreased during the transition period, it is necessary to cope with it firmly to keep it under control when the Estonian economy recovers, using both command and control tools on the one hand, and economic instruments (taxes and incentives) on the other. Former mandatory limits on the emission of industrial waste water and on the quality have been abolished. Generally, industrial waste water is discharged without pre-treatment into municipal waste-water facilities, which is in contradiction with the HELCOM recommendations. The privatization in industry creates opportunities for resolving this problem and the Ministry of the Environment together with the Estonian Privatization Agency should consider various options.

Coastal and marine water quality

In conformity with the HELCOM regulations, Estonia has to monitor and abate its pollution loads into the Baltic Sea, whether carried there by rivers or discharged straight from the coast by settlements and industry, in particular the organic load, phosphorus and toxic compounds. There are many different projects for municipalities, but the *situation concerning industrial water discharges directly into the sea is not clear*. The pollution load from all coastal urban areas should be taken into consideration in monitoring activities. Control measures need to be taken for BOD, nutrients and heavy metals abatement. Cooperation on the protection of marine waters with countries around the Gulf of Finland and the Gulf of Riga needs to be strengthened.

Chapter 5

WASTE MANAGEMENT AND SOIL CONTAMINATION

5.1 Current situation and trends

Waste management

Industrial waste

Industrial waste, defined in the Estonian Waste Act as “the manufacturing or working process residuals which have lost their original consumption qualities on the site of their generation or during the technological process”, accounted for 95% of the total volume (13.8 million tons) of waste produced in Estonia in 1994 (fig.5.1). *The generation of industrial waste has been rather stable over the last three years*, although the generation of hazardous waste has declined significantly (by 22.4%) since 1992, mainly because of the sharp drop in industrial output (by 32.9% since 1992). In some industrial sectors, production was completely stopped in 1993, e.g. phosphate fertilizers, sulphur acid, some steel production, cellulose and paper, which are large waste generators.

Oil-shale mining and quarrying dominate the waste sources, together with oil-shale based energy production (chapter 8) and the chemical industry. Total accumulation was estimated at 250 million tons by the end of 1993, and annual generation of oil-shale based ash, slag and semi-coke waste and waste from oil-shale mining activities was about 12.7 million tons in 1994 (i.e. 92% of total waste generation), of which 8.7 million tons, i.e. 69%, are dumped. According to the Estonian waste classification, most of the waste generated in oil-shale based energy and chemical production is hazardous mainly because of its high alkalinity.

Waste data in general have been collected from the industrial waste generating enterprises since 1991 and the quality of information improves year by year. *Industrial waste disposal in landfills* is geographically concentrated in the north-east, which reflects the high concentration of waste generation there (oil-shale mining and energy production). Estimates of the quantities of dumped or recycled waste reported by enterprises do not

seem entirely reliable. As the levy on dumped waste is multiplied 5 to 500-fold (according to its hazardousness) if the quantity of discharged waste exceeds the annual limit set in the permit, enterprises are tempted to minimize the reported quantities of the dumped waste.

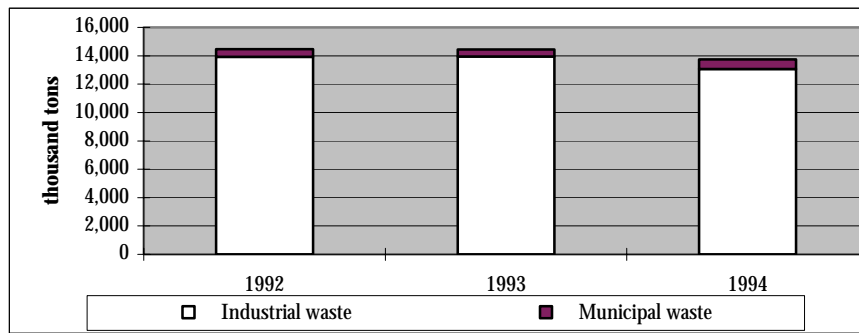
According to the 1993 statistics, about *half the industrial waste*—excluding oil-shale wastes—*is reused in the economy*. About 20 per cent of the oil-shale based industrial waste is used mainly for reclaiming areas spoilt by mining, road construction and also liming of cultivated soils. Until recently there were no waste incinerators and all industrial wastes were simply dumped.

Municipal waste

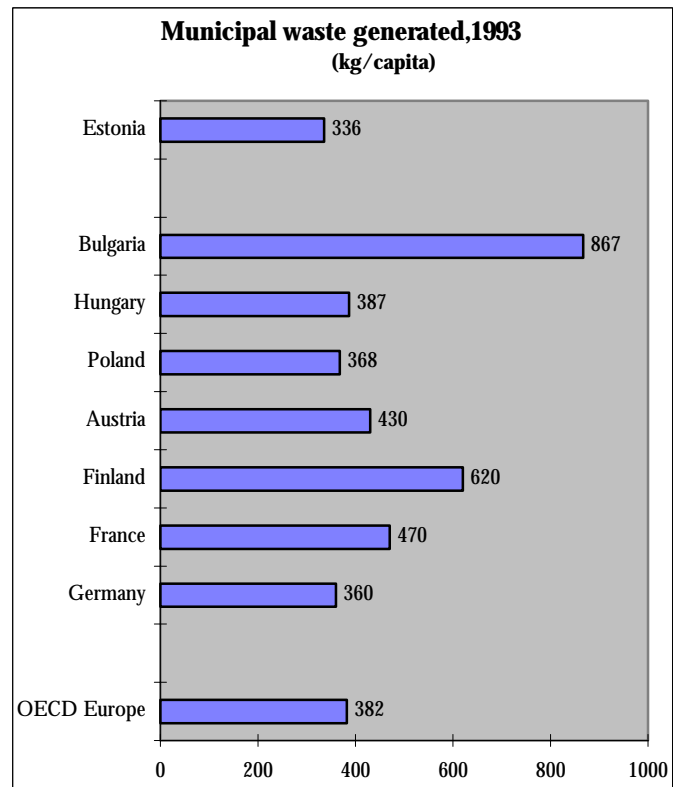
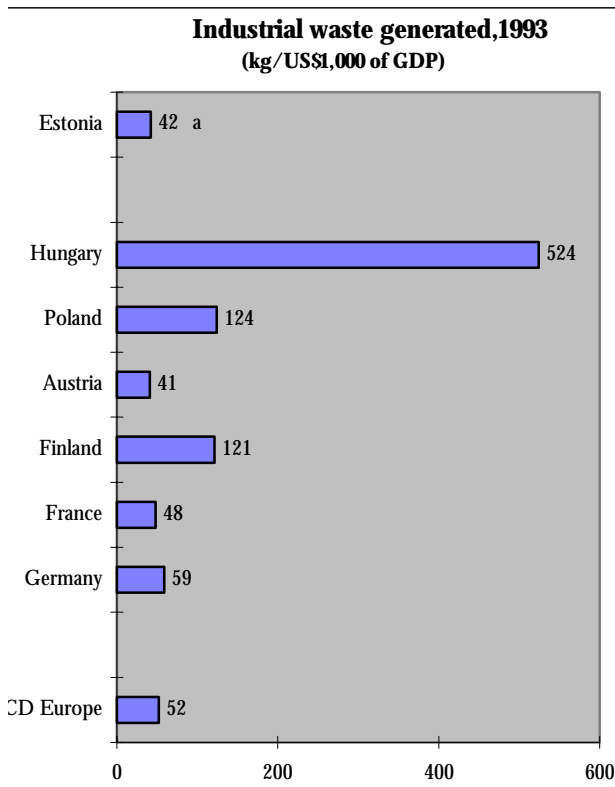
Domestic waste includes, according to the Estonian Waste Classifier 1991, solid domestic waste and sewage sludge. Between 1991 and 1993, municipal waste generation was rather stable, but it increased in 1994. *In 1994, municipal waste accounted for about 5 per cent of the total weight of overall waste generated*. The amount of solid municipal waste was estimated at about 473,000 tons, and sludge at 217,000 tons. In 1993, with some 336 kg/person/year of municipal waste, Estonia was *below the average of OECD Europe* (fig. 5.1). In 1994, the municipal waste generated per capita amounted to 455 kg. Municipal waste in the Tallinn area in 1994 was mainly made up of compostable waste (53% weight) and cardboard and paper (8% weight).

Almost all the domestic waste is dumped at uncontrolled landfills without separation. The average cost of disposal is EK 10-15 per cubic metre. About 60 per cent of the population, practically the entire urban population, is served by waste collection agencies. The small landfills which were managed by the collective and State farms (divided up in the course of the property reform) are now under the responsibility of the local governments. Most of the 300 known landfills are unauthorized; 44 of the larger ones are

Figure 5.1: Generation of industrial and municipal waste, 1992-1994



	1992	1993	1994	% in 1994
	(thousand tons)			
Total waste, including:	15,235	14,512	13,818	100
Industrial waste	13,916	13,940	13,064	95
solid	13,867	13,663	12,981	94
liquid	49	278	83	1
Municipal waste	558	510	690	5
solid	433	372	473	3
liquid	125	138	217	2



Sources:
Estonian Ministry of the Environment; OECD

Footnote:
a Data for Estonia exclude 13.5 million tons of ash waste from oil-shale production.

used by municipal service enterprises. Those larger sites are located near the major cities and bigger settlements. The responsibility for the maintenance of these landfills lies with the municipalities. The extent of the risk to human health and the environment caused by small landfills has not yet been assessed.

Proposals for the *closing-down of an old disposal site* in the Tallinn area have been prepared. The feasibility of a new facility for the treatment and incineration of municipal waste from the capital city Tallinn (which generates 1/3 of all Estonian municipal wastes) and its surroundings was completed in 1994 as a joint Estonian-Finnish project.

The system for *recycling* that had been in place for some categories of waste such as paper, glass and textiles collapsed when the arrangements with some republics of the former USSR which recycled the wastes from Estonia were interrupted and the link between Estonian waste collectors and recycled product tradesmen from other former USSR republics was cut. A new effort to recycle is now under way in selected areas, but results are slow. No separate collection system for specific types of waste exists. Bottles are returned to some extent and there is some progress in glass and paper collection and recycling. The amount of non-returnable bottles and the use of canned drinks have increased in the last years. So far no household wastes are incinerated nor composted. In a few areas the landfill gas is collected and used to heat houses, as in the Tallinn landfill where two boilers are supplied with this fuel.

Hazardous waste

The Estonian Waste Act (1992) and the Waste Classifier (1991) introduced *four classes of hazardous waste* according to their hazardousness. The total generation of hazardous waste in 1994 amounted to 7.5 million tons (54% of the overall generation of waste), down on 1992 levels (fig.5. 2). Almost all of it was generated by the oil-shale based industry.

The collection and treatment of hazardous waste are not satisfactory. Hazardous waste is at the moment mainly dumped. Treatment of hazardous waste is limited to some special waste types such as bilge oils, lead batteries and mercury tubes for which specific facilities exist. The incineration and physico-chemical treatment capacity available for

the other categories of hazardous waste is not sufficient. The oil-shale based waste of slight hazardousness is an unresolved problem. Part of it is reused and the rest is dumped in a few very large dumps operated by industry. The other kinds of hazardous wastes are mainly co-deposited in municipal landfills. The collection, transport and landfilling of asbestos waste is not given proper attention; in particular asbestos plate, which is the main roofing material, represents a growing part of demolition waste.

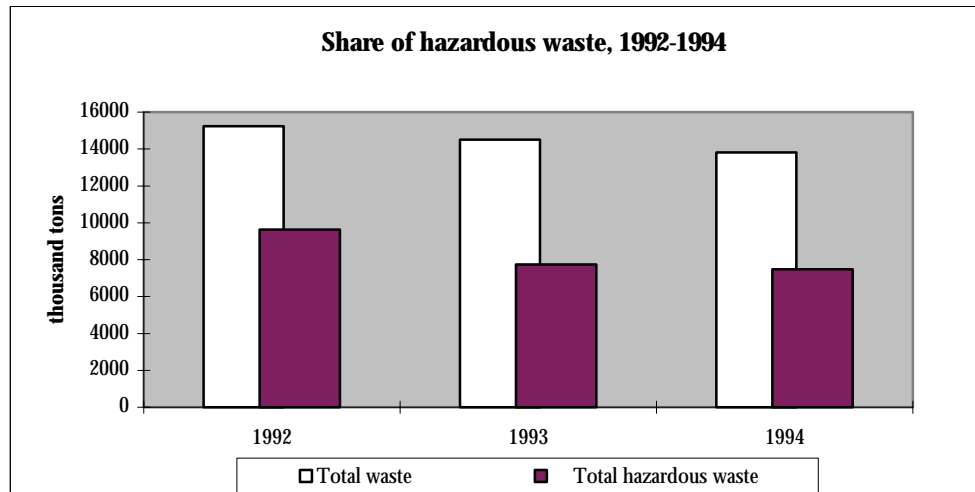
The feasibility of developing a hazardous waste management system in Estonia was studied from 1991 to 1993 by Danish experts for the hazardous waste generated by small and medium-size industries. A comprehensive survey of hazardous waste sources was carried out to estimate the amount of hazardous waste requiring the same kind of collection, transport, and treatment system. Several possible treatment sites were proposed, including the Kunda cement plant (mostly for burning oil and solvent residue) and the Aseri empty clay pits (possible landfill). The total *costs for the design and construction* of the required new facilities and plant reconstructions will be about EK 150 million split into an Estonian share of EK 107 million and foreign support estimated at approximately EK 43 million, at 1994 prices. The system is expected to be implemented in three phases: phase 1 is estimated to require a capital input of approximately EK 70 million, phase 2 about EK 32 million and phase 3 about EK 48 million, at 1994 prices.

Radioactive waste

To date the only active source of radioactive waste in Estonia is the use of radioactive isotopes for medical and research purposes. Before 1991, radioactive wastes were produced from other activities, for instance from the Sillamäe metallurgical factory originally enriching uranium for military and civilian uses and producing rare metals (niobium and tantalum) from ore concentrates which contained thorium. *The Sillamäe industrial depot*, which covers 33 ha and contains 1200 tons of uranium and 800 tons of thorium, as well as the surrounding 100 ha of radioactively polluted areas have been studied by Estonian and Nordic experts. The dam construction separating the landfill from the waters of the Gulf of Finland is deemed not to be strong enough.

Figure 5.2 : Hazardous waste generation, 1992-1994
(thousand tons)

	1992	1993	1994
Total waste	15235	14512	13818
Extremely hazardous waste (category I)	0.061	0.028	0.033
Highly hazardous waste (category II)	11.9	9.4	10.1
Moderately hazardous waste (category III)	1400	1536	1509
Slightly hazardous waste (category IV)	8228	6186	5957
Total hazardous waste	9639	7731	7476



Source: Estonian Ministry of the Environment

Other radiation sources, such as the demolition wastes from the Paldiski nuclear reactors used by the former USSR army and other small-scale energy production, are still a threat. The treatment of radioactively polluted waste water in the Paldiski submarine exercise centre was completed in summer 1995. The work was carried out with the financial assistance of the United States and involved Estonian, Finnish and Swedish specialists.

Soil contamination

Sites contaminated with oil and chemicals, abandoned and operating dump sites, former Soviet military bases and polluted industrial properties throughout Estonia have been identified and preliminarily investigated, but there is still *insufficient information on hazardous waste dumps and contaminated industrial sites* as well as on soil damage caused by agricultural and other activities.

It is estimated that some *400 million tons of waste have been stockpiled over the territory of Estonia*. Another 14 million tons of waste are added to that every year. Waste materials of oil-shale mining and processing cover thousands of hectares; there

are waste heaps over 100 m high. These terricones contain a number of compounds easily washed out with precipitation, such as organics and heavy metals. Phenols are leached into the Baltic Sea. In addition, the above-mentioned 300 dumps for domestic and industrial (including hazardous) waste, which cover 550 hectares, do not meet environmental protection requirements.

The army of the former USSR had over 1500 premises covering a total area of 81,000 hectares at its disposal in Estonia, i.e. 1.8% of the territory of Estonia. 820 of these sites present minor environmental hazards (lighthouses, residential areas), 290 present slight hazards (reserve airfields and small training areas—polygons). However, in about 300 sites the upper soil is contaminated with oil and chemicals. 135 sites are heavily polluted, and 20 present severe hazards. The pollution is caused by oil products, chemicals, dilapidated buildings, metal scrap, and domestic waste.

Some 8,000 ha of land at the large artillery ranges have been damaged by direct military activities on Pakri island, Aegviidu and Utsali. Unexploded bombs and ammunition have been left behind in

these areas, as well as offensive and training chemicals, such as napalm, smoke bombs, ignition mixtures, chlorine, etc. Demining works were started in 1993 at the Aegviidu artillery range and at Pakri island. The total area affected by different kinds of soil contamination is: oil pollution, 4,100 ha; wastes of iron, steel and non-black metal: 158,000 tons on 2,600 ha; mineral waste from construction: 365,000 tons on 700 ha; wood wastes: 20,000 tons on 500 ha; domestic waste: 52,000 tons on 300 ha. There were also large excavation works on military sites, often filled with large amounts of waste that were left behind by the departing Soviet army, such as oil products in tanks and containers (5,000 tons), scrap metals, tyres, lead accumulators (170 tons), rubber and plastic waste (3,000 tons), paint and varnish (160 tons), and others. Many spills and accidents had occurred previously, but these were practically inaccessible to Estonian environmental inspection.

The most hazardous sites are the former USSR military airport fuel tanks, fuel stores, boiler houses and missile bases, where a toxic alkaline triethylamine-xylydine mixture called samine was used as liquid rocket fuel. The accepted military norm for losses of jet fuel was up to 0.1%, but in fact losses reached several per cent, each of the military airfields using over 10,000 tons of fuel annually.

The fuel losses in Tapa, Pärnu, Tartu, Amari, Rakvere and Haapsalu were caused by leaks in fuel tanks and by careless fuel loading and are polluting hundreds of hectares of soil, groundwater and surface water. In the Keila-Joa area, 10 - 15 tons of samine have been spilt and pollution has spread over an area of 32 ha. There is a risk of samine pollution in Raudalu, Tapassaare, Rakvere, Männiku, Karujärve, Raadi (Tartu), Uniküla, Sangaste, Rooni and Varna (Valga) rocket bases. In Tartu and Sillaotsa, over 20 ha of the upper soil is saturated with oil to a depth of at least 3.5 m. In 1993, it was discovered that free petrol had polluted over 16 km² of Tapa groundwater and the polluted layer was over 2.5 m thick in some places.

A provisional estimation of the damage caused by the former USSR army was started in 1991. *A systematic inventory and assessment of damage caused were carried out in 1992-1994.* In 1993 preventive and sanitation works were also started. The preliminary estimate of clean-up costs is about EK 60 billion. Estonia now has to set priorities for the remediation of large sites and find adequate financial support. For the period of 1992 - 1995 the

State budget reserved EK 18.3 million for remedial action.

Due to its high cost very little clean-up of soil and groundwater has been carried out. Since 1993, large groundwater clean-up works have been carried out at Tapa airfield, where the necessary equipment has been supplied by the Danish Environmental Agency. In 1994, the free phase petrol was also collected from the surroundings of Paldiski boiler house, where an Estonian-Finnish pilot remedial project with biological treatment of oil-contaminated groundwater was started. Experimental clean-up of soil and groundwater contaminated with rocket fuel (samine) is carried out at Keila-Joa, where the investigations were done with the support of Germany. Stores and fuel pipelines of several unused fuel terminals have been cleaned to prevent any further contamination. New landowners have started cleaning up some oil terminals.

5.2 Responses

Objectives

The general waste management objectives of Estonia are waste prevention, promoting reuse and recycling, and safe disposal.

Short-term priorities (until 1997) include:

- Starting the construction of a hazardous waste collection, transport and treatment system;
- Setting up waste management planning at all levels: national, municipal and county;
- Setting quality objectives for soil.

Medium-term priorities (until 2000) include:

- Implementing the handling system of all hazardous waste generated in Estonia, including asbestos but excluding contaminated soil masses and oil-shale based special wastes;
- Increasing the recovery rate of solid waste, including packaging waste;
- Reducing the number of municipal landfills from the existing 300 to 120;

- Improving municipal landfilling and implementing new waste management technology in the Tallinn area and major cities, including material reuse and combustion energy recovery from municipal waste;
- Extending waste management, including the separation of waste.

Long-term priorities (after 2000) include:

- Preventing and minimizing waste generation, recycling and reusing waste;
- Further reducing the number of municipal disposal sites to 20;
- Improving the sanitary conditions of the landfills to the EU level;
- Recovering up to 60% of packaging waste as energy or material.

The Ministry of the Environment is considering *setting further objectives*. These include a short-term preliminary inventory and mapping of high-risk dumps and contaminated industrial sites and risk assessment of all main contaminated sites; implementation, in the medium term, of a first basic-level remediation in urgent cases, prioritization for the clean-up of contaminated sites, and the gradual creation of a system of separation and recycling of municipal waste and the introduction of composting, biogas utilization and incineration in existing power plants; the development, in the long term, of low-waste technology, recycling and reuse processes for waste of large generators including solutions for waste problems of oil-shale based production, and the clean-up of landfills and contaminated sites and the prevention of new damage, as well as soil protection against degradation.

Institutional aspects

Until 1991, most of the waste was simply dumped in an uncontrolled manner; some categories of waste were sent to other former USSR republics for recycling.

In the present system established in 1991-1993, responsibilities for waste management and remedial programmes are shared among the ministries of the environment, economics and agriculture, counties and municipal authorities. *The Ministry of the*

Environment is responsible for formulating the waste policy, budgeting waste-management plans and establishing institutions responsible for the construction of hazardous waste treatment facilities and issuing licences for these facilities. The Ministry of the Environment implements the Basel Convention through its Waste Commission, established to control the hazardous waste generation, treatment and international movements through a permitting system. The Ministry is also establishing national waste surveys and collecting information on waste through its Environmental Information Center.

The county authorities list the enterprises that need permits and issue waste permits, and supervise and control their implementation. They collect the data at the local level for transmission to the Ministry of the Environment. They also collect the waste charges. The links in waste management between counties and the Ministry of the Environment are strong.

At the local level, the producer is responsible for its waste and the municipality is responsible for organizing domestic waste collection and treatment. Towns and municipalities manage their own waste (collection, transport and disposal of household waste), the waste planning programme of their locality, and decide on the siting of waste disposal facilities. They will also be responsible for providing collection points for hazardous waste, and ensuring their subsequent transport to controlled transfer stations (or sites).

Legal requirements

In a relatively short time Estonia has created a *modern legislation concerning waste issues*. *The Waste Act* (1992) defines the wastes, their classification, the competency and duties of authorities at various levels, and the liability for any violation of the law. As amended in 1994, the Act provides a legal basis for banning or restricting the production, use and import of products and materials containing hazardous chemicals if the waste formed after usage cannot be disposed of in an environmentally sound way. The Act also requires the local authorities to draw up *solid waste management development programmes* for their regions, including a description of the current situation of waste management, the problems, objectives, development and assessment of alternative strategies and implementation measures. This waste management planning will be

introduced step-by-step depending on the possibilities of the local authorities.

The Act on Compensation for Pollution Damage (1993) and the Act on the Environmental Fund (1994) *define the framework for economic instruments in waste management*. Several governmental and ministerial decrees specify and complement these acts, in particular the regulations concerning the order to issue waste permits (1992), on the labelling of hazardous waste (1992), on environmental charges (1994), and the rates of the charges (1994, 1995). The Government Decree of 1992 regulates the import, export and transit movements of hazardous and other wastes.

There is *no comprehensive legislation for chemical management* in Estonia. Many issues concerning hazardous substances are regulated by specific acts and orders.

The *recent Packaging Law* (1995), in line with the relevant EU legislation, provides a basis for dealing with the increasing quantities of packaging waste, particularly that originating from the packaging of goods imported from western countries.

Civil liability in Estonia is based on fault. Liability for many waste disposal sites is difficult to establish because the responsible parties are unknown or the liability cannot be proven. After land privatization

or restitution, the new owner of the contaminated property has five years to investigate if his land was contaminated in the past. According to the Nature Protection Act (1990), the State is responsible for damage if a violator cannot be found. There are no administrative requirements or legal procedures concerning the clean-up of contaminated land.

Economic instruments

The *waste disposal charges* should be paid by all the enterprises for wastes deposited into landfills, dumps, repositories, etc. There is no levy on reused or recovered wastes. The charges are proportional to the hazardousness (table 5.1). Because of inflation, rates have had to be adjusted several times. Depending on the location and the sanitary conditions in which the waste is stored, and on the degree of the waste hazardousness (class), the pollution damage compensation rates vary from a factor of 1 to 500.

The waste charges are paid into *the Estonian Environmental Fund* (chapter 7). So far the incentive effect of this system of waste charges has not been assessed, but recent statistics on waste amounts generated in small and medium-sized enterprises indicate a rise in reuse.

Table 5.1: Charges for waste dumping, 1994
(EK per permitted ton of waste)

	Charge rate
Extremely hazardous waste (category I)	595.14
Highly hazardous waste (category II)	59.51
Moderately hazardous waste (category III)	5.95
Slightly hazardous waste (category IV)	2.13
Inert waste	0.71
Half coke of oil-shale	0.60
Flying ashes and slags from oil-shale power stations	0.21
Gangue and waste from oil-shale mining and enrichment processes	0.06

Sources: Estonian Ministry of the Environment
Estonian Environment 1993,
Environmental Information Center and
Estonian Ministry of the Environment, Tallinn 1996

5.3 Environmental performance

Estonia is a large generator of industrial waste, including hazardous waste. The economic restructuring has caused a general decrease in activity and even the shut-down of a number of industrial facilities, resulting in a drop in hazardous waste generation.

The disposal of solid waste, particularly industrial waste, is a severe problem due to the oil-shale based power and chemical production. The disposal of oil-shale as solid waste or ash-slurry causes severe adverse environmental impacts. Alternatives to the disposal of this waste are closely tied to the national energy production options. The expansion of municipal and industrial waste-water treatment will increase the sludge treatment problem in the future. Also, wastes generated in air pollution control facilities should be taken into account in the future. The siting and design of new ash fields and landfills should be done in such a way that the adverse impacts can be managed, especially the leaching from waste heaps.

Estonia does not have a general system for hazardous waste management with treatment and disposal facilities, which would also include asbestos waste. Small waste generators are still disposing of their hazardous waste in uncontrolled landfills mixed with other wastes. The problem concerns industrial dumps as well as municipal landfills. The location of hazardous waste sites throughout Estonia is still unknown as the inventory of landfills and disposal sites is not yet complete.

