# Instruments and Options for Environmental Policy during the Accession Process of EU Associated Countries in the Area of Environment and Energy

# Country Report Estonia

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# 1 Introduction

More than four years ago the European Union (EU) decided to start negotiations on accession with possible new member countries. The Czech Republic, Estonia, Hungary, Poland and Slovenia were the first countries to be accepted into the formal accession process. These countries are accordingly the called Accession Countries.

With regard to the leading role of the EU and of individual countries such as Germany in climate protection policies and strategies in general, it is important to consider the impact of the accession process on EU climate policy. $CO_2$ emissions of the Accession Countries amount to at least a fifth of the carbon dioxide emissions of all 15 EU countries. Accession countries' $CO_2$ emissions will not influence EU commitments for the first commitment period from 2008 to 2012. However, it is important to pay early intention to the Accession Countries, because they will be included in the European commitment for the second commitment period beginning 2013.

Taking this into account, the German Environmental Protection Agency (Umweltbundesamt) commissioned a comprehensive study to analyse the options and capabilities of the five Accession Countries in the field of environment and energy. This study was carried out by research institutes in Germany in co-operation with research institutes in the five Accession Countries. The study included the analysis of the most important issues, namely:

- Status quo and development of the energy sector and structural $CO_2$ mitigation options;
- Legal gap assessment and analysis of performance in the accession process;
- Identification of implementation patterns through detailed policy analysis;
- Evaluation of co-operation projects in the field of environment and energy in order to develop new projects that promote the accession process.

This volume includes the analysis with regard to each of these topics, which has been carried out by the co-operation partners in the accession countries. These contributions have been compiled to country reports for each of the five accession countries. Section 2 of this report shows the results of the legal gap assessment. In section 3 the results of the policy assessment are documented. Existing co-operation projects that have been identified as best practice are described in details in section 4. Additionally there are several tables of data relevant for the field of energy and environment and overview tables about the accession process and the screening of existing co-operation projects in the appendix to this report.

The overall analysis of all five accession countries has been compiled to the main report, which includes also the conclusion and recommendations that have been derived from this co-operative investigation and research process.

# 2 Legal Gap Assessment

The certain EC Directives, characterising the energy sector as well as environmental aspects closely related to the energy production and use are analysed with the help of comparison of current situation with the fixed in appropriate directives requirements. As Estonia is currently engaged in the process of harmonisation with the EU, many legislative acts, regulations and decrees are revised, amended or just created at present, following the EC Directives' requirements. Therefore, in many cases the conclusion about the evaluation of possible gap in the legislation, is given in the form of expression like "*... the existing legislation is partly in accordance with appropriate EC Directive*" or "*... harmonisation is under way and the new amended legislative act is to be passed in Parliament*". This means, Estonia has adopted or is currently adopting the main requirements of appropriate pieces of EC legislation. The result of approximation process with EU directives' principles in the field of energy and environment depends greatly on general economic and social development of the Republic of Estonia. In the following 9 EU Directives concerning energy and environmental aspects are analysed based on the common methodological approach, where the emphasis is on the short characteristics of local status quo and comparison of legislative basis. The analysis is done mostly in the way of interviewing the key persons from governmental authorities as well as the leading experts in energy and environment, using the information of local PHARE co-ordination unit, public databases on the EU approximation, published Estonian legislative Acts. As for the time frame, concerning the year of transposition or full implementation, the two screening tables, which form the annexes to present chapter, can give an approximate time frame only.

The second part of the investigation is devoted to the analysis of country activities in the field of energy and environment; programmes, governmental targets for energy conservation, public initiatives, etc. Special attention is paid to the use of renewable energy sources, which is of high priority in Estonia. Finally, the chapter gives some conclusions on the process of harmonisation in the field of energy and environment, which are the areas of particularly fast development towards European traditions and way of understanding.[1]

[1] The persons interviewed for the present analysis:
*Mrs Mari Koppel*, Director of Energy Department, Ministry of Economic Affairs;
*Mr Urmas Leitmäe*, Director of Technical Inspectorate, Ministry of Economic Affairs;
*Mr Allan Sepp*, Director of Energy Market Inspectorate, Ministry of Economic Affairs;
*Mrs Mare Annsoo*, Chief Specialist of Energy Department, Ministry of Economic Affairs

## 2.1 Directives

### 2.1.1 Liberalisation of the Electricity Market (96/92/EC)

The requirements of the Directive 96/92/EC concerning common rules for the international market in electricity is basically covered by the Energy Act and secondary legislation based on it. The Estonian Energy Act was passed on 11 June 1997; entered into force on 1 January 1998 (State Gazette 1 1998, 71, 1201). The planned year of full implementation is 2002.