Landfills, the responsibility for which now lies with the municipalities, are not managed in a proper way, and are still mostly uncontrolled. Commonly, municipalities do not have the financial and technical capabilities to solve such a large problem. Uncontrolled old dumps and contaminated sites are a threat to human health and the environment and there is a strong need to investigate them in order to determine cases for urgent action. Risk-based screening and site-ranking techniques would be needed to set priorities amongst the waste dumping sites and evaluate the need for remedial action. In particular,

measures are needed to prevent human exposure and contain the further spread of contamination at sites with demonstrated health and environmental impacts. They could be executed step by step, starting with the elimination of immediate risks. In the case of a change of owner or holder of the property, an introduction of the obligation to carry out site investigations and an assessment of actual and potential adverse effects of the site would be helpful.

The process of *drawing-up waste management development programmes* in each county, as required by the Waste Act (amendments of 1994), with the active participation of the local governments (municipalities), is a good approach, which has already been undertaken in some counties (Saaremaa, Järvamaa, Tartumaa, Tallinn). It is important that all the partners are involved in the drawing-up phase of the programme, be they from industry, administration or the public. Some counties have specific, acute problems, for instance the management of oil-shale wastes, which should be tackled in this process. Then reconciling all the county programmes at the Ministry of the Environment level is necessary to mould them in a common, harmonized and cost-effective national programme.

The enforcement of the waste regulations is not yet sufficient. The Government now has command and control as well as economic instruments. However, the existing list of enterprises needing a permit does not consistently cover all waste generators. It would be necessary in addition to applying fees for waste generation to strengthen enforcement compliance with the permit in order to encourage waste minimization and good housekeeping in enterprises. In the public sector the resources of local authorities are not sufficient to allow them to maintain and upgrade their waste management infrastructure.

The siting and construction of new waste management facilities, in particular for hazardous waste, should take into account physical and spatial planning considerations as well as human health protection.

Chapter 6

NATURE CONSERVATION AND MANAGEMENT OF NATURAL RESOURCES

6.1 State of and pressures on nature and natural resources

State of nature and biological resources

Nature conservation has long been an *integral part of Estonian culture*. Estonia's nature is characterized by a *rich biodiversity*. Today, some 9,000 species of flora, of which more than 2,000 species of higher plants, and some 18,000 animal species are found on its territory. In the past 50 years, 14 species of vascular plants and 38 species of lichens have become extinct. Sixty-nine animal species and 167 higher plants are threatened to some degree (table 6.1). On the other hand, a net increase has been noted in several mammal species, including some which are protected under the Bern Convention (wolf *Canis lupus*, elk *Alces alces*, beaver *Castor fiber*, wild boar *Sus scrofa*, lynx *Felis lynx*, brown bear *Ursus arctos*).

Forests and woodlands currently cover about half of Estonia's territory (table 6.2). Estonia belongs to the temperate hard-wood/coniferous forest zone. Twenty-five site types and 71 forest types have been distinguished over the territory. The main tree species include pine *Pinus silvestris*, birch *Betula pendula* and *B. Pubescens*, spruce *Picea abies*, alder *Alnus incana* and *A. glutinosa*, aspen *Populus tremula*, and other broad-leaved trees (oak, ash, lime, elm, etc.). According to the Estonian Forest Management Centre, about 95% of the woodlands are managed. Annual monitoring of the state of Estonia's forests shows that the area of mature forests has fallen, as has the average age of needles of coniferous trees. In 1994 the total standing *volume of forests* was 285 million solid cubic metres (table 6.2), the average standing volume being 147 solid cubic metres per hectare. In 1994, 4,670 hectares of State forests were regenerated. Whereas natural regeneration was used on 608 hectares, afforestation by planting or seeding was used on 4,062 hectares (87%). Compared to 1991, the volume of forest has increased by 5%.

In 1993, 7,000 ha of forests were recorded to have been damaged, particularly by excessive forest soil

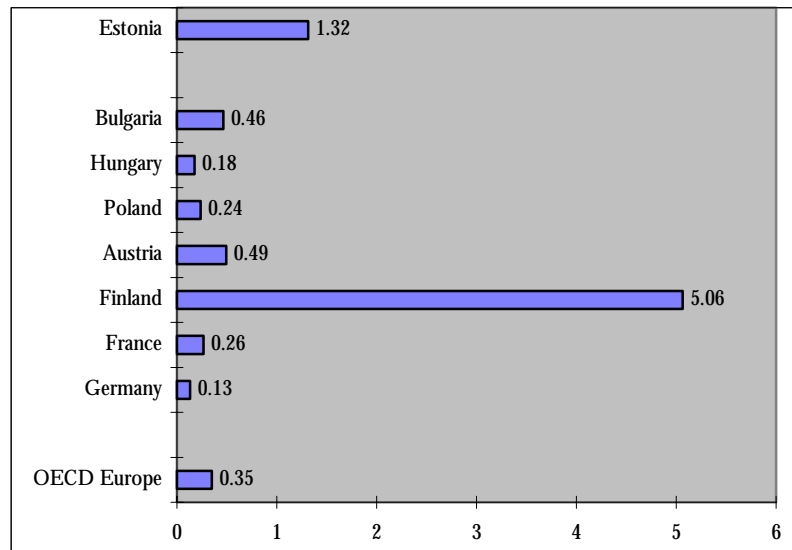
damp, and also by acid rain and pests. Diseases have also appeared in young forests. Poor maintenance of the drainage network and fires are also causing damage. However, over the past three years, the gradual increase in pine crown defoliation has almost completely stopped and the state of crowns has improved. In 1994, there were 284 forest fires damaging 453 hectares. The main cause of the fires was human activity. Only 3% of fires had natural causes.

Other typical natural communities in Estonia are *grasslands (mostly pastures), wetlands and meadows* (6%). Meadow communities are rich in species (some 690 species have been recorded). *Mires (fens, transitional bogs and bogs) and peatlands* cover approximately 23% of the territory.

Fishery has traditionally been an economically important activity in Estonia. This explains the number of bilateral agreements the country has signed on fishing at sea. The country's significant fish-processing industry depends heavily on the available fish resources and fish quotas. The most important species in Estonia's Baltic catches include herring, sprat, cod, flounder, salmon, perch, and pike-perch. A considerable amount of fish comes from the high sea, mainly from the Atlantic. The total fish catch from the Baltic Sea has increased in 1992-1994 mostly on account of sprat trawling (table 6.5). The stocks of whitefish and smelt have decreased due to eutrophication of the sea and the pollution of spawning grounds.

Two per cent of Estonia is covered with hundreds of lakes and rivers. *The lakes are rich in fauna and flora species* typical of arcto-alpine, atlantic and other regions. Lake Peipsi-Pihkva is known for its bream, pike-perch, perch, and sparring. However, in Lake Peipsi and Lake Võrtsjäru only the bream population is in a healthy state, whitefish, pike-perch and other

Figure 6.1: Share of land covered by forest, 1993
(hectare per capita)



Sources: ECE; Statistical Office of Estonia; OECD

Table 6.1: Wildlife species, 1994

Species	Number of species	Threatened species		
		Endangered	Vulnerable and rare	Total
Mammals	65	2	15	17
Birds	330	7	36	43
Reptiles	5		1	1
Amphibians	11		4	4
Freshwater fishes	71		2	2
Vertebrate total	482	9	58	67
Invertebrates	17600	1	1	2
Higher plants	2067	22	145	167

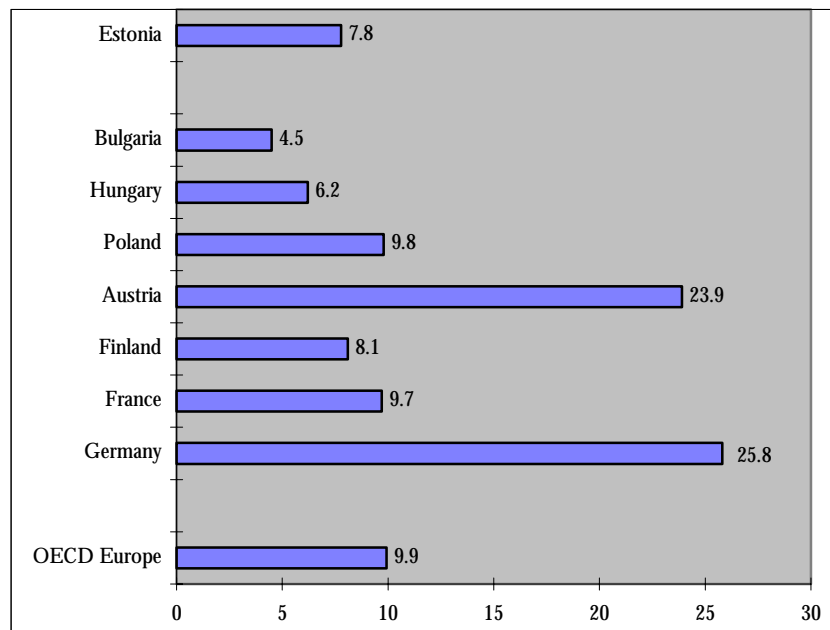
Source: Estonian Ministry of the Environment.

species having been overfished. In most rivers the natural stocks of salmon have shrunk, and few rivers remain suitable for spawning. The industrial impact on the Purtse and Narva rivers, which were once important salmon rivers, has driven the salmon away.

Protected areas covering large territories are divided into different zones: strict nature reserves (up to 1% of the country's territory) and special management zones (areas with restricted economic activities). In 1993, 24% of the territory was protected. However, 7.8% of the territory was protected according to the IUCN classification (table 6.4). There are 4 national parks, 5 State nature reserves and 50 other reserves of various kinds, including 14 landscape reserves. The biggest national park, the Lahemaa National Park,

covers some 650 km² of land plus a protected marine area of 470 km² and includes several islands. Some State nature reserves protect typical coastal vegetation, while other nature reserves protect peat bogs. The most famous nature reserve in relation to bird passage is the Matsalu State Nature Reserve, listed as a wetland of international importance under the Ramsar Convention. The Alam-Pedja Nature Reserve has recently been established on the territory of a former Soviet military area (26,000 ha) with well preserved forests. The West-Estonian Archipelago Biosphere Reserve aims to protect and preserve the biological diversity and landscape of large islands and coastal areas to the west of Estonia. The Pandivere Hydrological Reserve protects groundwater as well as surface water.

Figure 6.2: Major protected areas¹, 1993
(per cent of total area)



Footnote: ¹ IUCN management categories I-V. National classifications may differ.
Sources: Ministry of the Environment; OECD.

Table 6.2: Forest resources, 1991-1994

	1991	1992	1993	1994
Forest and other wooded land (thousand ha)	2148	2022	2017	2016
Forest stands (thousand ha)	1803	1920	1816	1850
Growing stock (million m ³)	272	274	277	285
Area covered with forest and OWL ^{1,2}	50.7%	47.7%	47.6%	47.6%

Sources: ECE; Statistical Office of Estonia

Footnote:

¹ OWL is the abbreviation for other wooded land.

² Percentage is calculated out of terrestrial area of Estonia.

State of mineral resources

Given its small size, Estonia is *relatively rich in mineral resources*. These resources have been the basis of its economy. The production and processing of mineral resources constitute a considerable share of the GDP. Table 6.5 shows the levels of active mineral resources reserves and their exploitation in 1994. The available data indicate that the *natural-resource based industries probably contributed, in total, to around half of Estonia's GDP at the beginning of the 1990s*. Since then the output in virtually all of these resource-based sectors and industries has fallen dramatically in both absolute and relative terms (chapter 7).

Deposits of the *most important mineral resources—oil-shale, phosphorite, dolomite and limestone*—are located in the north and north-east of the country. Estonia's reserves of *clay, sand and gravel* occur all over the country. Phosphorite used to be mined (to produce a phosphoric fertilizer) but because of economic concerns and environmental and health effects, production has ceased since 1991. *Curative mud* has been used since the beginning of the 19th century. Although Estonia borders the sea, there are few usable deposits of sea mud. There are *peat deposits* of commercial importance over an area of 477,000 hectares.

The oil-shale reserves in Estonia are the largest exploited deposits in the world. These deposits support the country's energy production (80% of the total mined) and chemical industries (20%). There are two oil-shale deposits: Estonian Deposit and Tapa Deposit (unexploited so far). As the main source of fuel and energy (chapter 8), oil-shale has been mined for most of this century; more than 850 million tons have been mined. Production peaked in 1980 with over 31 million tons mined. Economic changes, including the plummeting of industrial production, have reduced the level of oil-shale production in Estonia to 14.5 million tons in 1994 (including 7.7 million tons from underground mines and 6.8 million tons from opencast mines). Should this level be kept up, oil-shale resources could support the domestic energy and chemistry industries' needs for the next 50-60 years.

Pressures

Nature in Estonia is experiencing *anthropogenic pressures* from various activities, in particular spatial occupation, agriculture, mining, the abstraction of water, hunting and fishing. Moreover, the unsustainable cutting of forests, the drainage of land, the construction of dams on rivers, the eutrophication and pollution of waters also have a major impact.

Most important in the transition period is *the current land reform process*, which is leading to changes in management approaches to natural resource use and nature conservation. The *privatization of State and collective farms* provides an opportunity for the restoration of traditional agricultural activities and for the continued use of semi-natural habitats (flood plains, grasslands, wooded meadows and coastal meadows). For instance, semi-natural meadows and wetlands were not exploited in the former, large-scale farming system; with the land reform, they are becoming subject to intensive, small-scale private farming. Some areas of recreational interest have become sites for commercial activities, thus threatening their recreational value.

Changes in the structure of ownership are also affecting forest conservation. During Soviet times, large areas of forest were exempted from economic use; with the emergence of the market economy there is pressure to use these resources. In 1993, 57.9% of the forests were State forests, 38.6% belonged to collective farms, and 3.5% to private farms. The land restitution process shows that many private forest owners do not have the knowledge, financial resources or equipment to manage their forest land in a sustainable way. The private owners often have

radically different objectives to those laid down in the management protection plans established for the area. Forests suffer from the violation of forest regulations. Although damage from forest fires has decreased, *damage caused by unauthorized felling is increasing.*

One third of Estonia's forests suffer from water-logging, because the maintenance of the drainage network is neglected. They also suffer from intensive felling, littering and direct damage on the above-ground vegetation (mosses, lichens, grass, dwarf shrubs) by heavy forestry machines, however these are currently being replaced by more suitable equipment. *Acidifying pollutants in Estonia* originating from emissions within its territory or abroad (chapters 3 and 9) *also have an adverse impact on forests.* Some forest types such as swampy black alder forest (Filipendula and Dryopteris types), boreonemoral hardwood spruce forests (Hepatica-Anemone type) and alluvial river-bank forests (Allium-type) have been particularly affected.

In the last decades, too, over 700,000 ha of *water-logged meadows, fens and mesotrophic mires have been drained.* As a result, many species and communities have lost their natural habitats and the bogs, important to freshwater reserves, have been destroyed. Large-scale drainage coupled with dry weather have considerably lowered the water level in lakes and slowed the flow in streams and springs, some of which even dry up during spells of dry weather. About 300 water reservoirs (i.e. 1.5% of the territory) have been constructed to regulate the water flow and to provide drinking-water. A number of lakes are damaged, mostly via eutrophication processes due to *agricultural runoff of nutrients.*

The sharp fall over the last five years in the use of pesticides and in *agricultural production* in general has eased the pressure on the ecosystems. As a consequence, some species are increasing in number and specific management measures have been required to regulate their populations, including populations of some protected species.

During the post-war period many of the Estonian coastal areas (the border areas of the former USSR) were closed for many kinds of economic activities. Consequently, the *coastal area fisheries were underdeveloped.* The recent

Table 6.3: Fish catches, 1991-1994
(living weight in thousand tons)

	1991	1992	1993	1994
Total fish catches	110	131	133	120
Baltic Sea	45	37	42	46
Inland waters	3	3	2	2
Oceans (Atlantic and Pacific)	62	91	89	72

Source: Estonian Ministry of the Environment

Table 6.4: Major protected areas¹, 1994

	Number of areas	Area ² (1000 hectares)	Percentage of total territory
National parks	4	119.6	2.6%
State nature reserves	6	86.1	1.9%
Other reserves ³	78	146.0	3.3%
Total	88	351.7	7.8%

Source: Estonian Ministry of the Environment

Footnotes:

¹ IUCN management categories I – V.

² Land area only.

³ Including protected zones covered by the Biosphere and Hydrological Reserves.

Table 6.5: Exploitation of mineral resources, 1991-1994

	1991	1992	1993	1994	Reserve
Oil-shale (million tons)	19.6	18.8	14.9	14.5	3710
Peat (million tons)	1.8	1.4	0.6	1.1	1540
Phosphorite (million tons)	not mined since 1991				160
Limestone and dolomite (million m ³)	3.1	1.4	0.9	0.9	580
Clay (million m ³)	0.30	0.17	0.08	0.09	60
Sand and gravel (million m ³)	6.9	2.2	0.4	0.9	400
Curative muds (thousand tons)	5.0	1.3	2.2	0.7	2100

Sources:

Estonian Ministry of the Environment

Statistical Yearbook (1995)

recolonization of the Estonian coastal areas implies the new development or further development of coastal fisheries, which are becoming of economic importance for the local population. Investments into the fisheries sector are mostly joint ventures with foreign partners.

The pressure on nature from *tourism activities* is currently slight. However, projects to develop tourism activities and infrastructure in such protected areas as Lahemaa National Park and the Matsalu State Nature Reserve, may affect the protection status of these areas, unless an appropriate structure is developed and tourism activities sufficiently regulated.

Although the extraction of almost all of the mineral resources has been significantly reduced since the 1980s, when the intensity of mining was markedly higher and less attention was paid to environmental problems, *many serious environmental problems caused by mining and industrial exploitation of these resources remain.*

The oil-shale mining industry is one of the main polluters and disturbers of the environment. Mining is physically altering nature and shifting the local ecological equilibrium. Underground mines for oil-shale production may cause the "sinking" of the surface, which leads to bogs (swamps) being formed, agricultural areas becoming unusable, and forests dying out. Other environmental impacts of mining include the lowering of the groundwater table leading to the exhaustion of wells and aquifers, damage to vegetation and landscape, and loss of scenic values and amenities. The area affected by the drainage of oil-shale mines and open quarries causes difficulties in the water-supply to the local population and farms. Drainage water from the mines, although treated in sedimentation ponds, still damages the inland water bodies due to its high sulphate content. Another considerable impact of mining is caused by accumulated oil-shale mining and processing waste (chapter 5), which pollutes both air and water.

In the case of open quarries, natural landscapes, including valuable agricultural lands, are often completely destroyed. The exploitation of sand and gravel deposits and an attitude of carelessness have led hundreds of abandoned quarries to reduce the quality as well as the aesthetic value of landscapes. For instance, an area of 11,000 hectares has been damaged by oil-shale mining, of which some 9,000 hectares have been subject to reclamation and recultivation. However, in some cases,

recultivation of the opencast mine cannot compensate for the damage caused.

6.2 Objectives

The sustainable development by rational management of renewable and non-renewable natural resources is a major goal of the Estonian environmental policy.

In the area of nature conservation, *Estonia strives, first of all, to preserve the existing network of protected areas.* Moreover, the area where a strict protection regime is applied is to be increased from the current 1% to 5% of the country's territory by the year 2010. According to the Act on Protected Natural Objects (1994) and land reform provisions, the economic use of protected areas will be restricted where necessary. Estonia aims to systematically implement the principles and provisions of the Convention on Biological Diversity, as a Party to this Convention. The Act on Protected Natural Objects requires a specific management regime to be set up for each area. In several protected areas the rules have already been developed in cooperation with all the relevant partners. Nature conservation requirements will also be developed outside protected areas, in cooperation with county governments and local municipalities.

The *general policy objectives* in nature conservation are expected to be defined in the upcoming National Strategy (1996) and the related National Action Plan on Biodiversity to be finalized by 1997. The national legislation will be steadily harmonized with the nature conservation instruments of the Council of Europe and the European Union. The National Action Plan is expected to propose, inter alia, *concrete measures for the protection of Estonia's coasts, mires, forests and wetlands.*

For fisheries, *the aim is to create a framework for sustainable development of the fisheries sector and to promote national interests in international forums.* The Estonian fisheries are developing in close cooperation with the other Baltic States within the framework of the Baltic Marine Environment Protection Commission (Helsinki Commission). As a member of the International Baltic Sea Fisheries Commission, Estonia also has to comply with the regulations and recommendations adopted by this Commission. General objectives include maintaining a high-quality coastal and marine environment, protecting

and preserving the abundance of valuable species and biological diversity; developing coastal fisheries; and developing the national inland-lake fisheries, supporting fish farming.

6.3 Responses

Legislation

Although *Estonia has not yet defined a general strategy on nature conservation*, it has been preparing a coherent set of laws. The legislation is currently being improved in order to be consistent with the ongoing changes in ownership and in the economy. These are very important since most of the nature conservation problems are closely related to ownership and property matters.

A major achievement is the Act on Protected Natural Objects adopted in 1994. It establishes a zoning of the protected areas with various protection regimes. Limited management zones (buffer zones) surround core areas with stricter protection. The Act also lays down the procedure for protecting national assets (protected areas, single natural objects, protected species) which are located on State, municipal or private land, and determines the related rights and obligations of landowners, land users and other persons. It regulates the protection and management of protected areas and lays down obligations and restrictions on their management since they can become private property. In 1996, the protected areas will be inventoried and certified in connection with the implementation of the land and property reform. The information concerning the natural objects and their related protection requirements will be contained in a database, the Nature Conservation Register. This information is submitted to the cadaster. Land-use restrictions (obligatory for the owners) are then mentioned on the cadastral maps. Particular attention is paid to drafting regulations for the implementation of the Act, and 22 supplementary governmental orders and ministerial decrees have already been prepared.

Other acts dealing with specific aspects of nature conservation and management include the Animal Protection Act (1992), which is being revised, the Hunting Arrangement Act (1994), the Forest Act (1993) and the Act on the Protection of Marine and Freshwater Coasts, Shores and Banks (1995), which specify restrictions for using these natural resources. Explicit provisions to ensure nature conservation are also included in various other acts, such as the Land Reform Act (1991), the Land

Taxation Act (1993) and the Act on Planning and Construction (1995). For instance, the Land Reform Act stipulates that landowners are responsible for adhering to restrictions on economic activities in line with the protection regimes of protected assets. The Land Taxation Act specifies the tax exemptions which are applied to areas under a protection regime.

As the importance of forestry for the economy is increasing and unauthorized felling is a continuing problem, the goal of the Government is to maintain and improve forest management practices. The purpose of *the 1993 Forest Act* is to guarantee the rational management of the forest as this is Estonia's most important renewable natural resource. The State-owned and municipally-owned forests are managed according to this Act. Privately-owned forests are also subject to restrictions. The *1991 Fishing Act* regulates the conservation and use of fishery resources.

The rational use of mineral resources is based on the 1994 Earth's Crust Act. This Act prescribes the juridical basis and terms concerning the exploration, exploitation and use of Estonia's mineral resources. Under this Act, economically valuable mineral resources are registered and protected by the State. Consequently, mineral resources are not subject to privatization; the right to mine is granted through permits. Mineral deposits are classified according to their value in terms of national or local importance.

Institutions

The range of sectors and industries which abstract and use natural resources for productive purposes is very extensive. Therefore, different ministries and agencies share responsibilities for regulating the affairs of these sectors and industries. *The responsibility for the management of natural resources lies with the Minister of the Environment.* This provides the opportunity for unified accounting, supervision and regulation of the use of natural resources and environmental protection in accordance with the principles of sustainable development, as defined by the Act on Sustainable Development.

The Ministry of the Environment is also in charge of nature conservation. Various boards involved in specific aspects of nature conservation and natural resource management (i.e. Forest Board, Land Board, Board of Fisheries) are subordinated to the Minister of the Environment. The Ministry of the Environment and the Boards draft laws, develop

national policies, programmes and plans on nature conservation and natural resources management, and implement the relevant international conventions. The management and funding of national parks and State nature reserves is also their responsibility. The implementation of the laws and obligations on nature protection and natural resources is ensured by the Environmental and Nature Protection Inspectorate and the State Marine Inspectorate. Monitoring of the state of protected assets, and drawing up the Nature Conservation Register are the responsibility of the Ministry of the Environment.

The *Regional Environmental Departments* implement the laws at the county level. As they manage conservation areas of local importance, county officials have to validate the land restrictions on these areas. But the lack of a specific interpretation of the land reform legislation and of detailed guidelines is making this task difficult. The division of responsibilities between the State and county levels does not yet seem clearly established by law.

Economic instruments

In Estonia *resource taxes are applied to the use of oil-shale, mineral building materials and peat*. They apply to the total volume mined; they are not imposed on the final processed mineral resource as is the case with classic royalties, and thus represent an incentive to reduce mining losses. Revenues from these taxes are channelled into both national and local budgets. Until 1995, 80% of the total revenue was channelled into the national budget. From 1996, 70% of the resource taxes will be channelled into local budgets and 30% into the *Environmental Fund*. All taxes from the deposits of local importance go into local budgets. The role of taxes is to provide incentives to reduce natural resource utilization by establishing higher rates for loads exceeding the permitted levels or produced through activities for which no permit has been issued. In the case of oil-shale part of the money received in the State budget is sent to a special development fund for the oil-shale industry. Plans for the coming year include the channelling of this money to the Environmental Fund.

In accordance with the Fisheries Act, a *fisheries fund was established* to promote the development of this sector. The money collected has to be used to support the fishery restocking, resource conservation, science, education and technology transfer.

The 1993 Land Taxation Act establishes *incentives (tax exemptions) for maintaining the protection regime on lands that are returned to their former owners*.

Implementation

During the last three years important nature conservation work has been carried out as a result of the Land Reform Act (1991). As a first step 220,000 hectares were marked and proposed to remain State property for nature conservation purposes; this proposal is still under consideration. Another 200,000 ha of nature conservation areas were exempted from land tax to compensate for the loss of income and encourage private owners to maintain the protection regime. However, the temptation is strong to make a quick profit by clearing forests, in particular for owners who are not living on their plots. Moreover, until 1996, 50% of all property taxes went to the municipalities, the tax exemption offered under the Land Taxation Act meant that the municipalities lost out. On the other hand, the exemption did not fully compensate the loss of income; there was no other monetary compensation. Since 1 January 1996, 100% of land tax proceeds go to the municipalities. The Act on Municipalities establishes procedures for compensating the municipalities for revenues lost due to tax breaks. Up to now, as the sale of timber was profitable, large-scale unauthorized felling took place. Whereas the average number of violations before 1991 was 400 a year, it amounted to nearly 1,000 in 1993. Most of the damage resulted from violations of forest protection regulations. The number of violations against protected species increased between 1992 and 1993, but is still far lower than in the 1980s because of either the drop in the number of visitors to protected areas or the lax supervision by the authorities.

In Estonia, *high priority has been given to the management of landscapes*. During the years 1950-1980, a network was developed to link areas with different protection statuses (nature reserves, refuges for wildlife, etc.). This system aimed at compensating and balancing the pressure of human activities on nature. However, since 1993, the land restitution process has jeopardized the network of protected areas. Thus, there is a need to preserve the vulnerable Estonian landscapes from adverse consequences and to maintain ecological stability. The Act on Protected Natural Objects provides the legal framework for maintaining and strengthening the existing network of protected areas. Its further

development needs to be coordinated with relevant international initiatives, such as the IUCN Parks for Life and the Ecological Network envisaged under the Pan-European Biological and Landscape Diversity Strategy.

Since 1992, due to the property and land reform, *county and municipal authorities have acquired more responsibilities for nature conservation issues* (protected species, nature conservation objects, etc.). All Regional Environmental Departments have started to collect, process and update data concerning their own territories. Those data had been managed in the past by central authorities and institutions. As there is not much communication between researchers and county administrations, counties lacked information, in particular on species under protection. In many cases, they are not able to complete and update the database distributed by the Government. The local authorities also have to contribute to building up the Nature Conservation Register.

About 70 nature conservation experts work in protected areas, 8 in Regional Environmental Departments, 6 in the Nature Conservation Research Centre, 2 in the Environmental Information Centre and 6 in the Ministry of the Environment. *This level of staffing does not seem sufficient*, considering the number of protected areas to be handled, the regulations, programmes and plans to be developed, monitoring and statistics to be drawn up, and the different tasks arising from the international cooperation programmes.

Estonia has ratified several international conventions on nature conservation. For details see chapter 9.

6.4 Environmental performance

Nature conservation objectives

Protected areas are an important component in Estonia's approach to nature conservation. Since it regained its independence, Estonia has striven to protect and enlarge the well preserved areas it inherited from the Soviet period, in particular some well preserved former military zones. In 1994, protected areas represented 7.8% of the total land surface (fig. 6.2) and this will be extended to 12% by 1996, which places Estonia in line with most other European countries. An important additional potential exists in the two so-called Programme Areas (some 16% of the territory). Estonia is

considering setting an objective to ensure a strictly protected regime on 5% of its territory by 2010.

However, the management of many protected areas does not meet the internationally recognized criteria. Protection rules and zoning have to be established in each protected area on the basis of which management plans have to be drawn up.

The Law on Protected Natural Objects requires *the protection status for species in the protected areas to be defined. This has not yet happened.* In 1995 an inventory has been drawn up of all the protected species, in particular those in danger, and they have been located. To complete it, a general cadaster describing the various biotopes in the protected areas would be useful. According to the Law, every protected area should have a manager appointed by the Government. His responsibility is to issue certificates or documents on protection rules, and in particular the obligations of the private landowners. This structure is not yet fully in place.

The legislative and institutional framework

Estonia has adopted several new legislative acts and regulations. The country has also ratified international conventions on nature conservation, such as the Convention on Biological Diversity and the Bern, Washington and Ramsar conventions. However, *there is no overall strategy or any practical guidelines on nature conservation for county and municipal authorities.* When such a strategy and guidelines are developed, they should incorporate the provisions of the relevant instruments of the EU, Council of Europe, World Conservation Union (IUCN) and the international conventions on nature conservation.

One governmental body, the Ministry of the Environment, is now mainly responsible for nature conservation and the management of natural resources. The administrative structure is not yet working satisfactorily as the duties and responsibilities of the different levels are not clearly defined by law and the activities of the different bodies involved in nature protection and use of natural resources (the Land, Fisheries and Forest Boards, the Ministry Departments of Water, Mineral Resources, Physical Planning and Building, and the local institutions) not harmonized.

Information handling should be improved. A system of proper indicators should be used to monitor species, species communities, and the state

of ecosystems, in particular in protected areas. The collection of scientific data, statistics on species populations and trends in their evolution, information on land management regimes and pressures on the environment should be improved. All these data should be updated regularly and made easily accessible to decision makers at all levels, industry, business, scientists and the general public. They should be computerized, handled through a database, and made compatible and comparable to relevant international systems as far as possible.

Nature management

Estonia has preserved many landscapes, natural ecosystems and wildlife species. The current state of nature can be described as generally secure. Threatened plant and animal species are protected. With the reduction in waste-water discharges from industry and municipalities and the drop in pesticide use, the quality of aquatic ecosystems is improving.

However, some other measures could help to improve the situation. The drainage network, which is vital for such a flat, low-lying country, is not properly maintained. This results in water-logging, which causes damage to forests. Re-drainage should be carried out carefully. An EIA should be carried out first to avoid the risk of washing nutrients into the recipient water bodies and of destroying rare and endangered biotopes which might have benefited from the return to the natural water level (for instance the swampy black alder forests and river bank forests).

As many coastal areas were not accessible to the public, *the biodiversity of coastal areas has been well preserved.* Estonia now wants to develop tourism, in particular along the coasts and in some of the protected areas. Some counties, such as Haapsalu-Laanemaa, are developing tourism strategies. However, such strategies should include measures to reinforce control in protected coastal areas and to protect nature outside protected areas as well.

Estonia is currently drawing up its national programme on biodiversity, which will guarantee a consistent and complete system of nature conservation over the entire territory. The newly adopted environmental acts relating to nature conservation provide a solid foundation for such a system. Nevertheless, *much more effort is needed to protect wildlife and natural habitats outside*

protected areas. In particular, the protection of wetlands should be improved.

The ongoing privatization process could be a threat to nature, and in particular to protected areas, if not carefully undertaken. *There is a risk that restituted lands will be mismanaged and even overexploited.* Excessive felling has been noticed in private forests. Some recreational areas are becoming increasingly used for commercial activities. Also, the splitting-up of forests in the land restitution process results in small plots that are difficult to manage, use and protect. The construction of buildings has also been allowed in some protected areas. To ensure the sustainable management of the restituted forests and other lands, it is important to raise environmental awareness and to spell out the obligations and restrictions of the protection regime to the private owners. For meeting their obligations, the owners should be offered some form of compensation (for instance, land tax exemptions or provision of sustainable forest management services).

Considering the limited funds available for nature conservation activities, the cost-effectiveness of the achievements is rather good. But, considering the actual management of protected areas, there is *a wide gap between the level of financing and the ambitious nature conservation objectives.* The development of nature conservation strategies and policies is only just starting. Every consideration needs to be given to broadening the range of economic instruments to be applied to nature conservation policies.

Sustainable management of natural resources

Estonia has made some positive changes to improve the conditions and opportunities for sustainable management of non-renewable and renewable natural resources. Nevertheless, the policy objectives, institutional arrangements and policy instruments which are set and applied by the different authorities differ and are not necessarily consistent with each other or with clearly established principles based on the concept of sustainable development. *The overall objectives to be achieved through the regulation and management of the abstraction and use of natural resources are often not clearly stated,* expressed in an operational form or justified by a common, underlying principle. The procedures which are applied under the regulations are not consistent with the objectives to be realized through the

regulations; moreover, procedures are not always satisfactorily applied in practice.

Some economic instruments are applied as part of the natural resource management system, for example, using a system of natural resource user charges and pollution charges. Though they contain some valued features, they need strengthening as part of a broad review of the regulation and practice of natural resource management in Estonia.

The high environmental pressures generated by, and affecting, natural resource exploitation and use in Estonia, prior to its regaining independence, *resulted in derelict and contaminated land, contaminated groundwater, etc.* Their consequences persist and, from a policy, economic and technical standpoint, can be difficult to remedy.

As shown in table 6.5, there have been substantial reductions in oil-shale production and in its use in the energy and chemicals industries, less quarrying of limestone and production of cement, much less large-scale agriculture and a consequent reduction in the use of fertilizers and pesticides. These are the key sectors in which the main environmental pressures were located. However, the *period of*

contraction in a number of environmentally significant sectors and industries may be coming to an end and may be replaced by a period of expansion. This may occur at a time when a number of underlying deficiencies in the environmental protection system still remain. For example, property rights to land are not well-defined (given the complexities in implementing the provisions relating to the restitution of land); the absence of well-defined enforceable property rights is a well-known cause of the over-exploitation of natural resource stocks; substantial problems exist in ensuring a satisfactory level of compliance and field control with environmental regulations relating to natural resource abstraction and use.

All of this suggests that, *once the economy recovers*, and especially if natural resource-based production is a significant contributor to that recovery, the *environmental pressures could also grow*. If this were to continue, there is a risk that the overall development path which is being followed may, itself, become unsustainable. Hence some policy, institutional and instrument strengthening may be needed if this situation is to be avoided.

PART III: INTEGRATION OF POLICIES

Chapter 7

INTEGRATION OF ENVIRONMENTAL POLICY INTO AN ECONOMY IN TRANSITION

7.1 Economic transition and environmental quality

A primary determinant of environmental pressure is the level of per capita real income and the composition of national output. By the standards of the developed economies of the west, and of some central European economies, real incomes were relatively low in Estonia in the early 1990s (see annex II). This also caused some environmental pressures to be below the average of OECD member countries (for example, those associated with road traffic). On the other hand, because *Estonia specialized to some degree in the production or use of certain raw materials*, either in an unprocessed (e.g. oil-shale) or a processed (e.g. electricity and heat, certain chemicals, paper products and foodstuffs) form, its economy contained a number of heavily polluting and natural resource consuming sectors. The composition of the output intensified some environmental pressures, particularly in those regions of the country where these activities were concentrated (e.g. Ida-Virumaa, the north-eastern region).

The dismantlement of the Soviet Union and Estonia's subsequent transition process have, in the short term, had a major impact on both the level and composition of Estonia's GDP. *Output fell substantially during 1991-1994*. At the same time there was a decline in activity in most of the heavily polluting and resource-consuming industries in the primary and secondary sectors. The tertiary sector showed a significant increase in its share of GDP over the period. These changes are illustrated in table 7.1. The pollution, energy and resource intensity of the Estonian economy is considerably higher than in OECD Europe: by a factor of two for energy intensity, NO_x and municipal waste; by a factor of four for CO₂; and by a much higher factor for water use intensity and SO₂ (table 7.2).

The combined effects of the reduction in GDP and the change in its composition have alleviated certain environmental pressures and this is reflected in *an improvement in some environmental indicators for Estonia* (chapters on air, water and waste). In some cases these improvements have been substantial. However, they do not reflect the sustainable development process at work. Firstly, economic difficulties may have increased poverty, which in turn may aggravate some environmental pressures (e.g. due to increases in illegal mining and quarrying, encroachment on forest reserves, increases in illegal dumping and reduced compliance with environmental standards and norms). Secondly, *when economic recovery does take place* (this began in the first half of 1995), *environmental pressures will tend to intensify*. This will be particularly true if the pattern of growth and the form and effectiveness of its regulation continue as previously.

There are no official, medium-term forecasts available for the Estonian economy at present. However, it would seem unwise to assume that Estonia will either (i) continue to contract its primary and secondary sectors and rely exclusively on a continually expanding services sector to secure long-term sustainability; or (ii) revert to its pre-independence industrial structure.

7.2 Privatization and land restitution programmes

Two forms of privatization are taking place in Estonia: the privatization of enterprises and the housing stock, and the restitution of land in public ownership to their former private owners. Both forms have been major policy objectives for successive Estonian Governments since 1991. The primary motives behind these policies have been political and economic; it is only relatively recently that the possible environmental consequences of these programmes have begun to be scrutinized.

Table 7.1: Selected economic indicators, 1991-1994

	1991	1992	1993	1994
% change in GDP from previous year	-11	-14.2	-8.6	-3.2
Percentage composition of GDP each year: ¹				
primary sector	19.8	13.5	11.1	10.4
secondary sector	49.2	34.6	30.9	30.4
tertiary sector	31.0	52.0	58.0	59.2

Sources: Statistical Yearbooks (1994 and 1995), Statistical Office of Estonia, Tallinn

Footnote:

¹ Primary sector: agriculture, hunting, forestry, and fishing sectors.

Secondary sector: mining, energy, water-supply, manufacturing and construction sectors.

Tertiary sector: commerce, transport, finance and insurance, government spending, education, health care and social services, catering and hotels, trade, and others.

Table 7.2: Selected economic activity and environmental pressure, 1993

Measure		Estonia	OECD Europe
GDP per capita ¹	(US\$1,000 /inhabitant)	6.86	14.60
Energy intensity	(toe/ US\$1,000 of GDP)	0.51	0.21
Water use intensity	(m ³ / US\$1,000 of GDP)	200.10	41.09
Pollution intensity			
Municipal waste	(kg / US\$1,000 of GDP)	48.98	26.20
SO ₂	(kg/ US\$1,000 of GDP)	13.94	2.47
NO _x	(kg/ US\$1,000 of GDP)	3.79	2.11
CO ₂ ²	(tons/ US\$1,000 of GDP)	2.19	0.53

Sources: Estonian Ministry of the Environment; OECD; Statistical Yearbook (1995), Statistical Office of Estonia, Tallinn 1995

Footnotes:

¹ GDP at 1991 PPP exchange rates.

² Data for Estonia refer to 1992.

The enterprise privatization programme began in early 1991, when Estonia was still part of the former Soviet Union. However, the major developments have occurred since 1993, when the Act on Privatization and several other legal acts to support privatization were adopted and came into force. Following the adoption of the Act on Privatization, the State Property Department and the Privatization Enterprise (which had previously been responsible for the administration of the privatization process) were combined into the Estonian Privatization Agency (EPA). The stated policy of the Estonian Government is that *State ownership of enterprises should become the exception*. Only those enterprises listed in the Decree of October 1993 would remain in public ownership; all others should be privatized over the next few years. Whilst the current Government may wish to proceed more slowly with its privatization

programme than its predecessors, it is understood that the overall objective remains unchanged.

The privatization of small enterprises, mostly shops and other service businesses, was virtually completed by the end of 1994. It involved the privatization of more than one thousand small businesses. *The privatization of medium-size and large enterprises has proceeded more slowly*, using a variety of privatization methods notably national and international tenders and, latterly, the public offering of shares. During 1993/94 privatization contracts were concluded for enterprises producing, inter alia, furniture, chemical products, metal products, fish products, bakery products, textiles and construction materials. In May 1994, EPA reported that some major enterprises and utilities, including gas,

electricity, telecommunications, transport and port facilities, remained to be privatized. The goal is to finish large-scale privatization by the end of 1995. *The progress in the privatization of the oil-shale production and electricity-generating enterprises has been much slower.* The uncertainties related to their future ownership may make it harder to resolve the environmental problems caused by these firms. The environmental significance of the housing privatization programme lies in the uncertainties over who should pay for local services (electricity, water, waste collection and disposal, etc.). This contributes to the problem of financing local environmental services. The privatization of the housing stock lags behind that of land.

The 1991 Land Reform Act aims to replace a system of State ownership of land by one based on private ownership, while respecting the rights of both the former private owners of the land and the current users. Essentially this implies that land will be restored to its former private owners except if this would conflict with the legally protected current use of the land (in which case alternative land or another form of compensation will be offered). Certain provisions contained in this law have been further elaborated in the Property Act, which came into force in December 1993, and the Government Decree of February 1994. The Land Board (and its local units) and the district authorities are responsible for implementing this land restitution programme. *The process of land restitution is unavoidably complex and lengthy.* As of 1 January 1995, 6,800 registered units (relating to land title) had been entered into the Land Register but this represents only a small part of the total task to be undertaken. In the meantime, there are considerable uncertainties relating to land property rights which may be of both economic and environmental significance.

7.3 Policy and practice relevant to sustainable development

The Act on Sustainable Development

The Act on Sustainable Development was adopted in 1995. It is a framework law which establishes the principles upon which the national strategy for sustainable development in Estonia is to be based. The Act concerns mainly the sustainable use of the natural environment and of natural resources; the basis of sustainable development for *other* sectors of the economy is to be established 'by law, regulation or national programmes'.

The Act states that 'the *aim* of the sustainable use of the natural environment and of natural resources is to guarantee that the environment meets human needs and provides the resources necessary for economic development without causing significant damage to the environment and without depleting biological diversity'. In order to realize this objective, the Act specifies *guiding principles*, and makes general provisions for certain *actions* to be undertaken.

The *guiding principles* cover respect for the human and natural environment according to the Constitution; *restrictions on the rights* to dispose of property and to engage in business to protect nature; the fundamental requirement of economic activities to *minimize pollution* and to *maintain a balanced use of natural resources*; the planning of activities with significant *transboundary environmental impact* through international cooperation; the use of natural resources to be subject to control by usage rates and by charges; *publicizing of information* relating to programmes and projects affecting the environment and the use of natural resources.

These aims and guiding principles are to be translated into *actions* by, inter alia, setting up a minimum reserve level and annual rate of use for each resource to protect non-renewable natural resources and the natural balance of renewable natural resources; using national programmes to comply with international environmental agreements; applying *environmental impact assessment (EIA)* procedures to planning, programmes and projects; applying, where stipulated by law, *environmental audit* procedures to business activities; preserving *biological diversity* through a national programme and action plan; establishing *environmental norms* through regulation or operating permits; developing *environmental monitoring* not only for the state of the environment, but also to assess trends and for planning; preparing *national programmes*, relating to the use of natural resources and the environment, and *regional development plans* in environmentally threatened regions such as Ida-Virumaa and the Pandivere Upland, to balance economic development with environmental needs in such sectors as industry, energy, agriculture and tourism; and establishing *funds* needed to implement the national strategy for sustainable development.

Economic instruments

Various economic instruments are currently in use in Estonia. For instance, there are *emission charges*. Polluters pay charges on listed air and water pollutants and on waste disposal. For the first two there is a differential between discharges below a negotiated limit and above this limit. Charges per unit of discharge also vary according to its type and location. Standard rates are set nationally but may be adjusted within limits by local authorities, depending on local conditions, the economic situation of the enterprise and its willingness to install pollution control equipment. The details of each charge system, which are sometimes lengthy and relatively complex, are specified in separate acts and elaborated or updated through regulations. *Emission charges are now index-linked*, so their real values are no longer eroded because of inflation. The revenues from the air, water and waste charges are paid into the Environmental Fund.

Resource pricing. Resource charges are levied on the use of land, water and mineral resources such as oil-shale, peat and building materials. They are related to the total amount of the reserve extracted (i.e. including mining losses), rather than to the usable reserve extracted, in order to discourage unnecessary mining losses of raw materials. They are now also index-linked. In 1993 (the last year for which comparable data are currently available), the resource charge was EK 0.50 per ton of oil-shale reserve extracted. The charges represent a relatively small proportion of the sales price of the resources: 1.8% in the case of oil-shale; and 0.5% for peat. The revenues from these resource charges are paid in specified proportions, which vary according to the resource concerned, to the national and district authority budgets.

Subsidies. These are available from a variety of sources, including the Environmental Fund (discussed below), national and county-level governments, foreign aid and pollution/resource charge allowances. Implicit subsidies and cross-subsidization also occur (for example, in water use and waste-water disposal) where the level and structure of prices do not closely reflect the level and structure of the resource costs incurred. *No comprehensive data are yet available on the scale and distribution of these subsidy payments.*

Environmental Fund

The Estonian Fund for Nature Protection and Rational Use of Natural Resources was established in 1983, with a proportion of the revenues derived from fines

and non-compliance fees for polluting natural water bodies. However, until independence its revenues and expenditures were relatively small. In 1990, it was re-organized as an *extra-budgetary Environmental Fund comprising two elements: a national Republican Fund* (attached to the Estonian Ministry of the Environment) and *19 county or municipal funds*. The Environmental Fund, which unless otherwise specified refers to both elements, national and local, was again re-organized through the Act on the Environmental Fund (1994), which lays down its legal status according to its purpose, funding, administration and accountability.

It is established under the authority of the Minister of the Environment to *collect additional financial resources to provide extra funding for environmental protection*. It is administered by a Government-appointed board. Its membership includes representatives of the Ministry of the Environment, all district governments, the Ministry of Finance and scientific institutions. Its main sources of finance are: compensation charges for pollution damage; donations; revenues from activities which are charged; interest on loans provided by the Environmental Fund; allocations from the national and local budgets; domestic financial resources obtained as grants.

The Environmental Fund's annual budget, shown separately as an annex to the national budget, has to be approved by the Government. These financial resources can be used as grants, subsidies and loans for financing investment, current and research and development expenditure connected with environmental protection. According to the 1994 Act, *at least 25% of the revenues derived from compensation charges for pollution damage should be used to finance local environmental protection projects and compensation schemes proposed by local authorities.*

The sources of finance and uses of the national Environmental Fund in 1994 are illustrated in table 7.3. It indicates that water, air and waste charges (which were the major sources of finance) contributed equally to the bulk of the Fund's income, whilst the *water sector was the major recipient of the Fund*. The total expenditure of the Environmental Funds (national and county/municipal) in 1994 was estimated at approximately EK 45 million. *This represented only 8% of the country's total*

estimated environmental expenditure of EK 553 million, but was equivalent to around one third of all environmental expenditure financed directly from the State, county and municipal budgets (see table 7.4).

Table 7.4 also shows *the relative importance of total environmental expenditure from domestic sources measured as a percentage of GDP. During 1992-94 it varied from 1.6% to 1.8%.*

Environmental impact assessment and land-use planning

In contrast to economic instruments and the Environmental Fund, arrangements for environmental impact assessment (EIA) and land-use planning are much more recent in Estonia. Provisions relating to EIA are currently contained in Government Order 314 of 1992 on *Environmental Impact Assessment in Estonia*. Its requirements and procedures are outlined in the Minister of the Environment Order No.8 of 1994 on *Methodological Guidelines for Implementing Environmental Impact Assessment in Estonia*. The Ministry of the Environment is drafting an EIA law which would both enhance the legal status of its EIA provisions and amend some of the existing regulatory provisions. This new law is expected, inter alia, to extend EIA procedures to planning documents and programmes, as well as to projects, as envisaged in the Act on Sustainable Development. It may also contain some provisions for a separate procedure on environmental auditing.

The existing EIA regulation distinguishes between projects whose assessment falls under the responsibility of the Ministry of the Environment and those which are under the responsibility of the regional environmental authorities. During 1993, the first full year of the regulation, 34 EIA studies were undertaken, mostly relating to projects for cement production, oil terminals and the construction or modernization of ports. The existing procedure provides for public participation at two stages of the EIA process: prior to the preparation of the EIA study and after it has been carried out but before the decision is made to approve or reject the project. *The decision itself has to be made public and the legal right exists to challenge it in court.* A second feature of the procedure is the licensing of experts eligible to undertake EIA studies.

The *Act on Planning and Construction*, approved by the Parliament in June 1995, envisages a four-stage planning process: national planning, county planning, municipal comprehensive planning and detailed planning. Prior to this a number of pilot planning

studies had been carried out (e.g. in Kehtna, Järvakandi and the county of Pärnu) to test and develop the new planning approach, which is different both in character and in purpose from its predecessor. Environmental protection is among the main objectives of the Act. A distinctive feature is the provision for public participation in the planning process.

Other kinds of planning studies have been carried out, or are envisaged. Some of these are conducted within a Baltic framework to consider such issues as coastal development and major transboundary transport corridors. Others are more local in nature, such as the development action plan for Haapsalu. In some cases, these studies include both economic and environmental issues; in others they are confined to the former. In the future, they should be coordinated with the planning process envisaged under the Act on Planning and Construction.

7.4 Environmental performance

Environmental aspects of privatization and land reform

According to the standard Asset Purchase Agreement for Estonian Privatization, the purchaser is indemnified for any third-party damages or "clean-up" costs arising from environmental pollution prior to the date of acquisition; and the purchaser accepts liability for damages and costs arising from environmental pollution after this date. In the transfer of these enterprises, EPA used a standard contract containing an *indemnification clause committing the Estonian Government to covering the costs of any clean-up (for past pollution) ordered by the government authorities*. However, there is no legislation in place regulating how clean-up decisions will be taken and how the costs involved will be covered.

In order to provide a factual basis for determining these liabilities, foreign purchasers in particular usually require an environmental audit (or liability audit) before the contract is sealed. This is normally made by independent auditors who are recognized by EPA but paid by the purchaser. *Environmental auditing for enterprises under privatization is not a standard procedure nor a requirement.* These auditing

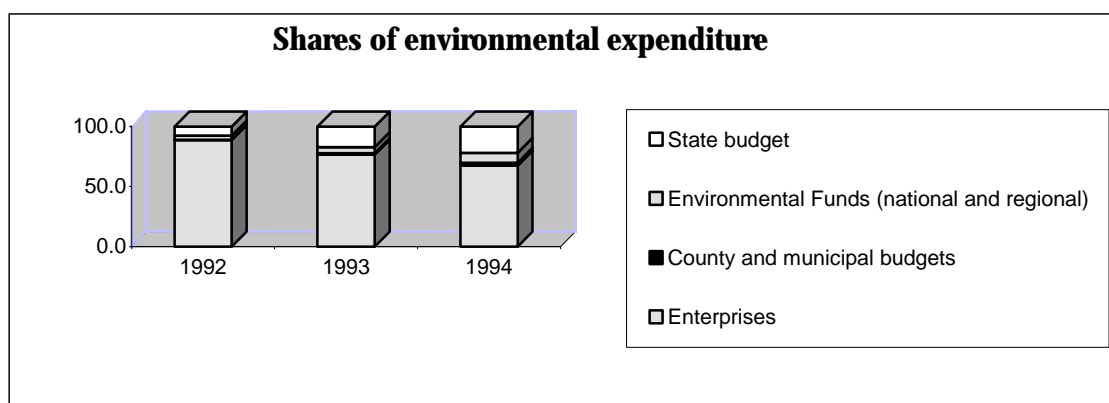
Table 7.3: National Environmental Fund, 1994

Source of income	Thousand		Expenditure	Thousand	
	EK	%		EK	%
Water pollution charges	7205.6	23.0	Water	12550.8	40.1
Air emission charges	6448.0	20.6	Air	1263.4	4.0
Waste charges	6960.3	22.3	Waste	2683.4	8.6
Hunting fees	1579.1	5.1	Hunting	275.8	0.9
Others	500.6	1.6	Nature conservation	1848	5.9
			Enforcement	2363.7	7.6
			Infobases and education	2992.1	9.6
			Reserve	2555.7	8.2
			Administration	330.4	1.1
			Environmental technology	249.5	0.8
Total sources in 1994	22693.6	72.6	Total expenditure in 1994	27112.8	86.7
Carried over from 1993	8574.4	27.4	Carried over to 1995	4155.2	13.3
Total available for use (1994)	31268.0	100.0	Total available for use (1994)	31268.0	100.0

Source: Estonian Ministry of the Environment

Table 7.4: Environmental expenditure from domestic sources, 1992-1994

Aggregate item of expenditure	1992	1993	1994	1992	1993	1994
	(million EK, current prices)			(% of total)		
State budget	15.2	58.8	121.5	7.4	17.1	22.0
County and municipal budgets	0.5	4.1	13.5	0.2	1.2	2.4
Environmental Funds (national and regional)	7.3	17.4	45.1	3.6	5.1	8.2
Enterprises	182.3	263.3	373.1	88.8	76.6	67.4
Total	205.3	343.6	553.2	100.0	100.0	100.0
Total as % of GDP				1.6	1.6	1.8



Source: Estonian Ministry of the Environment

Footnote:

¹ Estimates.

procedures rest, at present, with the EPA and they are performed only at the request of the potential purchaser. These audits raise certain questions:

- *Carrying out environmental audits is of prime importance* to establish a baseline record of past environmental damage and to determine if remedial steps are required. Auditing procedures, even though not yet regulated by the State, should nevertheless become a standard procedure in privatization. Consideration should be given to provisions on the content and timing of audits, the registration of auditors and opportunities for the review of environmental audits by, or on behalf of, the Ministry of the Environment;
- The indemnification of the purchaser for inherited pollution liabilities can be an acceptable means of dealing with the uncertainties of environmental liability, which can otherwise prejudice the success of a privatization programme. However, the consequence is that those liabilities remain with the State. Yet there is no provision, at present, for transferring a proportion of the purchase price to, say, the Environmental Fund in order to finance any third-party damages or "clean-up" costs. Since the damages have to be established in an appropriate court (i.e. via a potentially difficult legal procedure) and there is no compelling incentive to pay for "clean-up" costs, *there is a danger that these inherited pollution problems will continue unattended* and that the opportunity to address these through the privatization process will be lost.