#### *2.1.1.1 Objectives/Substantive Requirements*

The Directive 96/92/EC concerning common rules for the international market in electricity seeks a competitive market in electricity.

**Energy Act.** The Act regulates the fuel and energy markets, and state supervision of the fuel and energy sectors. (Energy Act; State Gazette 1 1998, 711201 para 1).The Energy Act regulates the operation of the generation, transmission and distribution system (also export, import and sale) of electric power.

The Estonian power network has been divided into two parts: a transmission network, operated by *Põhivõrk AS* and a distribution network, operated by *Jaotusvõrk AS*. The power network operates continuously as a unified system, complies with security and optimality requirements and ensures users an uninterrupted supply of electric power, which complies with quality requirements. Definitions by the Energy Act: The transmission network is a high voltage network with a voltage of 110 kV or higher; A distribution network is a low or medium voltage network with a voltage of 110 kV or lower. The principles of the EC Directive are followed here.

According to the Energy Act describes the production of electricity is open to independent producers (example in county Põlva) and to auto-producers.

The Estonian regulation contains the basic definition of the EC Directive harmonising the appropriate requirements. The Energy Act is in the process of amendments at present.

The regulating requirements are partly in accordance to the EC-Directive.

#### *2.1.1.2 Institutional Requirements*

On the basis of the Energy Act Ministerial Order No. 4 established the state supervisory authority -the Energy Market Inspectorate (EMI) - on the January 21, 1998. The Statute of EMI came into force on February 6, 1998.

The Energy Market Inspectorate has the competence to:

- Supervise the fuel and energy markets;
- Issue, supervise compliance with and revoke fuel and energy market licences;

- Review the financial performance of fuel and energy traders dominating the market
- Foster competition;
- Review, approve and confirm the prices of fuel and energy sold by enterprises dominating the market;
- Review and approve connection charges and the terms and conditions of connection contracts;
- Monitor compliance by fuel and energy traders with their activity and development obligations;
- Monitor the quality of fuel and energy being sold;
- Co-operate with Consumer Protection Association and facilitate exercise of the rights granted to such associations by Consumer Protection Act.

For the construction of a new generation capacity there is general regulation, but, also exists the procedure of negotiated access.

*Eesti Energia AS***.** Responsibility for the relevant generation capacity, transport of electricity and exploitation of the high-voltage transmission systems was conferred upon the 1998 the state owned company - *Eesti Energia AS*, which also has ancillary services (i.e. power system control centre) for the operation of a transmission and distribution systems of electricity (sub-stations etc).

*Eesti Energia AS* is a vertically integrated power system (a monopolistic status at present) consisting production, transmission and distribution of energy, which have a differentiated accountings.

The state shall maintain at least 51 % ownership of the share capital of commercial undertakings which are founded on the basis of power stations entered on the list of commercial undertakings that are of strategic importance of the state.

Present state ownership is 100 % ownership of the share capital of the transmission networks *(Põhivõrk AS)* and relevant generation capacity *(Narva Elektrijaamad AS).*

With the establishment of the EMI and the assignment of the *Eesti Energia AS* and the definition of their responsibilities the requirements of the Directive for the existence of a system operator are fulfilled. The Energy Act is in the process of amendments at present. Harmonisation is therefore partly reached.

#### *2.1.1.3 Procedural Requirements*

On the basis of the Energy Act, “The Regulation for Connection to Energy and Gas Networks” came into force on the 18 Apr 1998 by Government Decree 64 on 17 March 1998. In addition, there are national regulations on: technical and safety requirements; rights, obligations and liabilities of network operators; protection zones of the network; procedure for activity licenses; principles of income calculation. Ministry of Economic

Affairs (MoEA) is responsible to prepare the amendments to the Energy Act and sub-acts, which define precisely the requirements according to the EC-Directive.

**Licensing.** A market license is required for the export, import and sale of electric power. Operational fuel or energy traders are required to apply for a market license within one year after establishment of the procedure for issue of such licenses in Estonia. A market license gives a trader the right to sell, export or import specified goods or services, and determines the enterprise through which the trader operates. License also fix the licensed territory granted to the network operator, which may include several sales territories.

A fuel or energy trader dominating the market must sell energy and related services at prices and rates approved by the Energy Market Inspectorate and in compliance with the conditions provided for in its market licence. Prices together with applicable taxes must be made public by publishing in a national newspaper at least half a year before they are changed.