EPA maintains a database of environmental regulations to provide basic information to prospective purchasers, who often wish to know the environmental conditions and standards with which they will be expected to comply before their privatization contracts are finalized. Since October 1994, a procedure has been developed to involve a Ministry of the Environment official in the privatization process. It is understood that any change in ownership of an enterprise, arising from privatization, means that the enterprise will need to re-apply for all of its environmental permits. According to Estonia's environmental impact assessment (EIA) regulations, an enterprise is also required to undertake

an EIA prior to the granting of these permits depending on its type, size, etc.

This is an important opportunity for the environmental authorities to check the likely future environmental impact of the enterprise to be privatized and to propose, to EPA, environmental conditions which need to be recorded when the contract is finalized. Alternatively, the purchaser may prefer to undertake the EIA and finalize the environmental conditions under which he operates, once his development plans for the privatized enterprise are clearer. In either event, *it is important that the uses of EIA procedures and environmental audit procedures in the privatization process should be made more explicit and applied systematically.*

There are no policies to define the extent of remediation of past environmental damage, nor is there legislation to clarify the responsibilities of the Government and private owners for past environmental damage or a programme to identify and assess serious instances of past environmental damage and their risks. Although since late 1994 some contacts have been established between EPA and the Ministry of the Environment, *it is important to further involve the Ministry in the decision-making process of privatization and land reform* in order to fully assess and take into consideration the environmental implications.

The environmental consulting business is still in its infancy and cannot yet carry out timely environmental liability audits for properties that will be privatized. Similarly, environmental auditing expertise is also needed at the public authority levels so that it becomes easier to coordinate, evaluate the quality and take decisions on the basis of audits carried out by firms. *Training in environmental auditing and EIA procedures is required* to build up the skills of the environmental authorities in assessing environmental audits and for the private sector to build a base of qualified environmental expertise.

It is difficult for small and medium-sized enterprises to obtain information about environmental requirements. Consideration needs to be given to building awareness among businesses about their environmental obligations, the importance of complying with environmental regulations, and of incorporating steps to achieve

such compliance in their short- and long-term investment plans. *Schemes need to be worked out to assist privatized enterprises in obtaining financing for necessary environmental improvements.*

Issues concerning land ownership and use have received much attention in Estonia. The fact that the privatization of land and the privatization of enterprises fall under different civil jurisdictions may have a negative impact on both economic development and environmental protection—private owners of enterprises do not own the land only the buildings. One of the concerns in the land reform pertains to the continued preservation of protected areas. The leading principle in the land reform is that owners of protected areas are obliged by law to preserve these areas. Opportunities also exist to exempt these areas from taxes. Nevertheless, this has caused some problems as 50% of these taxes normally went to the municipalities. *There are a number of conflicts between the municipalities and the individuals whose land ownership rights are being restored.*

Such problems exist, for instance, with various categories of forests which need to be protected. Although clear-cutting is prohibited in Estonia, there is nevertheless excessive tree cutting in privately owned forests. The reasons are, on the one hand, economic, as it provides an opportunity for owners to improve their economic situation, and, on the other, the insufficient control on cutting activities. In addition to the possibilities for tax exemption and land swap, legislation restricts the use of privately owned protected areas. Other forms of incentives, such as financial compensation, are also being considered to ensure the preservation of these areas (see chapter 6).

Sustainable development: strategy and instruments

Legislative provision for integration

The recently adopted Act on Sustainable Development is a potentially important framework law for making sustainable development principles operational in Estonia. The country has also adopted a considerable number of other framework, and more specialized, laws (see chapter 2 for details) which lay down statutory provisions for preparing and implementing a sustainable development strategy. *This programme of legislative activity should be completed shortly, enabling the focus of attention to switch increasingly to the practical implementation.*

Defining and adopting sustainable development objectives

The Act on Sustainable Development defines objectives in a broad manner, which is appropriate to a framework law. Previously the Estonian Government had formulated some of its sustainable development objectives in more specific terms, either in a quantitative or qualitative form. However, in the near future, it will probably find it necessary to *formulate more of its objectives and intermediate targets in an operationally precise manner.* In doing so, it will be important to evaluate them carefully beforehand to establish their feasibility and their order of priority and timing.

Institutional and procedural arrangements for coordination and integration

Some institutional and procedural changes have occurred since Estonia regained its independence that should increase the Government's capability to promote a more integrated approach to environmental protection and economic development, which is intrinsic to a sustainable development strategy. These include: the broadening of the competences of the Ministry of the Environment in 1993; the ongoing preparation of a National Environmental Strategy with a National Environmental Action Plan to follow in 1996 and the recent decision, in early 1995, to establish a Commission on Sustainable Development.

*The National Environmental Strategy (NES) is being prepared, on behalf of the Government, under the leadership of the Ministry of the Environment. The NES will be submitted to the Government in the beginning of 1996. Its purpose is to stipulate the Government's objectives and practices for integrating the sustainable management of the environment into Estonia's economic and social development, into the next century. At the time of writing, the 'inception' phase had been completed and the 'technical' phase was in progress. The latter involves the identification, development and preliminary evaluation of strategic options for environmental protection and natural resource management in Estonia. The final phase will involve the choice between options and other recommendations for inclusion in the strategy which the Government will adopt. The intention is that a *National Environmental Action Plan (NEAP)*, developed according to the*

Environmental Action Programme) for Central and Eastern Europe, will address the more immediate actions which are necessary for the successful implementation of the strategy.

In the future it will be desirable to closely coordinate, and extend, these types of initiatives to ensure that:

- A firm commitment is secured, at the highest governmental level, to the sustainable development goals for Estonia;
- All ministries, and not only the Ministry of the Environment, assume responsibility for promoting sustainable development;
- Individual ministries develop the necessary planning and technical capacities for integrative work in order to discharge these responsibilities effectively.

Instruments for the promotion of sustainable development

As already mentioned, legislative provisions have been made, either at the framework level, or in more detail, for instruments which may be used to develop and implement the sustainable development strategy. Now it is *necessary to ensure that these instruments become more effective for the preparation and implementation of such a strategy*, even if this has to be achieved stage by stage. For example:

- A comprehensive system of environmental quality standards and corresponding emission limits for individual discharges needs to be put in place;
- An integrated (i.e. multi-media) system of pollution prevention and control needs to be developed;
- The structure and levels of pollution charges and resource prices need to accord more closely with the 'polluter pays' and 'user pays' principles;
- The future role of the Environmental Fund as an instrument of the sustainable development strategy should be clarified and the basic principles governing the sources and uses of revenues accruing to the Environmental Fund need to be reviewed;

- The newer integrative instruments—particularly the envisaged provisions for integrated development and land-use planning and for the use of EIA procedures at both the project and planning levels—need to be brought into operation as soon as possible.

Given the short time in which *the new legal measures have been in place*, it is too early to assess how well they will eventually work. However, there is sufficient circumstantial information concerning their deficiencies in practice at present to suggest that *improvements in implementation should be given a high priority*. The difficulties which occur at present are due to several factors, such as:

- Unrealistic environmental norms are still in place, which tend to foster a culture of non-compliance;
- Weakness in enforcement, due in part to insufficient inspection staff;
- Difficulties in maintaining certain wastewater treatment facilities in rural areas, arising from the privatization of particular large-scale collective farms;
- Difficulties in exercising property rights due to ambiguities over land ownership during the period of land restitution;
- The limited influence of economic instruments on environmental quality levels because environmental charges, in the main, fall below the levels consistent with the 'polluter pays' and 'user pays' principles;
- Difficulties associated with the transfer of responsibilities from State to county and municipal levels without sufficient supporting measures to strengthen their capabilities.

A package of measures (rather than a single type of measure) will be needed to remedy these deficiencies and this will need to be prepared carefully but urgently.

Chapter 8

IMPACT OF ENERGY ON THE ENVIRONMENT

8.1 Development of energy sector

Status and trends; structural changes

During the Soviet period, Estonia was integrated into the economic and political system of the USSR, and, thus, became specialized in energy- and resource-intensive industries such as the chemical, pulp and paper industries and electricity generation for export to Russia and Latvia. The generation of heat and power, in particular, was based on the large deposits of oil-shale, which B partly as a result of the failure to consider environmental factors B contributed to the relatively inexpensive supply of primary energy. These two aspects explain the *high energy intensity* of the Estonian economy, which in 1993 was 0.51 toe per unit of GDP. A comparison between the changes in energy supply and GDP shows that the *energy intensity* of the Estonian economy has *declined* in the course of the transition process. There is nevertheless a considerable need for adjustment as the level of energy intensity is still high when compared internationally. In terms of GDP, the energy supply in Estonia in 1993 was more than twice the average in OECD Europe, and above that of Hungary, but below that of Bulgaria and of Poland (fig. 8.1). The level per capita (3.5 toe/capita) is slightly above the average in OECD Europe, but some 50 per cent higher than in Bulgaria, Hungary and Poland.

After Estonia regained its independence, some industrial facilities were shut down, as they were not economically viable nor environmentally sound. The economic reform led industrial output to plummet and, hence, energy demand to fall. The *consumption of primary energy* dropped by 43 per cent, from 417 PJ in 1990 to 239 PJ in 1994. In the same period, *domestic electricity consumption* decreased from 7.3 TWh to 5.3 TWh and *heat consumption* from 24.9 TWh to 11.7 TWh. Recent trends show that the decline in domestic electricity consumption has come to an end. Electricity produced in Estonia has lost market share in the Russian Federation and Latvia, because the demand

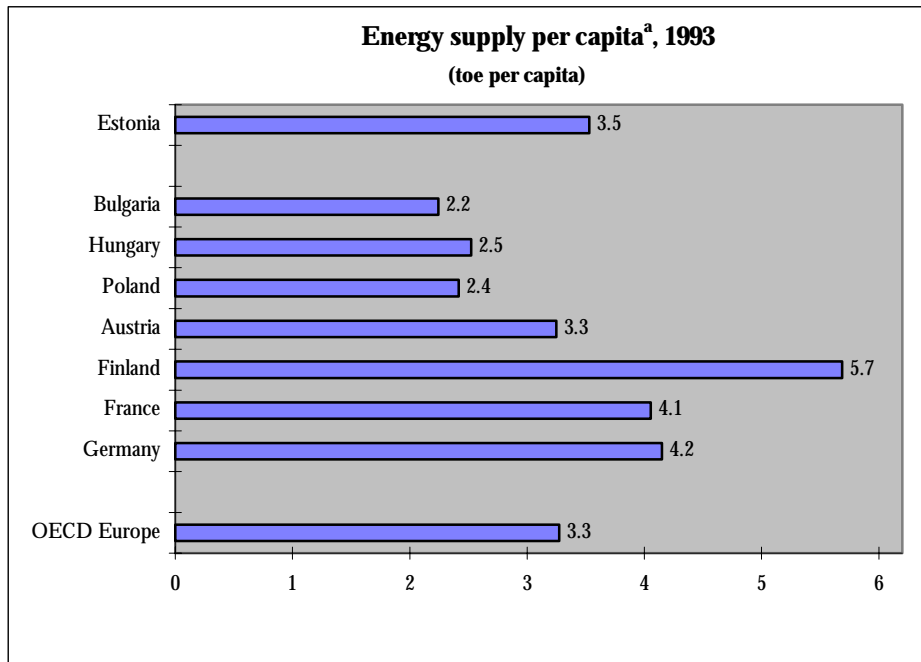
has fallen. Thus, *electricity exports* to Russia and Latvia decreased from 8.5 TWh in 1990 to 1.5 TWh in 1994.

Between 1990 and 1994 the decline in *imported fuels*—especially in natural gas, from 51.2 PJ to 21.4 PJ (a 58% drop) B considerably exceeded the decline in the domestic production of primary energy. The rapid reduction in the consumption of imported fuels has been caused, on the one hand, by the general decline in industrial production and, on the other, by the tremendous rise in the price of imported fuel to world market level. The prices of imported oil and gas are now approximately equal to western European prices. Domestically mined oil-shale and the electricity produced from it are much cheaper than other forms of energy because environmental costs are neglected, the oil-shale is cheap to mine and electricity rates do not include capital depreciation or investment elements. Increased energy prices have created a significant problem of unpaid bills: debts to energy suppliers are mounting as customers are unable or simply refuse to pay their bills.

Energy demand and end-use efficiency

Energy consumption *in industry* decreased from an average of 87 PJ (1985-90) to approximately 41.5 PJ in 1993. Industry (including the energy production sector) accounted for 81% of the total fuel consumption in 1994. In the same year, heat and electricity represented over 36% and 17%, respectively, of the total energy consumption (fig. 8.2). In spite of a substantial drop in the production of basic materials, the sector's energy intensity is still very high compared with other countries. Energy intensity in the industrial sector is estimated at 35 MJ/US\$, against 15 MJ/US\$ in the United States. This high energy use is a sign that the production processes are inefficient; equipment is worn-out and outdated; and technologies are obsolete.

Figure 8.1: Energy intensity, 1993

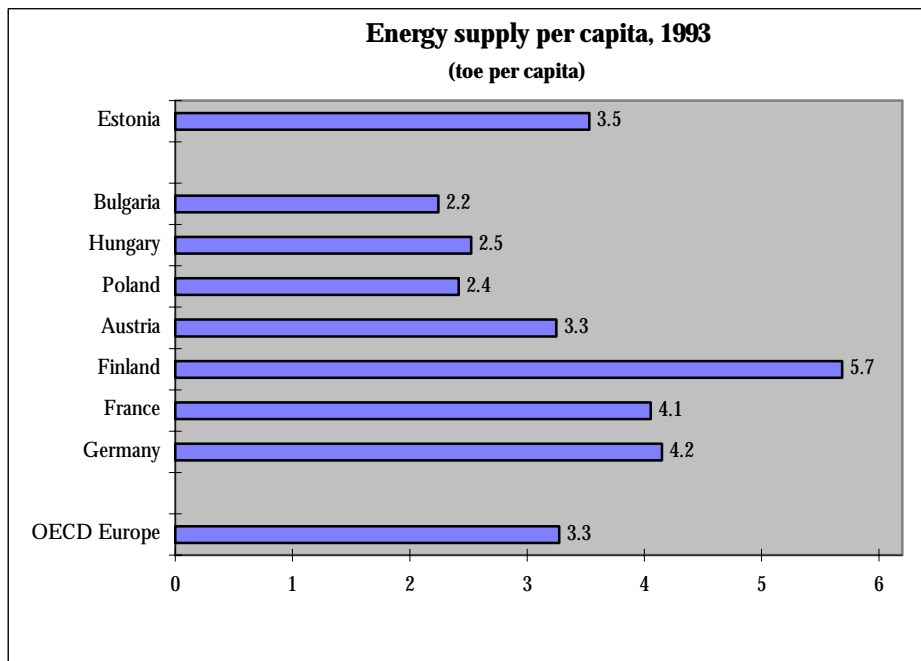


Sources: OECD, Statistical Yearbook (1995); World Bank Atlas (1995)

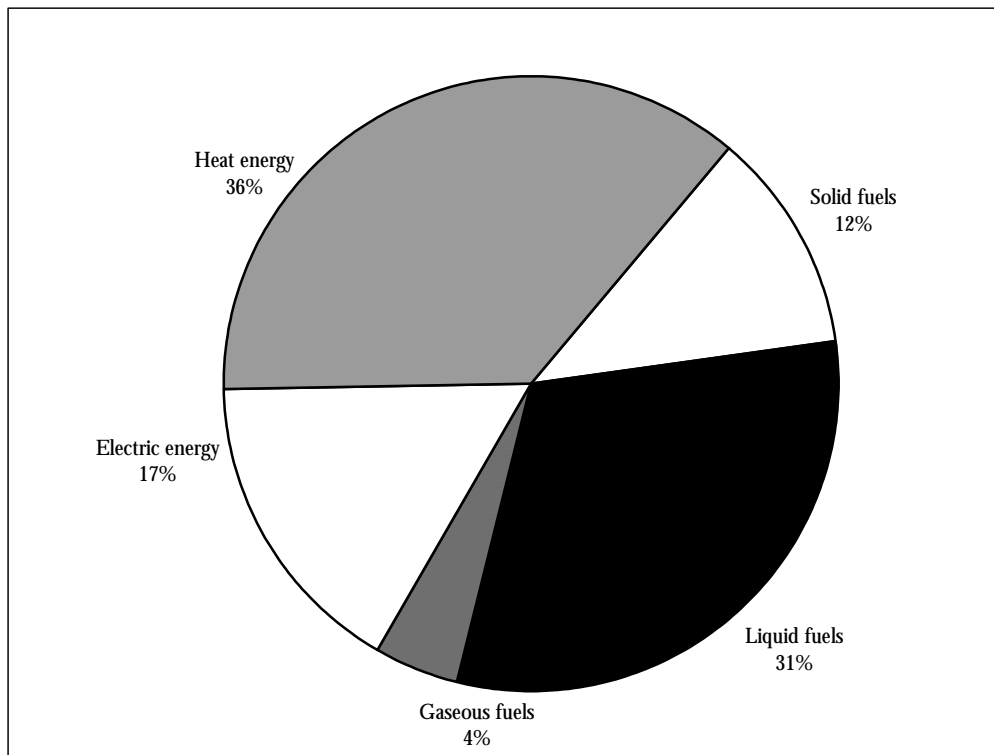
Footnotes:

^a Total primary energy supply.

¹ GDP at 1991 PPP exchange rates.



Sources: OECD, Statistical Yearbook (1995)

Figure 8.2: Total final energy consumption by energy source, 1994

Source: Statistical Yearbook (1995)

Energy consumption in the *residential sector* fell between 1991 and 1993, from about 43.8 PJ to about 35.5 PJ. Heat represented nearly 50% of the energy consumption for this sector. The district heating system delivered heat to more than 75% of the residential buildings. Taking into account the different structural factors for a comparison with western countries (e.g. higher occupation density in Estonia, fewer household appliances, and consequently much lower electricity consumption), the consumption of 0.8 GJ/m² of living area compared to 0.45 GJ/m² in Sweden (1992 estimates) indicates the existence of a considerable saving potential. Improvements can also be achieved by updating the heat production and distribution facilities. For example, in the district heating system upgrading and maintaining the heating distribution lines would reduce losses, thereby improve the system's efficiency. The *lack of metering equipment in heat production*—in 1993 only 42% was measured by heat meters, the rest was calculated from the fuel costs and average boiler efficiency—and *for end-use distribution* undermines the effectiveness of higher prices as an incentive to reduce energy use.

Energy consumption in the *transport sector* decreased significantly from 37.7 PJ in 1990 to 25.6 PJ in 1994. The drop is due to the rapid decline in the transport of goods, which is the result of the decrease in industrial production and the increase in imported fuel prices. The share of transport as a percentage of total fuel consumption is less than 6%. The upward trend in car traffic and the relative increase in the transport of goods by road at the expense of rail lead us to assume that energy consumption in this sector will show a marked increase in the next few years.

Energy production and transformation

Primary energy production is dominated by *oil-shale* (fig. 8.3). In 1993, it accounted for *over 60% of the energy supply*. Estonia is the only country in the world with an electric power generation system based almost exclusively on oil-shale. In 1993, the percentage of *electricity generation* by oil-shale was as high as 99%. The production of 14.9 million tons of oil-shale in 1993 came from six underground mines and three opencast mines in the north-east of Estonia. In 1993, the import of oil-shale from the Russian Federation amounted to 1.8 million tons.

Peat (4.2 PJ) and *wood* (7.3 PJ) production are of regional importance. With imported oil and gas becoming too expensive, many operators are switching to oil-shale, peat, wood or other biomass, which will create their own emission problems. *Shale oil*, which is produced from oil-shale in three processing plants, accounts for nearly 10% of heat generation. Compared with OECD countries, imported *oil and gas* account for a relatively small proportion of the total energy supply. Like many other east European countries, Estonia's energy supply relies almost completely on fossil fuels. In the course of the transition process the *share of oil and especially of natural gas is declining*, which is due to the alignment of prices for these fuels with world market levels.

Most energy is produced by six combined heat and power plants (Baltic, Estonian, Kohtla-Järve, Ahtme, Iru and Ülemiste). The installed electrical capacity for these plants is 3260 MW_{el}, and the installed heat capacity, 2750 MW_{th}. The Tallinn heat distribution network provides an additional 1450 MW_{th} of installed heat capacity. The two largest power plants, Baltic and Estonian, have a combined installed electrical capacity of 3000 MW_{el}. Over 90% of the capacity of the power plants is *based on oil-shale*. Due to the decline in energy demand, the power plants and the mines are currently working at about 50% capacity. The oil-shale power plants are tied to the location of the oil-shale production in north-eastern Estonia.

8.2 Environmental effects

Energy consumption in Estonia creates many environmental problems. Some, like local air pollution and acid rain, are common to many European countries. However, Estonia's oil-shale mining and processing for electric power generation, though making the country self-sufficient in electricity, are specific and significant sources of environmental disruption such as land degradation and groundwater contamination.

Air pollution

In Estonia, the *energy production sector is the main source of air pollution*. Air quality varies throughout the country. Tallinn and the oil-shale mining region in the north-east are the most affected by air pollution. The main emitters are the oil-shale based power plants. The Baltic and Estonian power plants account for 50% of particulate emissions and 70% of sulphur dioxide emissions from stationary sources in Estonia.

In 1994, these two power plants emitted 86,000 tons of particulates (dust, fly ash) and 98,000 tons of sulphur dioxide. Since 1990, emissions have fallen by about 40% due to the drop in energy production (chapter 3).

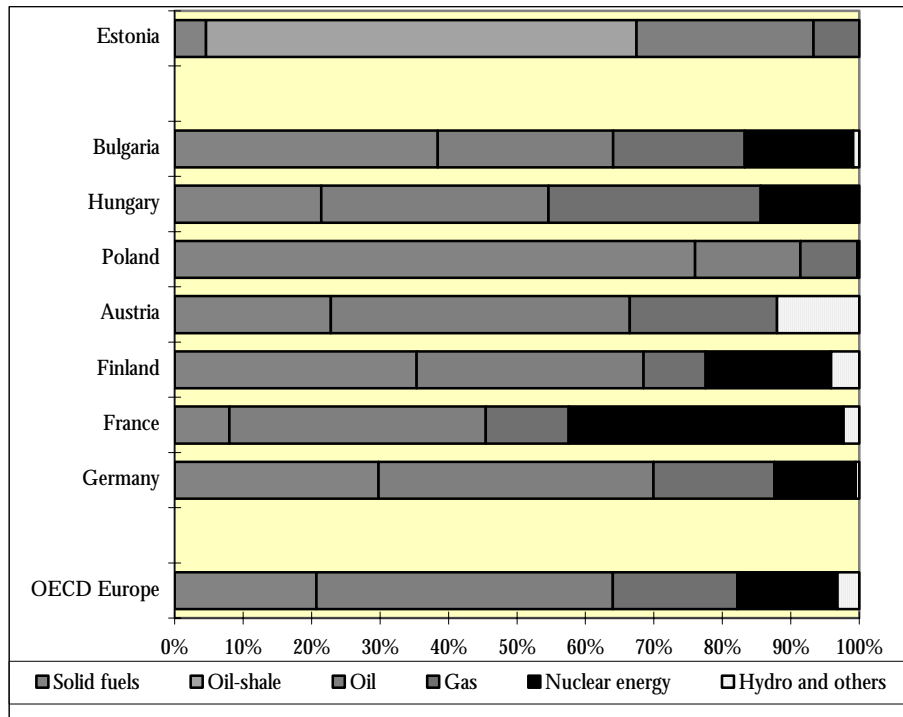
Emissions per capita in Estonia are remarkably high at 108 kg for particulates and 94 kg for sulphur dioxide in 1994. The high emissions of CO₂, 15 tons/capita in 1992, are the result of the combustion of oil-shale and the low efficiency of the power plants. The emissions are concentrated in the oil-shale mining region in the north-east, around the two industrial towns of Narva and Kohtla-Järve, where the ambient air quality standards were exceeded in several places. In addition to causing local air pollution, the emissions of sulphur dioxide contribute to the considerable transboundary fluxes of pollutants. Major emitters are located near border areas and emissions discharged into the air are carried to neighbouring countries (see chapter 9).

Other environmental effects

The high ash content of the oil-shale and the heavy metals it contains cause a number of problems in soil and water. Each year millions of tons of alkaline ash containing several microelements (e.g. heavy metals) are disposed of in ash fields. To date, approximately 197 million tons of *ash from the power plants* have been disposed of in an area of about 2,000 hectares. In 1994, 5.8 million tons of ash were produced, of which 7% were used in building materials and agriculture, for instance. The highly alkaline waste water leaching from the ash tips is not neutralized before being discharged. In 1994, some 5.5 million tons of *mining residues* were produced, of which nearly 1.8 million were sent for disposal. Owing to the concentration of kukersite, there is a risk of auto-ignition of the tips. A total of about 135 million tons of accumulated mining residues covers an area of 336 hectares.

Further problems are caused by the *processing enterprises* which convert the organic matter of oil-shale into oil and gas. To date nearly 80 million tons of *residues from the retorting plants* have been produced and landfilled. The landfill area of Kiviter is about 250 ha with the highest point of the pile about 100 m above ground. There is a possibility of leachate carrying compounds such as phenols, which can

Figure 8.3: Structure of energy supply, 1993
(percentage of total primary energy supply)



Sources: EBRD; OECD; Statistical Yearbook (1995)

Footnote:

¹ Breakdown excludes electricity trade.

affect rivers and groundwater. Other problems concern the *coke ash*, which is dumped in the vicinity of the processing plants (1.5 million tons in 1994). The central effluent treatment plant is not effective, and leaching carries phenols and heavy metals into groundwater and rivers.

The *oil-shale mining* operations cause additional environmental problems. Mining *lowers the groundwater table*. The affected area is about 1,500 km², of which about 200 km² cause severe difficulties in the water-supply for the local population and farms. *Drainage waters from underground mines* amount to 500,000 m³/day. Drainage waters from *open pits* amount to 214,000 m³/day. Due to their high SO₄ content, these drainage waters may have an impact if they are released into small rivers.

An area of some 200 km² is affected by the underground mining of oil-shale. Owing to the cavities left by the mining operators, about 74 km² are threatened by *land subsidence*. *Opencast mining* of oil-shale consumes approximately 400-

500 hectares of land a year. A total area of about 11,000 hectares has already been affected. Some 9,000 hectares of this total have been subject to reclamation and recultivation, mostly with forests.

8.3 Environmental performance

Energy policy and environmental objectives

Up to now, the greatest impacts affording relief to the environment have been due to *structural change*. Changing production and consumption patterns play a major role in reducing the energy intensity of the economy. The service sector, which uses less energy than industry, continues to increase; it is already bigger than industry. However, the continuing lack of objectives and programme for the development of the energy sector makes it difficult to make a long-term assessment of the situation. Some studies concerning the oil-shale industry were completed; they could support the drawing-up of an energy programme.

The general energy policy aims to achieve sustainable development in the energy sector; improve the efficiency of power generation, distribution and consumption; open the power and fuels markets; foster fuel substitution to local fuels (peat, wood); and encourage the population to economize on energy. Programmes to save energy should be implemented in all industries that produce and consume energy, especially the building heating sector, which is one of the largest energy consumers.

Direct environment-related governmental targets are the implementation of emission limits which meet the EU requirements; the reduction by 50% of the SO₂ emissions of the Baltic and Estonian power plants from their 1980 levels by 1997; a stabilization of CO₂ emissions at the 1990 level by 2000; and the solution of environmental problems of the oil-shale industry.

Institutional aspects

The *Ministry of Economics* is responsible for drawing up and implementing energy policy, preparing development programmes, supervising and administering State enterprises, and coordinating investment activities. The Estonian Privatization Agency (EPA) is responsible for the *privatization* of the energy industry, which is still at an early stage.

The six underground *oil-shale mines* and three opencast mines are still completely State-owned. The *electricity generation and distribution* enterprises are also State-owned. Oil-shale *processing* plants are now subject to privatization. Currently, there are no concrete plans for privatizing the mines and the electricity generation and distributing systems. The privatization of such enterprises is problematic as there is no comprehensive concept for the long-term development of the oil-shale industry. However, whether the current level of oil-shale production will be kept up is unclear. Other State measures such as the fixing of oil-shale prices by the State are obstacles to privatization. Structural change in the mining and processing of oil-shale could cause major social and political problems if drastic job cuts were to result. The Estonian Government has decided to sell part of its shares in the *Estonian Gas Company* abroad. *The production of oil products* is

run by private companies and most of the enterprises in the *peat industry* have already been privatized.

The *partial privatization* of enterprises operating in the energy sector might result in a further increase in efficiency. The lack of clear energy policy objectives and legal framework is a particular source of uncertainty for investors and an obstacle to privatization.

The ownership of several boiler houses for *heat generation* has been transferred to the municipalities. By the end of 1993 there were already two companies of this kind with foreign investors. The majority of such enterprises are, however, owned by the municipalities. The heat for residential areas is often supplied by the major power generators, which are in public hands. The beginning of a broad privatization of the housing stock will affect energy-efficiency in the residential sector. New owners have a direct stake and interest in reducing costs, including increasing the energy efficiency of the buildings by, for example, improving insulation, air tightness, windows and ventilation.

Instruments and measures

An appropriate *legal framework* is being established to achieve sustainable development in the energy sector. This includes:

- The 1994 Mineral Resources Act, which requires the appropriate recultivation for land use;
- The 1995 Act on Sustainable Development, which requires a national energy programme to be drawn up in order to balance economic activities with environmental needs;
- The draft air pollution act, which will require the implementation of emission standards;
- The draft energy law, which will require energy industries to take environmental concerns into account.

In addition to these there is a *system of economic instruments*, including fees for the use of natural

resources, such as oil-shale, peat and wood, and emission charges for pollutants subject to permits.

The 1992 Energy Conservation Programme gave priority to *energy saving*. Almost EK 14.4 million from the national budget was allocated to Programme projects. The main stress was on updating the heat production and distribution facilities and the wider exploitation of local fuels (wood, peat). Another objective was the installation of heat meters and modern substations in buildings; these provide more accurate control and regulation of heat consumption. Projects within the Energy Conservation Programme included:

- Investigations into the use of local fuels;
- Reconstruction and re-equipment of boilers;
- Installation of heat meters, substations, and heat pipelines;
- Development of energy legislation; and
- Costing for setting up special funding for energy projects and a National Energy Board.

In 1992, several programmes were set up for the reconstruction of the heat energy structures, energy conservation in public and institutional facilities and heat metering. In these sectors the majority of the projects were implemented with the assistance of *international loans*.

In 1992, Estonia signed a contract with EBRD for a 10-year loan of DM 73.4 million. The objective was to assist Estonia in obtaining a sufficient energy supply and in starting up an energy reorganization programme to speed up the restructuring of the energy sector to meet market standards. The contract included projects for the reconstruction of power plants and heat distribution networks and for energy saving programmes such as the supply of heat and electricity meters, equipment and materials for boiler plants and energy saving projects for 19 industrial plants. In 1993, Estonia obtained a loan of EK 76.4 million from the EU for the reconstruction of the heat market and the production of local fuels (peat and

wood). This loan was distributed based on applications received from the counties.

A 1993 Estonian-Finnish agreement calls for the SO₂ emissions of the Baltic and Estonian power plants *to be reduced by 50%* to 95,000 tons by 1997. Although this target is nearly attained, due to a decrease in electricity demand, the intention is to equip part of these power plants with desulphurization units. Feasibility studies concerning the refurbishment of these power plants have already been carried out. Little progress has been seen in *reducing the environmental problems of oil-shale mining and in particular of oil-shale processing*. There is a need for a comprehensive approach on the basis of thorough economic and environmental analysis.

Energy pricing

A crucial aspect for the development and structure of the energy supply and consumption *is pricing*. In Estonia there is an energy price split. In 1992, the prices of liquid and gaseous imported fuels were liberalized. This can be seen as an instrument to improve energy efficiency. *The prices of oil-shale and electricity are fixed* by the Government and are kept *relatively low*. The prices do not cover the costs of production, and in particular no account is taken of depreciation and return on investment. Under the present plans the prices are well below those in west European countries. As a result of this price split, the environmentally more acceptable liquid and gaseous fuels are relatively expensive, so their scope for development is limited. In order to keep prices of oil-shale and electricity predictable, there is a *system of scheduled price increases*. The increases roughly follow consumer price rises.

Increased energy prices have created a secondary problem: that of unpaid bills. Debts to energy suppliers are mounting as energy consumers cannot afford (or simply refuse) to pay their bills. In 1993, district heating companies reportedly collected only about half of their bills; the rest went unpaid and were added to debt accounts or were paid by the State. The State has also paid off debts to foreign energy suppliers. Revenue collection for heat poses a special problem: while electricity to non-payers can be shut off, heat supply to individual consumers is mechanically and morally difficult to

stop. The accumulated debts mean that little money is available to invest in new capital equipment. The resulting further decrease in the already small working capital resources and the associated investment deficits are an obstacle to plant maintenance and result in capital stock becoming increasingly out of date.

It is problematic that the *energy price split favours the use of domestic fuels*, since their production and use in the present form give rise to considerable environmental problems. Increasing prices of electricity and heating at the same rate as consumer prices means maintaining the status quo, i.e. poor possibilities for enterprises to invest and poor incentives for consumers to save energy.

Environmental charges have a limited steering effect because their real level is low. Lack of measuring equipment B especially in the household sector B is impeding the allocation of costs on the basis of consumption.

The policy of *encouraging the use of cheap local fuels* like peat and wood has already resulted in an increase in the share of these fuels in the primary energy supply. However, it is not clear if this intensification in the use of local fuel, in particular peat, is consistent with the goal of sustainable development.

Chapter 9

INTERNATIONAL COOPERATION

Its independence, regained on 20 August 1991, placed Estonia in a new geopolitical context, with Latvia to the south and the Russian Federation to the east. Estonia has now established close contacts in the field of environment with other countries around the Baltic Sea and in particular Finland, Sweden and Denmark. It has become a member of the United Nations and its constituent bodies and specialized agencies, as well as of the Council of Europe and several other international organizations. Since 1995, Estonia is formally associated to the European Union (EU). All this demonstrates Estonia's interest and *active participation in international cooperation*.

The major *goals of Estonian international environmental cooperation* are to:

- Integrate internationally accepted environmental principles and best practices, in particular those relating to sustainable development, in its national legislation, policy-making and management practices;
- Attract foreign assistance for environmental protection projects;
- Play an active role in subregional cooperation in the Baltic Sea area.

Estonia's international environmental policy has so far *focused on water protection and nature conservation*. Most of the foreign assistance and funds that Estonia has received to date have come in connection with the protection of the Baltic Sea.

Estonia has *ratified several environmental conventions* (annex III). Very few other conventions are expected to be ratified in the near future, as Estonia is concerned that it might not be able to meet convention obligations because of financial constraints.

9.1 Cooperation with neighbouring countries and the European Union

European Union

In May 1995 Estonia *signed the European Agreement Establishing an Association between the European Communities and Their Member States* on the One Part and the Republic of Estonia on the Other Part. This agreement contains some articles specifically devoted to the protection of the environment; further environmental issues are incorporated in several other articles, with a view to ensuring the integration of environmental concerns into sectoral activities. Estonia's goal is to achieve full membership at the turn of the millennium. New environmental laws are consequently being drafted to secure compliance with the corresponding EU legislation.

Accession to the EU implies, inter alia, meeting tighter environmental standards. This would pose practical problems, in particular for Estonia's energy and industry sectors. Substantial investments, improved environmental management practices and more powerful environmental information systems are essential to resolve these problems. A strategy based on a step-by-step approach and the prioritization of environmental actions is needed. Through its *PHARE* programme, the Commission of the European Communities is providing financial support to strengthen Estonia's institutions and harmonize legislation with the EU. It is also assisting Estonia in elaborating its National Environmental Strategy (NES), which will encompass the goal of meeting EU environmental requirements.

Cooperation with neighbouring countries

Cooperation between Estonia and its neighbours has been strengthened since it regained independence through the negotiation and implementation of bilateral agreements concerning the environment. Some twenty agreements have

been concluded, of which almost half are framework agreements on the environment as a whole, eight on fisheries and four on other specific issues. Recently, a special programme has been launched for a "Gulf of Finland Year 1996" together with Finland and the Russian Federation.

The Nordic countries

Bilateral framework agreements on environmental protection have been concluded with Denmark (1991), Finland (1991) and Sweden (1992). Specific agreements were concluded with Finland on air (1993) including the setting of concrete targets (chapter 3), on water protection (1993) and on combating marine oil and chemical spills (1993).

Cooperation with *Finland* focuses on: strengthening environmental legislation and institutions; investment projects developed within the framework of the HELCOM Baltic Sea Joint Comprehensive Action Programme; studying the technical and economic feasibility of environmentally sound oil-shale combustion; and training at the national and municipal levels. Finland has supplied monitoring and laboratory equipment and computer hardware and software to help build up Estonia's monitoring system.

Danish expertise is mainly directed at providing assistance relating to waste management, groundwater treatment and remediation of surface water bodies. For example, Denmark is assisting the Estonian authorities in the preparatory work for cleaning up polluted groundwater at the former military airport of Tapa. A pilot-scale remediation unit has been in operation for two years. *Sweden*, together with Finland and Norway, is studying the safety problems in the Sillamäe radioactive waste depository, which is a potential threat to the Baltic Sea. Scientific cooperation with Sweden on nature conservation has also been pursued for many years. The cooperation with Sweden also focuses on investment projects and technical assistance within the HELCOM Baltic Sea Joint Comprehensive Action Programme and on strengthening environmental legislation and institutions and training. *Norway* is involved in the financing of the Small Municipalities Environmental Project.

Latvia and Lithuania

Under the Baltic Council of Ministers, a committee of senior governmental officials from Estonia, Latvia and Lithuania has been set up for

environmental protection. A *trilateral agreement on environmental cooperation* was signed between the three Baltic States in July 1995. Cooperation is to be promoted on the sustainable use of natural resources, the management of hazardous waste, transboundary issues, marine protection and sea monitoring. On a *bilateral* basis, a framework agreement on environmental protection has been established with Latvia (1994). This now needs to be elaborated according to the particular problems which should be addressed. In the meantime, joint projects are under way on nature conservation and on environmental impact assessment (EIA) applied to the port of Ainazi in Latvia, which is close to the Estonian border. So far no specific bilateral cooperation arrangements for environmental purposes have been established with Lithuania.

Russian Federation

A framework agreement on environmental protection is under discussion with the Russian Federation, as well as a project for cooperation on the protection of the Baltic Sea and the Peipsi-Pihkva Lake. As part of this cooperation a draft agreement on the protection and rational use of natural resources of *Peipsi-Pihkva Lake* and its catchment area (i.e. the Narva river catchment area) is being prepared. It will deal, inter alia, with the monitoring of the lake quality, the management of the hydrographic basins and the identification and elimination of "hot spots".

Other countries

Bilateral agreements or other arrangements have also been concluded with Switzerland (1992), Germany (1992), the United States (1994) and Poland (1995). Environmental cooperation with *Switzerland* focuses on waste and water treatment; with *Germany* on recultivating mining areas, remediating former military sites, and treating waste water; with the *United States* on environmental monitoring and training in EIA and risk assessment, waste minimization and clean-up of the Paldiski fleet base (radioactive contamination). The cooperation with *Poland* is expected to address common issues of the Baltic Sea protection, including the exchange of environmental data.

Fisheries

Estonia has signed *bilateral agreements to define fishing quotas* with Canada (1992), Denmark (1992), Finland (1994), the Russian Federation

(1994), Sweden (1993), the United States (1992) and the European Community (1992). A treaty (1994) on the conservation and use of fish stocks in Lake Peipsi, Lake Lämmi and Lake Pihkva was concluded with the Russian Federation. Negotiations with Latvia on fisheries are still going on. Besides bilateral agreements, Estonia also ratified the Convention on Fishing and Conservation of the Living Resources in the Baltic Sea and the Belts (Gdansk, 1973).

9.2 Regional cooperation

Environment for Europe process

Estonia has been actively involved in the pan-European cooperation developed under the *Environment for Europe process* which started with the first Conference of the European Ministers of Environment at Dobris Castle (former Czechoslovakia, 1991). The process aims at converging environmental quality and policies on the continent, and securing peace, stability and sustainable development. In 1993-1995, Estonia co-chaired the Task Force for the implementation of the *Environmental Action Programme for Central and Eastern Europe*, the broad strategy of which was adopted at the second Ministerial Conference in Lucerne (Switzerland, 1993). The Programme concentrates on policy reforms, institutional strengthening and environmental investments in countries in transition from a centrally planned to a market economy.

Estonia also contributed to the preparation of the first pan-European state-of-the-environment report "Europe's Environment: the Dobris Assessment" and to the *Environmental Programme for Europe*, which was endorsed at the third Ministerial Conference "Environment for Europe" in Sofia (Bulgaria, 1995). The Programme addresses some of the key findings of the Dobris Assessment and highlights a number of long-term environmental priorities at the pan-European level. Estonia also participated actively in the preparation of the UNECE Guidelines on Access to Environmental Information and Public Participation in Environmental Decision-making and in the pan-European Biological and Landscape Diversity Strategy, which were also endorsed by the Ministers at Sofia.

Pollution of the Baltic Sea

The Helsinki Convention

Estonia signed the second *Convention on the Protection of the Marine Environment of the Baltic Sea Area* (Helsinki, 1992), and ratified it in 1995. For Estonia, this Convention is of the utmost significance, given the importance of the Baltic Sea for Estonia (see also chapter 4). During the Soviet period, Estonian institutions established close contacts with their counterparts in Finland on issues concerning the Gulf of Finland and gained experience in participating in several international Baltic Sea programmes. This explains why Estonia was capable of pursuing its cooperation uninterruptedly after regaining independence. The 1992 Convention reinforces the priority objectives previously defined to limit eutrophication and the discharge of toxic compounds in the Baltic Sea.

The duty to *reduce the pollution load from land-based sources* rests mainly with the municipalities and settlements of more than 5000 inhabitants, which means about 25 Estonian cities. At present, only the Tallinn municipality complies with HELCOM BOD₇ and phosphorus standards. However, when the recommendation on BOD₇ and phosphorus enters into force in 1998, most of the bigger towns will be able to meet the requirements, as the State Investment Plan, the Small Municipalities Environmental Project and other projects will by then have been implemented. It is difficult to estimate if existing *industrial plants* are or will be able to meet HELCOM recommendations, given the decline in economic activity. Pollution from *agriculture* is considerably reduced due to the current decrease in pesticide and fertilizer use. Some national regulations and norms on agricultural practices were introduced in 1994 and are in line with the HELCOM recommendations.

Also following HELCOM recommendations on *monitoring programmes for the Baltic Sea*, a new monitoring programme was established in Estonia and the monitoring network was reorganized in 1995 to monitor adequately eutrophication and polluting substances (including heavy metals and organic pollutants), emissions and effects. Under HELCOM, Estonia participates in different ecological studies of the Baltic Sea.

For Estonia one of the crucial topics in the coming years will be the strengthening of national capabilities to combat marine pollution and comply with HELCOM recommendations regarding tanker safety, the safe operation of ships and the reduction of air pollution from ships, as well as the conservation of natural habitats and biological

diversity and the protection of ecological processes in and around the Baltic Sea. Particular emphasis will have to be put on protecting valuable species and biotopes, in particular wetlands.

The Baltic Sea Joint Comprehensive Action Programme

The Baltic Sea Joint Comprehensive Action Programme was adopted in April 1992. It aims at ensuring the ecological restoration of the Baltic Sea and the preservation of its ecological balance. Problems and priority actions were identified in all the countries of the Baltic catchment area, including hot spots. Investment costs for hot spots in Estonia have been estimated at more than ECU 1.5 billion, i.e. 10% of the total Baltic hot spots' cost. Estonia's hot spots consist of 13 municipal, industrial and agricultural sites, of which 5 are on the top priority list of the first phase (1993-1997). Top of the list is the reconstruction of power plants in the Narva region, which makes up 70% of the overall estimated investment costs, i.e. over ECU 1 billion. The other priority hot spots are Tallinn (ECU 93.6 million, municipal and industrial water pollution), Matsalu Bay (ECU 30 million, management programme), Pärnu (ECU 18 million, municipal and industrial pollution problems), and the Gulf of Riga (ECU 20 million to be shared with Latvia, management programme).

The Programme is being implemented through a number of ongoing projects. In Narva, as a first experimental step, a full-scale desulphurization pilot plant for the Baltic oil-shale power plant has been constructed. In Tallinn, the first stage of a biological waste-water treatment facility was started in 1993. It has already cut the pollution load by two thirds. The second stage, encompassing a wide range of environmental issues, was approved by Parliament in May 1995 and will start soon. The construction of the Hapsalu/Maatsalu waste-water treatment plant is also to be started shortly, as it was approved by the Estonian Government in June 1995.

The projects are financed jointly by foreign investments and significant local funds. Foreign funding is coming through bilateral assistance (grants from Finland, Sweden, Denmark, Germany and EU PHARE) and loans from international financial institutions (IFIs). The private sector is becoming increasingly involved in the implementation of the Baltic Sea Programme in Estonia and in construction work and procurement via the tendering and bidding processes. The

current trend is to shift the burden of financing certain environmental measures from the public budget to the private sector.

Pollution by ships

In 1992, Estonia joined the International Maritime Organization (IMO) and ratified the 1973 International Convention for the Prevention of Pollution from Ships (MARPOL). It also joined the 1969 International Convention on Civil Liability for Oil Pollution Damage and the International Oil Pollution Compensation Fund. To obtain a reduction in *air and water pollution from ships*, Estonia has taken steps to encourage the use of fuel oil with a sulphur content below 1.5% by weight. The Port Authorities are focusing on the modernization of port reception facilities to handle waste generated on ships. To combat oil spills, a *National Oil Spill Contingency Plan* has been established covering the marine areas, the three main lakes and major ports. Finland and Sweden have contributed to the acquisition of oil-combating equipment, as part of the implementation of a bilateral agreement on cooperation in combating marine pollution concluded in 1993. Finland assisted Estonia to build up an oil-drift forecasting system operational for Tallinn, in an effort to deal with major oil spills.

Transboundary air pollution

According to EMEP, Estonia is a *net exporter of oxidized sulphur, oxidized nitrogen and reduced nitrogen*, even though it also receives emissions from abroad (chapter 3). The sulphur emissions (180,000 tons of SO₂ in 1992) are mostly exported to the EMEP area, e.g. to the Russian Federation (37%), to the Baltic Sea (18%) and to Finland (9%) where the waters and soils are quite sensitive to acidification. The oxidized nitrogen compounds emitted within the EMEP area (11,000 tons) affect the north-west of the Russian Federation (45%), Finland (11%) and the Baltic Sea (10%). Reduced nitrogen (22,000 tons) is exported mainly to the EMEP area, e.g. to the Russian Federation (21%), the Baltic Sea (12%) and Finland (7%).

Estonia is *not a Party to the 1979 Geneva Convention on Long-range Transboundary Air Pollution*. Estonia did conclude a bilateral treaty on air with Finland, under which it agreed to reduce its NO_x emissions to the 1987 level by 1994, reduce its SO₂ emissions by 50% of the 1980 level by 1997, and by 80% of that level by 2005 at the latest. Under this agreement a desulphurization

pilot unit has been sponsored by Finland, and several feasibility studies coordinated by the Nordic Environment Finance Corporation (NEFCO) are being carried out. The fact that Estonia is currently meeting the requirements under the agreement is primarily the result of the industrial recession. Furthermore, a study on the future of oil-shale mining and the energy production based on it, including related environmental issues, has recently been carried out by NIB and Finland.

Estonia operates two EMEP stations inherited from the Soviet Union. However, a recent EMEP evaluation of the quality of measurements shows that the results from the Estonian stations are not satisfactory and need improving. The urgent need for investment into monitoring equipment and modern environmental technology has long been recognized, and related projects under the Baltic Sea Joint Comprehensive Action Programme as well as under the bilateral agreement on air with Finland are being implemented step by step.

Other transboundary conventions

In May 1995, Estonia ratified *the Convention on the Protection and Use of Transboundary Watercourses and International Lakes* (Helsinki, 1992), which concerns surface waters as well as groundwaters. The Convention requires the country, for instance, to undertake comprehensive measures for the prevention, control and reduction of pollution of waters, particularly by hazardous substances, and to enter into bilateral or multilateral agreements, or adapt existing ones, with the relevant riparian countries sharing transboundary waters in order to define their mutual relations and conduct regarding the prevention, reduction and control of transboundary impacts. Estonia shares Lake Peipsi and the Narva River with the Russian Federation, which also ratified the Convention, and some waters (mostly groundwaters) with Latvia, which has not yet ratified it.

So far Estonia has not signed *the Convention on Environmental Impact Assessment in a Transboundary Context* (Espoo, 1991), which has yet to come into force. However, Estonia is planning to do so soon. The main precondition for ratification is the existence of appropriate national EIA legislation. Estonia is planning to enact its EIA law early in 1996. Estonia is also working bilaterally with Latvia on a particular EIA project (Ainazi Port) and considers this learning-by-doing experience as a very useful step in the process of joining the Convention, in particular to refine the

tasks and responsibilities of the competent authorities as well as acquiring experience in public participation.

Estonia has signed *the Convention on the Transboundary Effects of Industrial Accidents* (Helsinki, 1992). The Convention requires a country to take the appropriate measures (prevention, preparedness and response) to protect human beings and the environment against industrial accidents that are capable of causing transboundary effects. Estonia has nominated points of contact for the purpose of industrial accident notification and mutual assistance. The key question of coordination between the different ministries involved (Ministry of Internal Affairs, Ministry of Economy and Estonian Rescue Board) remains to be resolved, in particular the sharing of responsibilities.

9.3 Cooperation at the global level

Follow-up to UNCED

Estonia is seriously committed to the policies and principles that emerged from the Rio Summit. Not only did it ratify the 1992 Conventions on Biological Diversity and on Climate Change, but in 1995 its Parliament also adopted *the Act on Sustainable Development* in an effort to integrate environment and development (chapter 7). One of this Act's important implications for the international agreements is that the related obligations should be exercised through national programmes confirmed by the Government; and, when adopting development plans or concluding business-oriented arrangements, local authorities should consider the obligations under the international agreements as well as the national programmes.

Climate change

Estonia ratified *the Framework Convention on Climate Change* in 1994. The objectives of the Convention are mainly to keep the emissions of greenhouse gases at or below their 1990 level by the year 2000. The production of CO₂ per capita in Estonia is rather high, i.e. 15t/cap/y in 1992; NO_x emissions stood at 26 kg/cap/y in 1993 (chapter 3). To cut the CO₂ emissions from the increasing transport sector, there is a tax on the import of old vehicles; nevertheless the existing car fleet consists of old and thus more polluting vehicles. A regulation on the content of harmful substances and on norms for motor vehicle exhaust gases was

adopted in 1992. To date, no national policy to mitigate climate change problems has been drawn up in Estonia. Recent studies (as mentioned above in Section B.3. Transboundary air pollution) may be helpful in this respect too.

Nature protection

Since 1992, Estonia has joined a series of international conventions relating to the protection of the flora and fauna of inland ecosystems, in particular wetlands, as well as to the protection of the marine ecosystem of the Baltic Sea.

Estonia ratified the *Convention on Biological Diversity* in 1994. For the implementation of the Convention, the Government of Estonia established a special commission in early 1995 and developed a concrete agenda. The commission is entrusted with the preparation of a national programme on biodiversity by March 1996, and a national action plan by the end of 1996. The Act on Sustainable Development makes provision for the main steps of the Convention's implementation, i.e. the initiation of a country study, the development and implementation of a national programme and action plan whose development will be financed from the national budget.

In 1992, Estonia became a Party to the *Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat* (1971), with so far only one designated wetland, the Matsalu Nature Reserve. The advisory board, the national Ramsar Committee, determines the priorities concerning the protection of wetlands. An exact inventory of the coastal areas, which are important nesting grounds and resting sites for migratory birds, is currently being established in cooperation with Danish ornithologists. The Estonian Fund for Nature is working out a *nature conservation programme* which aims ultimately at designating more wetlands as protected areas and other Ramsar sites, and at drawing up guidelines for their management.

Although it recognizes the need to protect the substantial number of waterfowl, including endangered species, which migrates through its territory, Estonia has not yet joined the *Bonn Convention on the Conservation of Migratory Species of Wild Animals* (1979).

In 1992, Estonia joined the *Bern Convention on the Conservation of European Wildlife and Natural Habitats* (1979). However, Estonia is currently

facing difficulties in implementing the Convention. The populations of some species that are subject to protection under the Convention because they are threatened in the rest of Europe, are viable and even increasing in Estonia, to the point that they are causing various problems (chapter 6). In these specific cases, national conservation priorities differ considerably from the provisions of the Convention. As it is not possible to negotiate reservations when already a Party, Estonia intends to denounce the Convention and then join it anew and make a reservation according to the Convention's procedure.

Estonia joined the *1973 Washington Convention on International Trade in Endangered Species of Wild Flora and Fauna* (CITES) in 1992. Under the Act on Protected Natural Objects (1994), a special permitting procedure has been established to control the import and export of plant and animal species, fossils and hunting trophies. The permits are issued by the Ministry of the Environment and controlled by customs. A registration system is currently put in place to record the actual use of CITES permits.

Transboundary movement of hazardous waste

Estonia ratified the *1989 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal* in 1992. The notification procedure was incorporated into national legislation and a waste commission set up to issue permits for imports and exports. The implementation and control at the custom level is adequate. Estonia imports mercury tubes whose mercury is recycled in a specialized facility, and exports drained lead batteries to the United Kingdom and Sweden. However, continuation of this trade is subject to the decision of the OECD countries Parties to the Basel Convention, which intend to forbid any export to the countries in transition, including the materials on the green list. Estonia is not in favour of such a decision as it will impede, in particular, the import of metals (e.g. mercury), which represents considerable revenue for the country, and the export of specific materials for which OECD countries possess high-tech treatment facilities.

Protection of the ozone layer

Estonia is not a Party to the *Vienna Convention for the Protection of the Ozone Layer* (1985). Estonia does not produce chloro-fluorocarbons or halons. In 1990, its consumption of such products was 400

t/y. In 1992, a regulation from the Ministry of the Environment was adopted to restrict the use of 19 substances causing the depletion of the ozone layer. As a result, in 1994 consumption was reduced to 60 t/y.

9.4 Foreign assistance to Estonia

Substantial foreign assistance to Estonia started in 1991. In 1994, ECU 2.8 billion was pledged, as much as in 1992 and 1993 together, mostly by Finland, Denmark, Sweden, the United States, and IFIs. The main beneficiary sectors were environment (18%) and restructuring of administration (15.8%), ahead of agriculture (10.5%) and industry (9.5%). This assistance is made up of grants and loans.

Environmental assistance

Since 1991, Estonia has been receiving an increasing flow of foreign assistance for environmental protection. So far this assistance has taken the form of grants (ECU 400 million by early 1995). It has come from or been pledged by Finland (ECU 192 million), Denmark (ECU 76 million), Switzerland (ECU 66 million), Sweden (ECU 43 million), Germany (ECU 9.6 million), and the United States (ECU 3.4 million). Since 1992, the EU has also granted assistance to Estonia, in particular under the PHARE programme (ECU 2.8 million at the end of 1995). Loans from the IFIs (EBRD, World Bank, NIB, NEFCO) will complement the grants from the donor countries. *The exact amount of overall foreign assistance is difficult to assess.* So far, there is no well organized reporting accounting system relating to foreign assistance from the local to the State level in Estonia.

In 1992, financial support for studies and training represented roughly 60% of the total foreign assistance. *Technical assistance* has been directed to assessing the environmental situation and problems, and to facilitating capacity building, in particular in legislation, transfer of know-how and information on new technologies.

Since 1994, as a follow-up to the results of the assessments and related investment project preparation achieved so far, the share of investment has increased considerably. Investment financing mainly originates from Finland. However, the share of other donors seems to have increased since early 1995. 95% of the Finnish assistance is spent on water and air protection of the Gulf of Finland in projects located in the northern, more industrial part

of Estonia and aimed at implementing the Baltic Sea Joint Comprehensive Action Programme. They mostly concern power plants producing energy from oil-shale, which generate much sulphur, NO_x and dust, and include the enlargement and rehabilitation of the Tallinn waste-water treatment plant, clean-up of flue-gases at the Baltic power plant in Narva and the replacement of filters at the Kunda cement mill. The assistance from Denmark focuses on waste management and groundwater remediation. Sweden is conducting studies regarding radioactive safety problems in the Sillamäe radioactive waste depository. The United States assistance centres on water monitoring and lake protection, training in EIA and risk assessment, and waste minimization. Switzerland has pledged Sw F 7 million for 1995-1998 for issues dealing with waste-water treatment in Tartu and Otepää. PHARE assistance has been concentrated on institutional strengthening and development and also supporting investment in HELCOM "hot spots" and other actions (respectively ECU 2.8 and 10 million partly committed). The bulk of international loans and grants is spent on water, and to a lesser, but increasing, extent on waste and air.

Local co-financing is becoming problematic due to the limited local financial resources available as a contribution to the funding of an increasing number of domestic investments in environmental protection. The increasing local costs for construction work, which are now reaching those of Finland and Sweden, are an additional drawback. Examples of co-financing projects in which a combination of small grants from different sources typically softens the burden at the local level are numerous. For instance, the Haapsalu municipal water sewage and treatment project (US\$ 6.2 million) will be financed with grants from Sweden and Finland, complemented by US\$ 2 million from the local and State budget and a US\$ 2 million loan from the World Bank. However, the reimbursement of such a loan will put a considerable financial burden on the municipality, which, following the polluter-pays principle, plans to increase annually the local water rates to a considerable extent, subject to capping to 5% of overall family income for social reasons. The Small Municipalities Environmental Project (chapter 4) will invest ECU 43.4 million. Over half will be financed locally (municipalities 40.8% and the State 9.9%), to be complemented by grants from Finland, Norway, Sweden, Switzerland and EU PHARE (21.8%) and loans from EBRD and NEFCO (27.5%). The latter will be reimbursed by

the municipalities. This will mean an increase in the water and sewage bills in some municipalities, from the equivalent of 3.7% of family income in 1994 to 6.2% in 2000.

Attracting foreign assistance has been the task of the Ministry of the Environment, including project preparation, assessment and organization of tenders. The increasing number of projects, the specific procedures for project preparation which differ between IFIs, the coordination to ensure, with the local authorities, the evaluation of the project results have, together, been difficult to manage. A project management unit was established in the autumn of 1993 within the Ministry of the Environment. However, the shortage of staff in this unit makes it difficult to carry out effective project management and accounting.

9.5 Environmental performance

Achievements

Estonia has established bilateral and multilateral partnerships, and has made several new international commitments on environmental matters. Recently Estonia has introduced *specific provisions in its national legislation to ensure a better implementation of these international commitments*. The 1995 Act on Sustainable Development stipulates that the related obligations should be met through national programmes endorsed by the Government, and that every local authority initiative should consider the obligations under the international agreements.

One of Estonia's objectives in increasing its visibility at the international level was to *attract foreign technical and financial assistance* to improve the protection of its environment. Estonia has so far been successful in this task. Since 1991, Estonia has drawn substantial technical foreign assistance, which was a necessary preliminary step to preparing investment in concrete projects. Investment financing is now rising, benefiting from important foreign support.

Estonia has recently concluded an *agreement of association with a view to joining the European Union*, which implies the introduction of tighter environmental standards in the near future. Estonia has also concluded *a number of bilateral agreements on the environment* with its neighbours. Under many of these agreements, Estonia has received technical assistance, training and capacity

building in different fields according to the specific expertise and know-how of the western donor countries. Estonia is particularly striving to tighten its bilateral relationships with the other Baltic States in the field of the environment. It is pursuing negotiations with its neighbours on transboundary inland water management.

Estonia has *signed or ratified a number of international environmental conventions* which point to its priorities, i.e. the protection of the Baltic Sea, conservation of nature and specific transboundary environmental problems.

The protection of water, and in particular of the Baltic Sea water quality, is a major issue and Estonia is making considerable efforts to this end. As part of the Baltic Sea Joint Comprehensive Action Programme, Estonia is making a substantial financial contribution to waste-water treatment plant projects, even if foreign co-financing is indispensable to complete projects. Various projects for big and smaller municipalities, industrial discharges, as well as agricultural run-off, have been achieved with foreign financial assistance channelled through this Programme. They have resulted in a large decrease in the pollution load discharged into Estonian watercourses and, hence, into the Baltic Sea. It is expected that in 1998 when the 1992 HELCOM recommendations on BOD₇ and phosphorus will be in force, most of the towns in Estonia will meet the requirements.

Areas for progress

Although Estonia has shown its capability to attract foreign assistance, the preliminary feasibility studies have usually been carried out by consultants from donor countries with *little involvement of the local expertise*. For the implementation phase, *local co-financing is becoming increasingly difficult* due to tight financial constraints.

The absence of a national strategy and an action plan for the environment creates an ambiguity for potential foreign investors and foreign donors. In the energy sector the absence of a clear vision for the future is hindering further projects in the Narva region to improve the air quality. This area, which has been designated as the "hottest" hot spot in Estonia, requires an estimated investment of more than ECU 1 billion to solve the pollution problems that it is causing. Such an amount cannot be raised without substantial foreign financial assistance. Recent studies indicate, however, that these

investments could be made in two or more phases to distribute the burden over a longer period of time.

With the recovery of the economy, and in particular of industrial activity, *transboundary fluxes of polluting emissions from Estonia will most probably increase*. The potential adverse impact of agriculture on the quality of transboundary waters, and in particular the Baltic Sea, should also be carefully looked at once agricultural activity recovers.

The transboundary emission fluxes from Estonia have decreased and work is being done under the bilateral agreement with Finland to reach agreed targets. The current performances should be consolidated and improved in the future to reduce transboundary air pollution from the northern part of Estonia to the Russian Federation, Finland and the Baltic Sea. Further action is needed to improve the operation of the two existing Estonian EMEP stations.

Despite the efforts already made, *much remains to be done to reach the environmental quality of most western countries*, and in particular to reach the environmental standards of the European Union, as Estonia plans to do. This objective necessitates a realistic, step-by-step approach and the prioritization of actions.

The requirements of the conventions to which Estonia is a party have not always been sufficiently assessed. This explains some of the problems that Estonia is currently experiencing with their implementation, in particular with the Bern Convention. Economic difficulties and the relative weakness in experience and institutional framework for implementation add to these difficulties. In Estonia, the responsibility for implementing environmental conventions is almost exclusively concentrated under the Ministry of the Environment without involvement of any other ministries. The conventions on nature conservation that Estonia has ratified are interlinked but their implementation is managed completely separately.

Chapter 10

CONCLUSIONS*

Estonia entered the current period of transition to a market economy with some relative advantages compared to other former USSR republics. It had the highest gross domestic product (GDP) per capita in the Soviet Union, one of the highest levels of education and basic institutional infrastructure, and some continuing contact with Western institutions. However, its economic performance had been constrained by the *limitations of the centrally planned system*. The technology employed in civilian industries became increasingly backward relative to that in the West, and the environment suffered. A number of heavily polluting and natural-resource-consuming sectors inherited by Estonia intensified environmental pressures, particularly in the north-east and the Tallinn area. The military bases of the former Soviet army caused severe soil and groundwater pollution.

Since 1989, Estonia has initiated important economic reform, accompanied, after it regained its independence in August 1991, by major political and administrative transformations. The country has taken *important steps to improve the environment*: it has adopted a series of basic environmental laws, broadened the scope of the application of economic instruments, strengthened institutional capacity and mobilized domestic and external resources for environmental investments. The pollution load has so far decreased as a result of Estonia's economic contraction. With sustainable development as an underlying principle for the formulation of governmental policies, the challenge now is to cope effectively with the environmental implications of the upcoming economic recovery, to integrate environmental considerations into the economic reform process

with a view to reducing further the pollution and resource intensity of the economy, and to promote the convergence of environmental policies and conditions with those in advanced market economies, particularly the member States of the European Union.

This UNECE report sets out the baseline for assessing future environmental progress and examines Estonia's environmental performance in *five key areas*, namely:

- Legislative and institutional strengthening;
- Integrating environmental and economic decisions;
- Reducing the pollution burden;
- Conserving nature and managing natural resources;
- Strengthening international cooperation.

In each of these areas, the extent to which government *policy objectives* are being met has been assessed. This assessment includes both domestic objectives and international commitments, and is based, to the extent possible, on environmental effectiveness and economic efficiency criteria. A number of recommendations are put forward to further improve Estonia's environment.

Strategic Issues

Over the past years, Estonia has made *substantial progress in transforming its economy* into a market-based system. Forceful measures to secure

*_/ Conclusions approved at the Ad Hoc Meeting on the Pilot UNECE Environmental Performance Review of Estonia held on 16 January 1996 in Geneva.

macroeconomic stabilization, structural adjustment and privatization and to gain access to western markets are beginning to bear fruit. After several years of economic contraction (real GDP declined by 24% between 1991 and 1994), the year 1995 may mark the beginning of the recovery of output.

Major environmental improvements have up to now been achieved mainly as a result of shrinking industrial and agricultural activity. The 58% decline in gross industrial output, between 1991 and 1994, is responsible, to a great extent, for the reduction over the same period in SO₂ emissions by 39% and particulates by 42%, NO_x emissions by 30% and CO emissions by 45%. It also explains the significant drop in the pollution load in the main rivers, and the decrease of 56% in industry's water consumption and of 30% in hazardous waste generation. Over the same period, energy consumption dropped by 39%. Gross agricultural output decreased by 44%, and the consumption of pesticides and fertilizers by 75% and 63%, respectively. This sector's pressure on the environment, particularly soils, surface waters and groundwaters, has eased as a result.

However, a future recovery in the primary and secondary sectors of the Estonian economy will revert positive trends in environmental conditions if it is not accompanied by such measures as the modernization of obsolete capital stock, the introduction of clean technology, energy efficiency and energy conservation, "good housekeeping" and the introduction of environmental management systems in enterprises. Furthermore, the sectoral restructuring programmes which Estonia is expected to draw up for the energy, transport and agricultural sectors should address environmental issues. The Ministry of the Environment has to be involved in the development of these programmes.

The structure of the Estonian economy has been abandoning its heavy reliance on energy- and natural-resource-intensive production and moving towards services such as finance, commerce, trade, tourism, real estate, insurance and communications. The share of the tertiary sector of GDP grew from 31% in 1991 to 59% in 1994. Moreover, there is a shift from heavy, energy-intensive industries to labour-intensive consumer-goods manufacturing industries. If these structural changes continue, they should result in lower environmental pressures in the future.

Financial resources, particularly for investment purposes, are scarce and attention has to focus on

how to mobilize and channel additional domestic resources—the main source of environmental financing—and on how external resources can be used more effectively to complement these. To this end, sectoral and economic ministries, in addition to the environment ministry, should participate more actively in the listing of priority environmental investments, in the implementation of the polluter-pays principle, in the application of economic incentives to secure compliance with environmental standards and regulations, and in managing external assistance.

The objective of harmonizing Estonia's environmental legislation with the requirements of the relevant international conventions and with European Union (EU) standards and regulations will present a continuing challenge for the Estonian Government for several years to come. A step-by-step approach will be required to adjust, and dialogue between environment and sectoral ministries, business and industry, including agriculture, forestry and fisheries, as well as NGOs, and other interest groups has to be initiated without delay and institutionalized.

The adoption of the 1995 Act on Sustainable Development indicates a clear commitment to realign Estonia's economy with the goal of sustainable development. The Commission on Sustainable Development, established in accordance with this Act, could play a strategic role in promoting the integration of environmental considerations in the economic reform process and in sectoral decision-making. For this purpose the Commission should ideally be headed by the Prime Minister and involve the Ministers in charge of environment, finance, economy, energy, agriculture, transport and health. Senior representatives of business and industry, academics and environmental NGOs should also be invited to participate. The Commission should be supported by a small interdisciplinary staff with strategic planning expertise, who should provide a forceful mechanism for drawing up a national sustainable development strategy for adoption by the Government, and then overseeing its implementation and periodic updating.

It is recommended that the Commission on Sustainable Development should give consideration to the following cross-sectoral policy issues:

- Setting environmental objectives and targets for the main economic sectors;

- Ensuring the environmental *assessment of economic and sectoral programmes and plans* including privatization programmes;
- Prioritizing environment-related *investments*, financed from both public funds and external sources;
- Internalizing environmental costs in the *prices of energy, water, raw materials and transport services* by applying, step-by-step, the polluter-pays principle;
- Securing the implementation of *environment-related requirements of the Association Agreement with the EU* in different sectors;
- Promoting cooperative arrangements and *partnerships with business and industry*, to encourage better environmental management within enterprises;
- Involving *other informal sectors, particularly environmental NGOs*, in strategic planning for sustainable development.

Legislative and Institutional Strengthening

In the short period since regaining its independence, Estonia has achieved a high rate of legislative activity in the environmental field. The innovative nature of a number of its legislative provisions, in particular its sustainable development legislation, and the integration of environmental protection and natural resources management under the responsibility of the Minister of the Environment are significant developments. Environmental management within the public administration has been decentralized and, consequently, important responsibilities have shifted to the county and municipal levels. Recently substantial efforts have been made to begin to upgrade environmental monitoring capacity in the country.

At the same time, ensuring practical compliance with rapidly changing legal requirements and adjusting the institutional system accordingly is a continuing task. Deficiencies in practical compliance still arise from: the lack of adequate regulations to implement the framework laws; transitional deficiencies in the numbers of inspection staff; transitional difficulties associated with the decentralization of environmental management and the channelling of enforcement

responsibilities to the regional departments and municipalities without ensuring that their capabilities have been adequately strengthened.

Several environmental laws and regulations are still to be enacted and the reform of *existing strict but frequently unenforceable standards is not yet completed*. There are still considerable gaps in the environmental information system, which does not fit well with international systems such as those of UNECE, OECD, and EU, and therefore does not fulfil its strategic role. In the open society which is developing and where active participation of the public is sought, *procedures and mechanisms are still not sufficiently developed to ensure effective public access to environmental information and public involvement in environmental decision-making*.

Therefore, the following recommendations should be considered:

- Fill in as soon as possible the existing legislative gaps, particularly on energy, air, noise, environmental impact assessment (EIA) and auditing, the management of chemicals and the clean-up of contaminated sites;
- Draw up and agree upon priorities for the development and revision of environmental standards;
- Streamline environmental regulations and permit conditions *introducing the integrated approach to pollution prevention and control*;
- Improve the system of monitoring compliance and enforcement of environmental legislation by introducing, in particular, self-monitoring and self-reporting procedures;
- Create or strengthen environmental units in economic and sectoral ministries, particularly those responsible for industry, transport, agriculture and privatization;
- Improve coordination between environmental authorities at the national, county and municipal levels and clarify their respective responsibilities;
- Develop a training programme to strengthen the capabilities of

municipalities to cope with their environmental responsibilities;

- Taking into account the general structure and organization of the national administration in Estonia, undertake a feasibility study on the creation, of *an environmental agency* subordinated to the Ministry of the Environment and responsible for, inter alia, monitoring and compliance with environmental legislation, management of protected areas, environmental research and development.

Integrating Environmental and Economic Decisions

Instruments for policy integration

Estonia has made provision for a number of legislative, economic, planning and institutional measures to help integrate environmental and economic decision-making. The Act on Sustainable Development provides a potentially important framework for the development of a sustainable development strategy in Estonia. Although this law defines objectives broadly, *some environmental objectives have previously been formulated* in more specific terms, either in quantitative or qualitative form. However, in the near future, it will be necessary to formulate more of its objectives and intermediate targets in an operationally precise manner.

A *National Environmental Strategy* is being prepared under the leadership of the Ministry of the Environment. Its purpose is to establish the Government's objectives and practices for integrating the sustainable management of the environment into Estonia's economic and social development, into the next century. The preparation of this strategy will be followed by the drawing-up of a national environmental action plan to address the more immediate actions which may be necessary.

Estonia has made some *progress in improving the policy framework for integrating environmental and economic decision-making*. The Ministry of the Environment has created some mechanisms for inter-ministerial cooperation, such as informal working groups, between ministries. By and large, sectoral ministries have yet to develop mechanisms to report to the Government and the public on their efforts to integrate environmental concerns in their activities. The Ministry of the Environment also

needs more economic expertise to help it fulfil its integrative role.

Estonia has been applying *a variety of economic instruments in environmental policy*. These include charges on air and water pollutants, waste disposal, use of land, water and mineral resources such as oil-shale, peat and building materials. However, the low levels of these charges weaken their incentive capacity for pollution prevention. The *Environmental Fund* has been established to collect emission charges and to provide extra funding for environmental protection. The total expenditure of the Fund in 1994 represented 8% of the country's total environmental expenditure. *Environmental expenditure from combined domestic and external sources* has been growing in the 1990s. The share of domestic sources of environmental expenditure of GDP reached an estimated 1.8% in 1994.

Provisions relating to *environmental impact assessment* (EIA) were introduced in Estonia by a Government Order of 1992. An EIA law, which is presently being drafted by the Ministry of the Environment, will extend EIA procedures to planning documents and programmes in addition to projects. A considerable number of EIAs is being undertaken annually, but the quality of some of them may be questionable. The Act on Planning and Construction, approved by the Parliament in June 1995, introduced a variety of *new planning mechanisms*. Guidance documents have to be prepared by the Ministry of the Environment on the use of these mechanisms to better integrate environmental considerations into land-use planning.

Estonia is undertaking an *ambitious programme of enterprise privatization and land restitution*. However, there are no legal provisions in place to regulate how decisions regarding clean-up of past environmental damage will be taken and how the costs will be covered. Environmental auditing for enterprises under privatization is not a standard procedure nor a requirement. The fact that the privatization of land and the privatization of enterprises fall under different civil jurisdictions may prejudice both economic development and environmental protection — private owners of enterprises do not own the land, only the buildings. One of the concerns in the land reform pertains to the continued preservation of protected areas.

It is therefore recommended that consideration should be given to the following proposals:

- *Formulate environmental objectives and targets in an operationally precise manner*; their feasibility should be evaluated, before adoption, according to their likely costs and benefits and the financial, technical and human resources available for their timely implementation; the commitment of all respective ministries and other actors involved should be obtained;
- Enhance the *economic analysis capacities within the Ministry of the Environment* and the environmental policy analysis capabilities in the economic and sectoral ministries;
- Extend the use of economic instruments and aim at charges covering fully the environmental costs involved: the *user-pays principle and the polluter-pays principle should be more rigorously applied*, even if step by step during the transition period, and implemented, in particular, *in natural resource pricing, in waste, air-pollution and waste-water charges*; the cost-recovery mechanisms of taxes and charges at the local level should be considerably improved.
- Strengthen the role of *the Environmental Fund as an important instrument of environmental financing* in a transition period by, inter alia, improving its operational procedures, project appraisal and financial management practices; give consideration to increasing its income with some of the proceeds of privatization to be used for environment restoration, donor grants and loans from international financial institutions following relevant internationally agreed guidelines;
- Bring into operation, as early as possible, the recently approved integrative instruments, in particular the *legislation on land-use planning*;
- Ensure that privatization procedures include environmental *requirements for all privatization schemes*: environmental audits should be a key component of the privatization procedure for industrial enterprises; establish detailed regulations relating to environmental liability when privatizing enterprises; and consider introducing a procedure to allocate part of

the purchase price of privatized enterprises to *finance third-party environmental damages and clean-up costs*;

- Strengthen the *role and involvement of the Ministry of the Environment in the privatization process*, in particular by establishing an inter-ministerial unit between this Ministry and the Estonian Privatization Agency to address issues of environmental requirements in privatization, such as the assessment of environmental damage costs and the resolution of environmental liability questions.

Sectoral integration: energy

A deep recession in energy production and mining in Estonia resulted in the *decline of oil-shale and power output* by more than half the maximum output of the 1980s. As this sector is responsible for a significant adverse environmental impact in Estonia, the recession has made a significant contribution to the reduction in total national emissions into air and water bodies over the past few years. Furthermore, the process of bringing energy prices in line with world market prices is beginning to result in a more efficient use of energy. This process is supported by several programmes for the conservation of energy and reconstruction of heat production and distribution facilities. Most of these projects are partly financed with foreign loans and grants.

However, *the continuing absence of clear energy policy objectives* is an obstacle to the privatization of the energy sector, a source of uncertainty for investors and problematic from the standpoint of environmental protection. Also problematic is the energy price split between relatively clean imported fuel, which follows world market prices, and domestic oil-shale and electricity, whose low price is fixed by the Government for *different* reasons and which encourages its production and use.

It is most important from an energy and environmental policy standpoint to *work out a long-term development strategy for Estonia's oil-shale and power industries*, which takes into account economic, social and environmental considerations. Estonian power stations, especially oil-shale-fired ones, are old and their technology is outdated. Large investments, together with attracting foreign capital and involving international financing institutions, are crucial for

the modernization of energy production. Privatization could facilitate this process. Such measures should be complemented with incentives for efficient energy use and the elimination of disincentives, in particular, by introducing relevant pricing policies in energy-related industries step by step.

Therefore, it is recommended that consideration should be given to the following proposals:

- Ensure that the *policies for the production and use of energy are fully in line with the concept of sustainable development*, through, in particular, full-cost pricing of energy resources including external environmental costs in accordance with the polluter- and user-pays principles in a step-by-step approach;
- Draw up a *national energy programme* which should, in particular, ensure energy-saving in all industries and buildings; set targets and a timeframe for the modernization of the energy industry; and make provision for an eventual transition of energy prices to market prices which ensure resources for necessary investments. The privatization objectives and plan for the energy and mining sectors should be formulated at an early date;
- *Undertake a comprehensive analysis of the mining and processing of oil-shale*, draw up and compare environmentally sound options relating to the long-term use of this fuel, taking into account employment and other social considerations;
- *Review the consistency of the current policy, which encourages the use of local fuels* like peat and wood, *with the goal of sustainable development*;
- Consider possibilities for mobilizing financial resources for installing *desulphurization and dust control facilities at power plants*.

Reducing the Pollution Burden

Air

Overall emissions of SO₂ and particulates remain fairly high, and further reductions are necessary to improve local air quality, particularly in north-

eastern Estonia, and to control transboundary fluxes originating from Estonian sources. For the main polluters, the oil-shale-based and cement industries, some initial studies and investments have taken place. However, in order to meet national ambient air-quality standards, major environmental investments are required. In urban areas, such as Tallinn, the *sharp increase in road vehicles is a problem* that will grow in future. Better urban planning, more stringent fuel standards and further emission standards for vehicles are necessary.

Air pollution control in Estonia has concentrated on stationary sources and local air quality issues, and is based on a *permit system* for which compliance monitoring is weak. The Ministry of the Environment is preparing a draft air pollution act to provide for more appropriate emission standards and stricter controls through permit, monitoring and inspection requirements. *Air quality monitoring has improved*. However, the total number of compounds covered by existing air quality standards is still too big to be realistically monitored. In Estonia, *no overall plan for air pollution control and management yet exists*.

Therefore, it is recommended that consideration should be given to the following proposals:

- *Adjust the number of ambient air quality standards to a realistic and measurable level*;
- *Draw up national and regional plans for air pollution abatement*, which set out reduction targets for air pollution from both stationary and mobile sources, and measures to improve air quality, in particular in the north-east of the country; and integrate these plans with a national energy programme;
- *Introduce sulphur content standards for fuel oil*;
- *Address problems associated with the growth in transport* by, in particular, raising fuel and emission standards for motor vehicles and reversing the price differentiation between leaded and unleaded petrol to make unleaded petrol cheaper;
- Ensure that transport programmes provide for *strengthening environmentally sound water, rail and public transport systems*,

while improving at the same time their efficiency and performance.

Water

Since it regained its independence, Estonia has placed a high priority on reducing the pollution burden on water, and improving the quality of the inland waters as well as of coastal and sea waters. Significant domestic and foreign resources are already expended for this purpose. Estonia has also developed a permit system to achieve sustainable water management. Charges are levied for water abstraction, and for waste-water discharges. Ground and surface water bodies are regularly monitored and assessed. Monitoring systems still need to be completed to cover coastal and marine waters.

However, improving the quality of drinking-water as well as the performance of water-supply facilities is still a major concern. There is a lack of waste-water treatment facilities for urban and industrial sewage. Industrial waste-water is often discharged directly without pre-treatment into municipal waste-water units. The implementation of the regulatory instruments at the local level is still weak and compliance monitoring almost non-existent due to the loose coordination between the central and municipal levels and the general understaffing at the latter level. The private as well as the public sector are insufficiently involved in the development of water management schemes.

Accordingly, it is recommended that consideration should be given to the following proposals:

- Establish *emission limits for industrial waste water and update water quality - standards, particularly drinking water standards;*
- *Strengthen the implementation, enforcement and monitoring of compliance with the permit system* by, in particular, focusing first on the main point polluters, namely cities and large industrial sites;
- *Draw up programmes and good practice guidelines for the control of water pollution from non-point sources, particularly from agricultural sources;*
- *Review and clarify the present distribution of responsibilities between*

the national level, the county authorities, municipalities and the water companies; and develop a more participatory and transparent approach involving municipalities and the growing private sector, in particular when setting charges and providing subsidies for investments;

- Encourage the use of *environmental auditing* in public waterworks and sewage works;
- *Develop training programmes* for personnel at drinking-water preparation facilities and waste-water treatment plants.

Waste and contaminated soils

Estonia is a large generator of industrial waste for a country of its size. Significant quantities of waste have accumulated over the years in dumps. Today, all wastes, including hazardous wastes, are still disposed of in landfills, most of which do not meet sanitary requirements. The resumption of economic growth is likely to result in an increase in the quantity of waste and in growing threats to human health and the environment, unless corrective measures are taken. An increase in generation of waste sludge from intensified waste-water treatment and from certain air pollution control facilities is also to be expected. Polluted soils from former military sites, with the threats that they are posing to groundwaters, drinking-water supply and coastal water quality, are also a major problem.

Conscious of the importance of the overall waste problem, Estonia has created in a relatively short time a modern legislative framework based on the command and control approach, and supported by some economic instruments. A classification system for hazardous waste has been set up. Provisions for the regulation of the import and export of hazardous waste are in place in accordance with the obligations under the Basel Convention. However, to date the *implementation of waste management practices has been weak* and, in particular, the permitting system for waste disposal is only in its starting-up phase. There is no prioritization of goals for cleaning up contaminated sites, particularly over the short term. The public awareness of everyone's individual behaviour and role in waste management, and in particular household waste management, is insufficient.

Based on the above assessment, it is recommended that consideration should be given to the following proposals:

- *Stop the uncontrolled disposal of hazardous wastes*, including asbestos waste, as soon as possible; and establish the necessary separate collection, storage, treatment and disposal facilities starting with the most hazardous wastes;
- *Improve the implementation of the permitting system*; review the list of enterprises needing a permit to cover consistently all waste generators;
- *Ensure the finalization of the solid waste management programmes at the county level*, which should, in particular, address specific regional waste problems, such as the management of oil-shale waste in the north-east;
- *Complete the inventory of hazardous waste dumping sites and of contaminated sites*, including those contaminated by military activities, assess the risk that they pose to human health and the environment, and establish priorities for remediation on the basis of this assessment, applying basic remediation in urgent cases;
- *Introduce economic incentives to encourage effective waste recycling and reuse*;
- *Launch training programmes* on waste management issues for personnel in both the public administration and industry, accompanied by a public awareness campaign on this subject;
- *Carefully consider the best siting for construction of new waste landfilling, treatment and incineration facilities and future oil-shale ash fields* following the provisions of the 1995 Action Planning and Construction; give particular consideration to human health, cost-effectiveness and acceptance by the local population; encourage municipalities to seek joint solutions for the siting and use of waste facilities where appropriate and to conclude cost-sharing arrangements for this purpose.

Conserving nature and managing natural resources

The intensive abstraction and use of natural resources, in particular of oil-shale, have caused *considerable resource conservation and environmental pollution problems* in Estonia. With the adoption of the 1994 Act on Protected Natural Objects and the 1995 Act on Sustainable Development, considerations of the rational use of natural resources and nature conservation are beginning to be introduced into economic and sectoral legislation and practices. Protection statutes for every nature asset are clearly defined by law as are the conditions for its protection. The boards responsible for forests, land and fisheries, which are involved in specific aspects of nature conservation and natural resource management, are now under the direct authority of the Minister of the Environment. *Biological diversity in Estonia is well preserved*, especially in forest and mire ecosystems. This is due to a long-term policy and mire protection (since 1970), awareness by the population, and also to the decrease in human pressure on nature connected with the decline in agricultural and industrial production. The protection regime in the existing protected areas, covering 7.8% of the Estonian territory, has been maintained.

However, the management of some protected areas does not meet the internationally accepted criteria. Protection rules and zoning have to be established in each protected area on the basis of which management plans have to be drawn up. Dissemination of information on nature conservation to the public should be considerably improved. The expansion of tourism could jeopardize the survival of some species and their habitats, particularly in formerly closed coastal areas. *The ongoing privatization process could also be a threat to nature, and in particular to protected areas*, if not carefully undertaken. If the established protection rules are not effectively clarified and implemented, there is a risk that restituted lands, and in particular forests and coastal areas, will be mismanaged and even overexploited.

It is therefore recommended that consideration should be given to the following proposals:

- *Speed up the finalization of the National Action Plan on Biodiversity*; ensure that it includes detailed guidelines for the preservation and improvement of the network of protected areas; and introduce

- concrete nature conservation measures outside protected areas in order to strengthen the protection of endangered species and biotopes;
- *Meet the current objective of maintaining half the forests as State-owned; revise the Forest Act and strengthen provisions on forest protection and their enforcement in order to avoid conflicts between the economic, short-term interests of forest owners and the broader interests of sustainable management of forests;*
 - *Draw up clear guidelines and prepare manuals for county administrations and municipalities on listing protected species on their territories, describing their habitats and related conservation measures;*
 - *Reinforce the protection regime in the existing protected areas, strengthen the criteria for their designation in line with internationally recognized criteria and clarify the responsibilities for managing the various protected areas and strengthen compliance monitoring and enforcement;*
 - *Provide human and other resources necessary to ensure the application of a strict protection regime on 2% of the territory of Estonia by the end of the century, and on 5% of the territory by the year 2010;*
 - *Resolve uncertainties relating to property rights and to the conservation regime to be maintained in protected areas, ensure that these rights are enforceable, particularly in relation to the abstraction and use of natural resources; consider opportunities for broadening the scope of compensation measures for landowners if restrictions on land use and resource abstraction apply;*
 - *Encourage the maintenance of traditional forestry and agricultural practices (such as grazing, drainage network maintenance, extensive farming, etc.) in those protected areas which need this protection regime for their conservation, inter alia, by providing subsidies to farmers to ensure their livelihood while maintaining the ecological balance on their lands;*
- *Define measures for ensuring the sustainable management of the main natural resources such as peat, forests and fisheries;*
 - *Expedite the preparation of integrated regional development plans for the areas most affected by natural resource management problems (e.g. Ida Virumaa) or where economic opportunities for development are closely related to the natural resources stock. Ensure that plan preparation takes sufficient account of both economic and employment needs and requirements for the sustainable management of natural resources;*
 - *Draw up and launch, in cooperation with counties and municipalities as well as NGOs, a national landscapes programme.*
- Strengthening international cooperation*
- Estonia is successfully making considerable and continued efforts to multiply its links and develop cooperation with the international community, in particular, its neighbouring States. It has signed or is negotiating a number of bilateral environmental agreements. Its international environmental policy has so far focused primarily on water protection, particularly in the Baltic Sea area, and on nature conservation. Since regaining its independence, Estonia has increased its efforts to join and participate in environmental cooperation activities at the pan-European and global level. It participates in a number of global conventions and is preparing to participate in regional transboundary conventions.*
- Estonia has been successful in attracting a significant amount of foreign technical and financial assistance to improve its environmental situation. Most of these financial resources have been provided to help Estonia comply with the Convention on the Protection of the Marine Environment of the Baltic Sea Area and have been mostly spent on water management improvements. However, transboundary air pollution problems persist, and the monitoring of air emissions needs to be improved. A clear national environmental strategy is necessary to further encourage foreign investors and donors in the future. On the other hand, tight domestic resource constraints, particularly at the local level, are exacerbating co-financing problems.*

To pursue Estonia's action on the international scene, it is recommended that consideration should be given to the following proposals:

- *Improve the management and coordination of foreign assistance programmes, and in particular strengthen the project management unit at the Ministry of the Environment. Regularly update and make available, in particular to foreign investors, the information concerning progress made in investment projects which involve international funding;*
- Fully apply policy measures, practices and instruments contained in or agreed under the *international environmental conventions* to which Estonia is a party or to which it is intending to accede, in particular on EIA, industrial accidents and water management in a transboundary context;
- *Improve the implementation of international conventions* by strengthening links between the Ministry of the Environment and other ministries as many provisions of environmental conventions are of cross-sectoral nature;
- *Accede to the Convention on Long-range Transboundary Air Pollution and its EMEP protocol, and consider the accession to the recent protocols on volatile organic compounds and sulphur taking into account, in particular, the investment requirements;*
- *Prior to joining further conventions, evaluate both their environmental benefits and likely implementation costs in the light of international environmental responsibilities and commitments;*
- Speed up the ongoing negotiation of bilateral agreements with Latvia and the Russian Federation concerning the protection and use of transboundary water bodies, in particular the shared groundwaters and the Narva River basin, including Lake Peipsi.

ANNEXES

Annex I: Selected environmental data

	EST	POL	HUN	BGR	CAN	USA	AUT	BEL	DNK	FIN	FRA	DEU*	GRC	ISL	IRL	ITA	LUX	NLD	NOR	PRT	ESP	SWE	CHE	TUR	GBR*	OECD*	**
LAND																											
Total area (1 000 km ²) ²	45	313	93	111	9976	9809	84	31	43	338	552	357	132	104	70	301	3	37	324	92	505	450	41	779	245	34566	
Major protected areas (% of total area) ³	7.8	9.8	6.2	4.5	8.9	10.6	23.9	2.5	32.2	8.1	9.7	25.8	1.7	8.8	0.7	7.6	13.9	10.4	17.1	6.3	8.4	6.6	17.7	1.1	20.3	10.1	
Nitrogenous fertilizer use (t/km ² arable land)	2.7	4.6	2.5	5.4	3.1	5.5	8.2	22.1	13.1	6.6	11.2	14.1	8.3	7.8	36.4	7.6	a	39.8	12.4	4.2	3.7	6.9	12.5	4.4	20.1	5.7	
FOREST																											
Forest area (% of land area)	47.6	29.3	19.5	35.4	45.1	31.1	46.9	20.2	10.5	76.4	27.7	29.8	20.3	1.4	5.7	23.0	34.4	10.3	38.9	36.0	31.9	68.3	31.7	26.2	10.1	31.2	
Use of forest resources (harvest/growth)	0.9	0.5	0.5	0.4	0.7	0.6	0.6	..	..	0.6	0.7	0.7	0.5	..	..	..	0.7	0.5	0.6	1.1	0.5	0.6	0.8	0.8	0.5	<u>0.6</u>
Tropical wood imports (US\$/cap.) ⁴	..	..	..	..	0.6	1.5	1.5	11.0	3.2	2.9	6.9	4.7	3.5	1.9	8.5	7.6	a	18.4	4.7	16.0	5.9	1.2	0.8	0.6	3.8	<u>6.3</u>
THREATENED SPECIES																											
Mammals (% of species known)	26.2	9.7	69.9	13.8	7.8	10.5	37.5	21.5	24.0	11.9	21.2	39.4	37.1	-	16.1	25.4	53.2	44.8	8.0	17.2	16.8	19.0	26.5	10.2	45.2	..	
Birds (% of species known)	13.0	7.5	94.2	33.8	4.5	7.2	28.1	29.0	12.9	6.8	14.7	36.9	11.8	13.3	24.7	30.9	19.3	32.6	10.4	34.9	11.6	7.9	40.7	8.7	28.3	..	
Fish (% of species known)	2.8	9.2	34.6	23.1	4.4	2.4	42.5	..	18.2	11.7	6.3	68.2	36.9	-	..	28.6	38.2	43.5	-	18.6	23.5	4.0	18.5	3.9	12.2	..	
WATER																											
Water withdrawal (% of gross annual availability)	18.0	19.5	5.7	8.3	1.6	18.9	3.0	..	10.0	2.0	19.1	28.2	..	0.1	..	32.1	1.2	8.6	..	10.1	26.2	1.6	2.2	14.3	15.5	11.1	
Fish catches (% of world catches)	0.1	0.5	-	..	1.7	6.0	-	-	1.6	0.1	0.9	0.4	0.1	1.5	0.2	0.5	-	0.5	1.8	0.3	1.5	0.3	-	0.4	0.8	31.3	
Public waste water treatment (% of population served)	85	37	31	35	63	72	72	..	98	77	68	86	11	2	..	61	90	97	57	21	59	95	91	6	87	<u>60</u>	
AIR																											
Emissions of sulphur oxides (kg/cap.)	95.6	70.9	80.1	168.1	106.6	76.5	8.9	42.1	30.4	27.5	21.3	48.4	50.6	33.1	53.4	29.6	26.2	10.7	8.4	29.2	56.6	11.6	8.4	29.0	55.1	<u>46.9</u>	
" (kg/US\$ 1000 GDP) ⁵	13.9	15.9	12.8	45.3	5.7	3.3	0.5	2.5	1.7	1.9	1.2	2.9	6.7	2.0	4.6	1.7	1.3	0.7	0.5	3.2	4.5	0.7	0.4	6.4	3.5	<u>2.6</u>	
Emissions of nitrogen oxides (kg/cap.)	26.0	29.1	17.7	28.1	68.2	81.8	22.8	30.1	51.4	53.2	26.5	36.0	38.5	88.5	36.5	35.9	..	35.6	53.1	22.0	32.0	45.8	21.6	9.3	40.6	<u>44.4</u>	
" (kg/US\$ 1000 GDP) ⁵	3.8	6.5	2.8	7.6	3.7	3.5	1.3	1.8	2.9	3.6	1.4	2.1	5.1	5.3	3.1	2.1	..	2.2	3.0	2.5	2.6	2.9	1.0	2.1	2.6	<u>2.5</u>	
Emissions of carbon dioxide (t/cap.) ⁶	15.0	8.8	6.1	6.1	15.4	19.8	7.3	11.3	11.4	10.9	6.4	11.0	7.2	9.1	9.4	7.1	30.4	11.2	7.3	4.7	5.7	5.9	6.2	2.5	9.7	11.0	
" (ton/US\$ 1000 GDP) ⁵	2.19	2.05	0.97	1.63	0.82	0.84	0.41	0.66	0.64	0.75	0.35	0.65	0.94	0.54	0.73	0.42	1.40	0.68	0.42	0.51	0.45	0.37	0.30	0.42	0.61	0.66	
WASTE GENERATED																											
Industrial waste (kg/US\$ 1000 GDP) ^{5,7}	42	124	524	..	..	147	41	169	20	121	48	59	55	9	..	36	166	32	44	..	28	88	..	78	61	88
Municipal waste (kg/cap.)	336	368	387	867	660	730	430	340	460	620	470	360	310	560	..	350	490	500	520	330	360	370	400	380	350	490	
Nuclear waste (ton/Mtoe of TPES) ⁸	..	..	..	..	7.7	1.2	-	1.7	-	2.4	5.3	1.9	-	-	-	-	-	0.2	-	-	1.7	4.9	3.4	-	5.0	<u>2.0</u>
NOISE																											
Population exposed to leq > 65 dB (A) (million inh.) ⁹	..	..	..	10.0	..	17.2	1.2	1.2	0.5	0.2	9.4	9.5	2.0	..	..	..	..	0.6	0.5	3.0	8.9	0.3	0.8	..	5.7	<u>124.0</u>

.. = not available. - = nil or negligible.

a Data for Luxembourg are included under Belgium.

¹ The presentation is based on the format of the OECD Environmental Performance Reviews. Data refer to 1993 or the latest available year. They include provisional figures and secretariat estimates. Varying definitions can limit the comparability across countries.

² NLD: Excluding Lake IJssel (1 708 km²) and internal waters (Wadden Sea and North Sea: 2473 km²).

³ Data refer to IUCN categories I to IV.

⁴ Total imports of cork and wood from tropical countries.

⁵ GDP at 1991 prices and purchasing power parities.

Source: Estonian Ministry of Environment, OECD, Renewable Energy TAASEN, Statistical Office of Estonia, UNECE.

* Figures in italics include:

for Germany: western Germany only.

for United Kingdom: water withdrawal and public waste-water treatment: England and Wales only.

⁶ CO₂ from energy use only; international marine bunkers are excluded.

Data for Estonia refer to 1992.

⁷ Waste from manufacturing industries (ISIC 3).

Data for Estonia exclude 13.5 million tons of ash waste from oil-shale production.

⁸ Waste from spent fuel arising in nuclear power plants, in tons of heavy metal,

per million tons of oil equivalent of total primary energy supply.

⁹ Road traffic noise.

** Underlined figures exclude Mexico.

Annex II: Selected economic data and trends

	EST	POL	HUN	BGR	CAN	USA	AUT	BEL	DNK	FIN	FRA	DEU ¹	GRC	ISL	IRL	ITA	LUX	NLD	NOR	PRT	ESP	SWE	CHE	TUR	GBR	OECD ²	
TOTAL AREA (1 000 km²)²	45	313	93.03	111	9976	9809	84	31	43	338	552	357	132	104	70	301	3	37	324	92	505	450	41	779	245	34566	
POPULATION																											
Total population, 1993 (100 000 inh.)	15	385	103.1	85	288	2576	80	100	52	51	577	812	104	3	36	571	4	153	43	99	391	87	69	595	578	9640	
% change (1980-1993)	3.0	8.1	-4.0	-4.5	16.9	13.1	5.8	1.7	1.3	6.0	7.0	3.7	7.3	14.0	4.7	1.1	4.1	8.1	5.5	0.4	4.7	4.9	8.7	33.0	2.7	11.1	
Population density, 1993 (inh./km ²)	33.5	123.0	110.5	77.3	2.9	26.3	95.3	328.0	120.4	15.0	104.6	227.5	78.4	2.5	50.7	189.4	146.9	409.9	13.3	107.2	77.5	19.4	168.1	76.3	236.2	27.9	
GROSS DOMESTIC PRODUCT																											
GDP, 1993 (billion US\$) ³	10	172	63	31	539	6039	137	172	92	73	1040	1375	79	4	46	977	8	252	76	90	495	140	146	306	919	16176	
% change (1980-1993)	..	..	..	..	34.4	36.0	28.8	23.5	26.8	19.7	27.5	29.9	19.7	28.4	61.4	26.1	49.6	26.8	36.9	33.5	36.9	15.8	21.5	93.3	29.5	36.3
per capita, 1993 (US\$ 1000/cap.)	6.9	5.0	6.3	3.7	18.7	23.4	17.2	17.2	17.8	14.5	18.0	16.9	7.7	16.8	13.0	17.1	21.7	16.5	17.5	9.1	12.6	16.0	21.1	5.2	15.9	16.8	
INDUSTRY⁴																											
Value added in industry (% of GDP)	24	40	23	42	26	27	35	29	24	28	29	37	22	22	36	32	34	28	35	38	34	27	34	32	28	31	
Industrial production - % change (1980-1992)	..	..	..	..	17	29	35	20	35	24	11	23	9	..	109	11	45	19	71	55	19	4	22	111	15	<u>26</u>
AGRICULTURE																											
Value added in agriculture (% of GDP) ⁵	10	7	6	9	2	2	2	2	3	5	3	1	13	10	7	3	1	4	3	6	4	2	3	15	2	<u>3</u>	
ENERGY SUPPLY																											
Total supply, 1993 (Mtoe)	5	93	26	19	221	2029	26	51	20	29	234	337	23	2	11	156	4	70	22	18	91	47	25	59	217	4390	
% change (1980-1993)	..	-25.0	-9.5	-32.0	14.3	2.6	11.8	9.8	1.5	15.7	22.6	-6.1	42.0	46.2	26.2	12.4	6.3	7.0	18.0	70.6	32.5	15.0	18.6	88.9	7.8	15.3	
Energy intensity, 1993 (Toe/US\$ 1000)	0.51	0.54	0.40	0.60	0.41	0.34	0.19	0.29	0.21	0.39	0.22	0.25	0.29	0.48	0.23	0.16	0.47	0.28	0.29	0.19	0.18	0.34	0.17	0.19	0.24	0.27	
% change (1980-1993)	..	..	..	..	-15.0	-17.2	-13.2	-11.1	-20.0	-3.3	-3.8	..	18.7	13.8	-21.8	-10.8	-28.9	-15.6	-13.8	27.8	-3.3	-0.7	-2.4	-2.3	-16.7	..
Structure of energy supply, 1993 (%) ⁶																											
Solid fuels	67.5	76.0	21.4	38.4	14.7	27.6	22.8	18.3	43.1	35.3	8.0	29.8	38.7	1.9	31.3	7.7	30.4	12.0	8.2	24.2	21.8	19.1	4.7	40.9	23.6	23.4	
Oil	25.8	15.4	33.2	25.6	34.2	38.0	43.6	41.4	44.2	33.1	37.4	40.2	60.0	34.9	47.9	60.5	55.7	36.7	36.2	71.6	53.5	31.6	51.1	46.8	38.6	42.2	
Gas	6.7	8.3	31.0	19.2	27.4	24.2	21.5	18.6	12.3	9.1	12.1	17.7	0.4	-	20.2	27.4	13.6	49.8	11.0	-	6.3	1.5	8.0	7.2	26.8	20.6	
Nuclear	-	-	14.4	15.8	11.1	8.3	-	21.7	-	18.3	40.1	11.9	-	-	-	-	-	1.5	-	-	16.1	34.2	24.1	-	10.8	10.8	
Hydro, etc.	-	0.3	-	0.9	12.5	2.0	12.0	-	0.5	4.1	2.3	0.5	0.9	63.2	0.7	4.4	0.3	-	44.7	4.2	2.3	13.7	12.2	5.1	0.2	3.1	
ROAD TRANSPORT⁷																											
Road traffic volumes, 1993																											
-billion veh.-km	..	111	24	13	248	3701	76	60	39	43	441	578	46	2	27	412	4	98	23	38	104	75	53	31	444	7467	
- % change (1980-1993)	..	148.7	28.3	..	20.8	53.0	113.6	31.6	46.8	60.7	49.1	53.4	123.4	65.7	45.0	82.0	76.7	38.8	38.8	79.8	39.4	70.3	45.3	108.6	83.6	<u>56.4</u>	
- per capita (1 000 veh.-km/cap.)	..	2.9	2.4	1.5	8.6	14.4	9.5	6.0	7.4	8.5	7.7	7.1	4.4	7.6	7.5	7.2	10.3	6.4	5.4	3.9	2.7	8.6	7.7	0.5	7.7	7.7	
Road vehicle stock, 1993																											
- 10 000 vehicles	40	813	241	149	1719	19406	411	458	194	216	2945	4057	281	13	115	3235	22	637	199	297	1622	388	342	352	2434	48063	
- % change (1980-1993) ⁸	157.1	165.1	105.1	-	30.1	24.6	46.4	31.8	17.5	54.8	35.7	47.7	121.9	38.1	42.6	69.2	61.6	31.7	42.1	146.4	81.5	26.2	41.1	201.2	40.4	40.6	
- per capita (veh./100 inh.)	27	21	23	17	60	75	51	46	37	43	51	50	27	51	32	57	59	42	46	30	41	45	49	6	42	50	

¹ The presentation is based on the format of the OECD Environmental Performance Reviews.

Data refer to 1993 or the latest available year. They include provisional figures and secretariat estimates.

Varying definitions can limit the comparability across countries.

² NLD: Excluding Lake IJssel (1 708 km²) and internal waters (Wadden Sea and North Sea: 2473 km²).

³ GDP at 1991 prices and purchasing power parities.

⁴ Total industry: includes mining and quarrying (ISIC 2), manufacturing (ISIC 3), and gas, electricity and water (ISIC 4).

⁵ Agriculture, forestry, hunting, fishery, etc.

.. = not available

-- nil or negligible

* Figures in italics include western Germany only

** Underlined figures exclude Mexico

⁶ Breakdown excludes electricity trade

⁷ Refers to motor vehicles with four or more wheels, except for Italy which include three-wheel vehicles

⁸ Data for Estonia refer to passenger cars only

Legend: D = denounced, R = ratified, acceded, approved; S = signed; y = in force

Source: IUCN, Secretariats of conventions

(continued)

Worldwide agreements			Albania	Andorra	Armenia	Austria	Azerbaijan	Belarus	Belgium	Bosnia and Herzegovina	Bulgaria	Canada	Croatia	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	Georgia	Germany	Greece	Hungary	Iceland	Ireland	Israel	Italy	Kazakhstan	Kyrgyzstan	Latvia
1949	(GENEVA) Convention on Road Traffic	y	R			R			R		R	R		R		R		R	R			R	R	R	R	R	R			
1957	(BRUSSELS) Int. Conv. Relating to Limitation of Liability of Owners of Sea-going Ships	y							D			S				D		D	D		D			R		R	S			
1958	(GENEVA) Conv. Fishing and Conserv. Living Resources of High Seas	y							R	R		S				R			R	R					S	S	S			
1963	(VIENNA) Convention on Civil Liability for Nuclear Damage	y			R						R		R		R		R						R							
1969	(BRUSSELS) Intern. Convention on Civil Liability for Oil Poll. Damages	y	R						R			R	R	R		R	R	R	R	R	R	R		R	R		R	R		
	1976 (LONDON) Protocol	y	R						R			R		R		R		R	R				R	R		R				
1969	(BRUSSELS) Conv. Intervention on the High Seas in Case of Oil Poll. Casualties	y							R		R	R	R			R		R	R			R	S	R	R	R				R
1971	(RAMSAR) Conv.-Wetlands of International Importance	y			R	R	R		R		R	R	R		R	R	R	R	R	R	R	R	R	R	R	R	S	R		
	1982 (PARIS) Amendment	y			R	R					R	R			R	R	R	R	R			R	R	R	R	R				
	1987 (REGINA) Amendments	y			R	R					R	R				R		R	R			R	R	R	R	R				
1971	(GENEVA) Conv. on Protection against Hazards from Benzene(ILO 136)	y								R			R		R			R	R			R	R			R	R			
1971	(BRUSSELS) Conv. Establish of International Fund for Compensation Oil Pollution Damage	y	R			R			R		R	R	R	R		R		R	R			R	R		R	R				
1972	(PARIS) Conv. Protection of the World Cultural and Natural Heritage	y	R		R	R	R			R	R	R	R	R	R	R		R	R	R	R	R	R	R	R	R				
1972	(LONDON) Conv. on the Prevention of Marine Poll. by Dumping of Wastes and other Matter	y					R	R				R	R	R		R		R	R			R	R	R	R	R				
1973	(WASHINGTON) Conv.-International Trade End. Species	y				R		R	R		R	R		R	R	R	R	R	R			R	R	R		S	R	R		
	1983 (GABORONE) Amendment					R			R							R		R	R			R	R							
1973	(LONDON) Internat. Conv. for the Prevention of Pollution from Ships (MARPOL)								R		R					S			R				R			S		R		
	1978 (LONDON)Protocol (segregated balast)				R		R	R		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			R	R	R	R
	1978 (LONDON) Annex III on Hazardous Substances	y				R		R	R		R		R		R	R	R	R	R	R	R	R	R	R			R	R	R	R
	1978 (LONDON) Annex IV on Sewage				R		R				R		R		R	R	R	R	R			R	R				R	R		
	1978 (LONDON) Annex V on Garbage	y				R		R	R		R		R	R	R	R	R	R	R	R	R	R	R	R	R	R		R	R	R
1974	(GENEVA) Conv. on Prot. against Hazards from Carcinogenic Subst. (ILO 139)	y								R				R	R			R	R			R	R				R			
1977	(GENEVA) Conv. on Prot. against Hazards from Air Poll., Noise and Vibration (ILO 148)	y					R		R	R			R		R	R		R	R			R					R		R	R
1979	(BONN) Conv.-Conservation Migratory Species of Wild Animals	y							R						R	R		R	R			R	S	R		R	R	R		
	1991(LONDON) Agr. Conservation of Bats in Europe	y							S						R	R			S				R							
	1992 (NEW YORK) Agreement ASCOBANS	y							R						R	R						R								
1982	(MONTEGO BAY) Conv. on the Law of the Sea	y				R		S	S	R	S	S	R	R	S	S		S	S			R	R	S	R	S		R		
1985	(VIENNA) Conv.-Protection of the Ozone Layer	y				R		R	R	R	R	R	R	R	R	R		R	R			R	R	R	R	R	R	R		R
	1987 (MONTREAL) Prot.-Subst. that Deplete the Ozone Layer	y				R		R	R	R	R	R	R	R	R	R		R	R			R	R	R	R	R	R			R
	1990 (LONDON) Amendment to Protocol	y				R		R				R	R	R		R		R	R			R	R	R	R	R	R			
	1992 (COPENHAGEN) Amendment to Protocol	y										R				R						R	R	R	R	R	R			
1986	(VIENNA) Conv. on Early Notification of Nuclear Accidents	y			R	R		R	S		R	R	R	R	R	R	R	R	R			R	R	R	R	R	R	R		R
1986	(VIENNA) Conv. on Assistance in the Case of Nuclear Accident	y			R	R		R	S		R	S	R	R		S	R	R	R			R	R	S	R	R	R		R	
1989	(BASEL) Conv.-Control of Transbound. Movts of Hazard. Wastes	y				R					R	R	R	R	R	R	R	R	R			R	R	R	R	R	R			R
1990	(LONDON) Conv. Oil Pollution Preparedness, Response and Cooperation	y										R				S		R	R			R	R	R	R	R	R			
1992	(RIO) Conv.-Biological Diversity	y	R		R	R	S	R	S		S	R	S	S	R	R	R	R	R	R	R	R	R	R	S	R	R	R	R	S
1992	(NEW YORK) Framework Conv.-Climate Change	y	R		R	R	R	S	S		R	R	S	S	R	R	R	R	R	R	R	R	R	R	S		R	R	R	R
1994	(VIENNA) Conv. on Nuclear Safety				S	S			S		S	S			S	S		S	S			S	S	S		S	S	S		
1994	(PARIS) Conv. to Combat Desertification				S	S						S	S			S		S	S	S	S	S			S	S	S	S		

Legend: D = denounced, R = ratified, acceded, approved; S = signed; y = in force
Source: IUCN, Secretariats of conventions

(continued)

Worldwide agreements			Liechtenstein	Lithuania	Luxembourg	Malta	Monaco	Netherlands	Norway	Poland	Portugal	Republic of Moldova	Romania	Russian Federation	San Marino	Slovakia	Slovenia	Spain	Sweden	Switzerland	Tajikistan	The for. Yug. Rep. of Macedonia	Turkey	Turkmenistan	Ukraine	United Kingdom	United States	Uzbekistan	Yugoslavia	European Community		
1949	(GENEVA) Convention on Road Traffic	y																														
1957	(BRUSSELS) Int. Conv. Relating to Limitation of Liability of Owners of Sea-going Ships	y			R	R	R	D	D	R	R								R	D	R						D			S		
1958	(GENEVA) Conv. Fishing and Conserv. Living Resources of High Seas	y									R										R						R	R		R		
1963	(VIENNA) Convention on Civil Liability for Nuclear Damage	y		R							R						R	S				R					S			R		
1969	(BRUSSELS) Intern. Convention on Civil Liability for Oil Poll. Damages	y			R	R	R	R	R	R	R		S	R				R	R	R	R						R	S		R		
	1976 (LONDON) Protocol	y			R	R		R	R	R	R			R					R	R	R						R					
1969	(BRUSSELS) Conv. Intervention on the High Seas in Case of Oil Poll. Casualties	y					R	R	R	R	R		S	R				R	R	R	R				R	R	R	R		R		
1971	(RAMSAR) Conv.- Wetlands of International Importance	y	R	R	S	R		R	R	R	R		R	R		R	R	R	R	R	R		R	R			R	R		R		
	1982 (PARIS) Amendment	y	R	R	S			R	R	R	R		R	R		R	R	R	R	R	R						R	R				
	1987 (REGINA) Amendments	y	R	R				R	R	R				R						R	R						R					
1971	(GENEVA) Conv. on Protection against Hazards from Benzene(ILO 136)	y				R							R			R	R	R													R	
1971	(BRUSSELS) Conv. Establish of International Fund for Compensation Oil Pollution Damage	y				R	R	R	R	R	R			R				R	R	R	S						R	S		R		
1972	(PARIS) Conv. Protection of the World Cultural and Natural Heritage	y		R	R	R	R	R	R	R	R		R	R	R	R	R	R	R	R	R	R		R	R	R	R	R	R	R	R	
1972	(LONDON) Conv. on the Prevention of Marine Poll. by Dumping of Wastes and other Matter	y			R	R	R	R	R	R	R			R					R	R	R					R	R	R		R		
1973	(WASHINGTON) Conv.-International Trade End. Species	y	R		R	R	R	R	R	R	R		R	R		R	R	R	R	R	R							R	R			
	1983 (GABORONE) Amendment	y			R		R	R								R	R	R	R								R					
1973	(LONDON) Internat. Conv. for the Prevention of Pollution from Ships (MARPOL)							S	R	S			S					S	S								R	S		R		
	1978 (LONDON) Protocol (segregated balast)			R	R	R	R	R	R	R	R		R	R				R	R	R			R			R	R	R		R		
	1978 (LONDON) Annex III on Hazardous Substances	y		R	R		R	R	R	R	R		R	R				R	R	R	R						R	R	R		R	
	1978 (LONDON) Annex IV on Sewage			R	R		R			R	R		R	R				R	R	R							R					
	1978 (LONDON) Annex V on Garbage	y		R	R		R	R	R	R	R		R	R				R	R	R	R						R	R	R		R	
1974	(GENEVA) Conv. on Prot. against Hazards from Carcinogenic Subst. (ILO 139)	y							R									R	R	R	R										R	
1977	(GENEVA) Conv. on Prot. against Hazards from Air Poll., Noise and Vibration (ILO 148)	y			R				R		R			R	R	R	R	R	R	R		R					R				R	
1979	(BONN) Conv.-Conservation Migratory Species of Wild Animals	y			R		R	R	R		R							R	R	R							R				R	
	1991(LONDON) Agr. Conservation of Bats in Europe	y			R			R	R		S																R					
	1992 (NEW YORK) Agreement ASCOBANS	y						R												R							R					S
1982	(MONTEGO BAY) Conv. on the Law of the Sea	y	S		S	R	S	S	S	S	S		S	S		S	R	S	S	S		R			S					R	S	
1985	(VIENNA) Conv.-Protection of the Ozone Layer	y	R	R	R	R	R	R	R	R	R		R	R		R	R	R	R	R		R	R	R	R	R	R	R	R	R	R	R
	1987 (MONTREAL) Prot.-Subst. that Deplete the Ozone Layer	y	R	R	R	R	R	R	R	R	R		R	R		R	R	R	R	R		R	R	R	R	R	R	R	R	R	R	R
	1990 (LONDON) Amendment to Protocol	y	R	R	R	R	R	R	R	R	R		R	R		R	R	R	R	R		R	R				R	R				R
	1992 (COPENHAGEN) Amendment to Protocol	y		R	R			R											R	R							R	R				
1986	(VIENNA) Conv. on Early Notification of Nuclear Accidents	y	R	R	S		R	R	R	R	R		R	R		R	R	R	R	R				R		R	R	R		R		
1986	(VIENNA) Conv. on Assistance in the Case of Nuclear Accident	y	R				R	R	R	R	S		R	R		R	R	R	R	R				R		R	R	R		R		
1989	(BASEL) Conv.-Control of Transbound. Movts of Hazard. Wastes	y	R		R		R	R	R	R	R		R	R		R	R	R	R	R							R	S				R
1990	(LONDON) Conv. Oil Pollution Preparedness, Response and Cooperation	y				S		R	R	S									R	R								R				
1992	(RIO) Conv.-Biological Diversity	y	S	S	R	S	R	R	R	S	R	S	R	R	R	R	S	R	R	R			S			R	R	S	R	S	R	
1992	(NEW YORK) Framework Conv.-Climate Change	y	R	R	R	R	R	R	R	R	R	R	R	R	R	R	S	R	R	R						R	S	R	R	R	S	R
1994	(VIENNA) Conv. on Nuclear Safety				S			S	R	S	S		S	S		S	S	S	S								S	S				
1994	(PARIS) Conv. to Combat Desertification				S	S		S	S	S									S	S			S	S		S	S	S			S	

Legend: D= denounced, R = ratified, acceded, approved; S = signed; y = in force (continued) – Source: IUCN, Secretariats of conventions

Legend: D = denounced, R = ratified, acceded, approved; S = signed; y = in force
Source: IUCN, Secretariats of conventions

(continued)

Regional and subregional agreements			Albania	Andorra	Armenia	Austria	Azerbaijan	Belarus	Belgium	Bosnia and Herzegovina	Bulgaria	Canada	Croatia	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	Georgia	Germany	Greece	Hungary	Iceland	Ireland	Israel	Italy	Kazakhstan	Kyrgyzstan	Latvia	
1950	(PARIS) Intern. Conv. for the Protection of Birds	y				S			R		S									S			S		R			R			
1957	(GENEVA) European Agreement-Intern. Carriage Dangerous Goods by Road (ADR)	y				R		R	R	R				R		R	R		R	R		R	R	R				R			
1958	(GENEVA) Agreem.-Adoption Uniform Cond. of Approval and Recognition for Motor Vehicles Equipment and Parts.	y				R		R	R	R				R		R	R		R	R		R	R	R				R			
1968	(PARIS) European Conv.- Protection of Animals during Intern. Transport	y				R			R					R		R			R	R		R	R	R	R		R				
	1979 (STRASBOURG) Additional Protocol	y				R			R	R				R		R			R	R		R	R	R	R		R				
1969	(LONDON) European Conv. -Protection of Archeological Heritage	y				R			R	R	R			R		R			R			R	R	R				R			
1973	(GDANSK) Conv.- Fishing and Conserv.of Living Resources in Baltic Sea and Belts	y														D		R				D									
	1982 (WARSAW) Amendments	y														D		R				D									
1974	(HELSINKI) Conv.Prot. Marine Env. Baltic Sea	y														R	R	R				R								R	
1976	(BARCELONA) Conv. Prot. Mediterranean Sea against Pollution	y	R											R	R				R			R				R	R				
	1976 (BARCELONA) Prot. Dumping	y	R											R	R				R			R				R	R				
	1976 (BARCELONA) Prot. Co-operation in Case of Emergency	y	R											R	R				R			R				R	R				
	1980 (ATHENS) Prot. Land-based Sources Pollution	y	R											R	R				R			R				R	R				
	1982 (GENEVA) Prot. Spec. Protected Areas	y	R											R	R				R			R				R	R				
	1994 (MADRID) Prot. against poll. from exploration/exploitation												S	S								S				S	S				
1979	(BERN) Conv.-Conservation European Wildlife & Natural Habitats	y				R		R		R				R		R	R	R	R		R	R	R	R	R	R	R	R			
1979	(GENEVA) Conv.-Long Range Transboundary Air Pollution	y				R		R	R	R	R	R	R	R	R	R	R		R	R		R	R	R	R	R	R	R		R	
	1984 (GENEVA) Prot.-Financing of Co-op Programme (EMEP)	y				R		R	R	R	R	R	R	R	R	R		R	R		R	R	R	R	R	R	R				
	1985 (HELSINKI) Prot.-Reduction of Sulphur Emissions by 30%	y				R		R	R		R	R			R	R		R	R		R		R				R				
	1988 (SOFIA) Prot.-Control of Emissions of Nitrogen Oxides	y				R		R	S		R	R			R	R		R	R		R	S	R		R		R				
	1991 (GENEVA) Prot.-Volatile Organic Compounds					R			S		S	S			S			R	S		R	S	S				R				
	1994 (OSLO) Prot.-Further Reduction of Sulphur Emissions					S			S		S	S	S		S	S		S	S		S	S	S		S		S	S			
1991	(ESPOO) Conv. Env. Impact Ass. in a Transboundary Context		R			R		S	S		R	S			S	S		R	S		S	S	S	S	S	S	R				
1992	(HELSINKI) Conv. Prot. and Use of Transboundary Waters and Intern. Lakes		R			S			S		S				S		R	S	S		R	S	R				S		S		
1992	(HELSINKI) Conv. Transboundary Effects of Industrial Accidents		R			S			S		R	S			S		S	S	S		S	S	R				S		S		
1992	(HELSINKI) Conv.Prot. Marine Env. Baltic Sea (2nd)														S		R	S			R									R	
1992	(BUCHAREST) Conv. Prot. Black Sea Against Pollution	y									R									R											
1992	(PARIS) Conv. Prot. Marine Env. North-East Arltantic								S						S		S	S			R			S							
1993	(LUGANO) Conv.- Civil Liability for Damage from Activities Dangerous For the Environment													S				S				S	S				S				
1994	(LISBON) Energy Charter Treaty		S	S	S	S	S	S	S	S	S		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	1994(LISBON) Prot. on Energy Efficiency and Related Aspects				S	S	S	S	S	S	S		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	

Legend: D = denounced, R = ratified, acceded, approved; S = signed; y = in force
Source: IUCN, Secretariats of conventions

(continued)

Regional and subregional agreements			Liechtenstein	Lithuania	Luxembourg	Malta	Monaco	Netherlands	Norway	Poland	Portugal	Republic of Moldova	Romania	Russian Federation	San Marino	Slovakia	Slovenia	Spain	Sweden	Switzerland	Tajikistan	The for. Yug. Rep. of Macedonia	Turkey	Turkmenistan	Ukraine	United Kingdom	United States	Uzbekistan	Yugoslavia	European Community	
1950	(PARIS) Intern. Conv. for the Protection of Birds	y			R		S	R			S							R	R	R									R		
1957	(GENEVA) European Agreement-Intern. Carriage Dangerous Goods by Road (ADR)	y	R		R			R	R	R	R		R	R		R	R	R	R	R						R			R		
1958	(GENEVA) Agreem.-Adoption Uniform Cond. of Approval and Recognition for Motor Vehicles Equipment and Parts.	y			R			R	R	R	R		R	R			R	R	R	R						R			R		
1968	(PARIS) European Conv.- Protection of Animals during Intern. Transport	y			R			R	R		R		R	R				R	R	R			R			R					
	1979 (STRASBOURG) Additional Protocol	y			R			R	R		R		R	R				R	R	R						R					
1969	(LONDON) European Conv. -Protection of Archeological Heritage	y	R		R	R					R					R	R	R	R	R		R				R			R		
1973	(GDANSK) Conv.- Fishing and Conserv.of Living Resources in Baltic Sea and Belts	y								R				R					R											R	
	1982 (WARSAW) Amendments	y								R				R					R											R	
1974	(HELSINKI) Conv.Prot. Marine Env. Baltic Sea	y		R						R				R					R											R	
1976	(BARCELONA) Conv. Prot. Mediterranean Sea against Pollution	y				R	R										R	R					R						R	R	
	1976 (BARCELONA) Prot. Dumping	y				R	R										R	R					R						R	R	
	1976 (BARCELONA) Prot. Co-operation in Case of Emergency	y				R	R										R	R					R						R	R	
	1980 (ATHENS) Prot. Land-based Sources Pollution	y				R	R										R	R					R						R	R	
	1982 (GENEVA) Prot. Spec. Protected Areas	y				R	R										R	R					R						R	R	
	1994 (MADRID) Prot. against poll. from exploration/exploitation					S	S										S	S					R								
1979	(BERN) Conv.-Conservation European Wildlife & Natural Habitats	y	R	S	R	R	R	R	R	S	R	R	R			S		R	R	R			R			R				R	
1979	(GENEVA) Conv.-Long Range Transboundary Air Pollution	y	R	R	R			R	R	R	R	R	R	R	S	R	R	R	R	R			R		R	R	R	R	R	R	
	1984 (GENEVA) Prot.-Financing of Co-op Programme (EMEP)	y	R		R			R	R	R	R			R		R	R	R	R	R			R		R	R	R	R	R	R	
	1985 (HELSINKI) Prot.-Reduction of Sulphur Emissions by 30%	y	R		R			R	R					R		R			R	R					R						
	1988 (SOFIA) Prot.-Control of Emissions of Nitrogen Oxides	y	R		R			R	R	S				R		R			R	R	R				R	R	R			R	
	1991 (GENEVA) Prot.-Volatile Organic Compounds		R		R			R	R		S								R	R	R				S	R	S			S	
	1994 (OSLO) Prot.-Further Reduction of Sulphur Emissions		S		S			R	R	S				S		S	S	S	S	R					S	S				S	
1991	(ESPOO) Conv. Env. Impact Ass. in a Transboundary Context				R			R	R	S	S	R	S	S		S		R	R						S	S	S			S	
1992	(HELSINKI) Conv. Prot. and Use of Transboundary Waters and Intern. Lakes			S	R			R	R	S	R	R	R	R				S	R	R						S				R	
1992	(HELSINKI) Conv. Transboundary Effects of Industrial Accidents			S	R			S	R	S	S	R		R				S	S	S						S	S			S	
1992	(HELSINKI) Conv.Prot. Marine Env. Baltic Sea (2nd)			S						S				S					R											R	
1992	(BUCHAREST) Conv. Prot. Black Sea Against Pollution	y											R	R									R		R						
1992	(PARIS) Conv. Prot. Marine Env. North-East Arltantic				S			R	S		S							R	S	R						S				S	
1993	(LUGANO) Conv.- Civil Liability for Damage from Activities Dangerous For the Environment		S																												
1994	(LISBON) Energy Charter Treaty		S																												S
	1994(LISBON) Prot. on Energy Efficiency and Related Aspects		S		S	S		S		S	S	S		S		S	S	S	S	S	S		S		S					S	

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Source: IUCN, Secretariats of conventions

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Annex IV
CHRONOLOGY OF SELECTED ENVIRONMENTAL EVENTS (1990-1995)

1990

- January The West-Estonian Archipelago Biosphere Reserve, the first in the Baltic countries, is set up; it covers more than 400 islands of West Estonia and is the largest in northern Europe.
- March The Nature Protection Act of the Estonian Soviet Socialist Republic is approved.
- A leakage of 1.55 mln. m³ of alkaline water from the precipitation basin of the Baltic Thermal Power Station reaches the Narva water reservoir between 26 March and 5 April.

1991

- January A regulation introduces the first permitting system in Estonian legislation.
- April The mining of phosphorite in Maardu is stopped.
- August Estonia regained its independence.
- September An agreement between the Ministry of the Environment of Estonia and the Ministry of the Environment of Denmark on cooperation on environmental protection is signed.
- November A regulation introducing ambient air pollution standards is adopted. Estonia and Finland sign an environmental protection treaty.

1992

- January Estonia signs the 1974 Convention on the Protection of the Marine Environment of the Baltic Sea Area.
- March A new constitution is approved; it stipulates everyone's obligation to protect the environment.
- April The Diplomatic Conference of Ministers of the Environment, held in Helsinki, adopted the Baltic Sea Environmental Declaration (1992) and the 1992 Convention, paving the way for financing environmental protection projects in Estonia.
- May The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal is ratified by the Parliament (Riigikogu).
- An agreement between the Ministry of the Environment of Estonia and the Ministry of the Environment, Nature Conservation and Nuclear Safety of Germany on cooperation on environmental protection is signed.
- The Estonian Parliament passes three laws: the currency law, the law on backing the Estonian kroon and the foreign exchange law. According to those laws, the kroon is fully backed by gold and foreign exchange. A decision is also made on the possibility of using the country's forest reserves to back the kroon.

June Estonia participates in the United Nations Conference on Environment and Development in Rio de Janeiro (Brazil), Estonia signs the Framework Convention on Climate Change and the Convention on Biological Diversity.

Currency reform is carried out. The kroon is pegged to the deutsche mark.

July 4,590 tons of car tyres burn in Muuga harbour.

October Regulations on the toxic substances content and norms for motor vehicle exhaust gases and furnace exhaust gases are adopted.

November The Parliament adopts the Waste Act.

1993

January 82 tons of oil from the tanker "Kihnu" reach Kopli Bay.

March The Environment Ministers of the Baltic countries, including Estonia, hold an international conference in Gdansk (Poland).

April The Conference of European Environment Ministers is held in Lucerne (Switzerland), bringing together environment ministers from west and east Europe, including Estonia.

May The Act on Privatization and several other acts to support privatization are adopted and come into force. The Estonian Privatization Agency is set up.

July Agreements between the Government of Estonia and the Government of Finland on air and water protection are signed.

October The biological waste-water treatment plant in Tallinn is reconstructed. As a result, the waste water from Tallinn city is treated according to HELCOM standards.

Underground water is polluted following a severe oil leakage over several square kilometres of land from the reservoir of a timber plant in Arukula. Since the oil contains several toxic and carcinogenous substances (mostly aromatic hydrocarbons), the local water will remain hazardous to human health for the next 10-15 years.

The EU PHARE support to environmental protection in Estonia starts up.

December The Act on Compensation for Pollution Damage is adopted, resulting in a significant increase in environmental charges and fees.

An agreement between the Government of Estonia and the Government of Finland on cooperation to combat oil spills is signed.

Karula and Soomaa National Parks are founded to protect mires and landscapes.

1994

January The Act on the Environmental Fund is adopted.

March Switzerland provides the first instalment of a Sw F 7 million investment in the construction of a waste-water purification plant in Tartu to be completed by 1997.

April	<p>The Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat is ratified. The Matsalu nature reserve, the first internationally important wetland in Estonia, is created.</p> <p>53 tons of fuel oil from the "Tamula" fishing ship is accidentally discharged and reaches the harbour of Tallinn.</p>
May	<p>Explosion of an electric filter at the Kunda cement factory.</p>
August	<p>The Russian army leaves Estonia. Most of the territories taken over from the military units of the former USSR are found to be severely polluted with oil and chemical products, debris and domestic waste (total area of 81,000 hectares).</p>
November	<p>HELCOM PITF (Programme Implementation Task Force) meeting is held in Tallinn. 1995</p>
February	<p>The Act on Sustainable Development is adopted.</p> <p>The World Bank and Estonia sign a US\$ 2 million loan agreement to finance the Haapsalu-Matsalu project.</p>
March	<p>The Act on Packaging is adopted.</p> <p>Parliamentary elections (RIIGIKOGU).</p>
April	<p>The 1992 Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea (HELCOM) is ratified.</p>
May	<p>Estonia signs the European Agreement establishing an Association between the European Communities and their Member States, which contains some articles specifically devoted to the protection of the environment.</p>