At present harmonisation is partly reached.

#### *2.1.1.4 Monitoring and Reporting*

The Energy Market Inspectorate has organised a market surveillance system and supervises the energy calculations and the unit cost structure of *Eesti Energia AS.* On the basis of the Energy Act, the Technical Inspectorate was restructured for the surveillance of technical rules and standards for power generation, transmission and distribution. The harmonisation process of other specific procedures will be gradually continued.

The further amendments of the Estonian law will contain regulation for the control and transparency as required by EC Directive.

Transitional Provisions: The Energy Act will be further detailed and amended by MoEA according to EU principles in order to promote competition with new traders entering the electricity market. The Estonian Energy Conservation Programme should be adopted to the end of 1999. Sub-acts to the Energy Act will be prepared and completed. The Act on Competition and the Consumer Protection Act will be supplemented concerning energy enterprises (e.g. *Narva Elektrijaamad AS*) dominating the market. With the further amendments of the Energy Act, the role of ministries and public institutions and their performance at managing the energy sector will be specified.

The harmonisation process is gradually continued; the full implementation is foreseen for 2002.

### 2.1.2 Liberalisation of the Gas Market (98/30/EC)

Gas market issues are covered by the Estonian Energy Act; see for more details in above.

#### *2.1.2.1 Objectives/Substantive Requirements*

The Directive (98/30/EC) concerning common rules for the internal market in natural gas seeks a competitive market in natural gas.

The Energy Act was passed by Parliament in 1997 for the common rules of authorisation for the construction of capacity, the operation (also ancillary services) of the natural gas transmission, distribution, supply, storage facilities and access, and provisions for natural gas consumers.

The technical rules for the operation of systems ensure interoperability of the sector, where as basic rules still must be laid down with regard to transmission, storage (LNG) and liquefied natural gas undertakings, as well as to distribution and supply undertakings. The harmonisation process of other specific procedures will be gradually continued, it is planned to year 2002.

On the basis of the Energy Act the definition “large user of gas” means a user who uses gas in industry or in a district heating boiler plant. or power station. Large users who are connected to a network have the right, within the limits of the network's technical possibilities, to purchase energy or gas from any energy or network operator operating within the territory of the Republic of Estonia.

Estonia already has basic regulation covered by the Energy Act. Sub-acts to the Energy Act will be prepared and completed by MoEA. The situation with creation of competitive market in natural gas is close to be monopolistic as only one big company *Eesti Gaas AS* is prevailing.

It could be said that the regulating requirements are only partly in accordance to the EC Directive.

#### *2.1.2.2 Institutional Requirements*

The Energy Market Inspectorate, which was established on the basis of the Energy Act by Ministerial Decree No. 4 on 21 Jan 1998, aims at the achievement of a competitive market in natural gas and in the general economic interest, public-service obligations which may relate to security, including security of supply, regularity, quality and price of supplies, and environmental protection.

In order to perform its functions, the Energy Market Inspectorate (see in above) has the right to determine the pricing principles to be implemented by fuel and energy traders dominating the market in the circumstances provided for in the Energy Act.

*Eesti Gaas AS*, a private company, has responsibility for the relevant natural gas import capacities, transport of natural gas, security of supply, regularity and exploitation of the systems. The company has a monopolistic status at present.

In general, the regulating requirements are only partly in accordance to EC Directive at present.

#### *2.1.2.3 Procedural Requirements*

Ministry of Economic Affairs has compiled the criteria and procedures for accession. A number of regulations were issued in 1998 to follow the procedural requirements foreseen by EC Directive. “The Regulation of Market Licensing for Trade by Fuel and Energy Enterprises” came into force on the 17 September 1998. In addition, the “The Regulation for Connection to Energy and Gas Networks”, was enforced on the 18 April 1998. This Regulation ensures that technical rules would be establishing minimum technical design and operation requirements for the connection to the system of natural gas facilities.

For the construction of a new generation capacity of natural gas facilities or the supply of natural gas, there is a general regulation available, but also exists the procedure of negotiated access.

**Licensing.** There are the technical inspection licenses, which are activity licenses regulating fuel and energy sector for a specified term, e.g. three years and market licenses, which are valid for up to twelve years. Fees shall be charged for activity licenses pursuant to the State Fees Act. By “The procedure for issue, extension, revocation and supervision of activity licenses” (came into force on 19 Sept 1998) is established a regulation of the Government. The harmonisation process of other specific procedures will be gradually continued. The full implementation is planned by 2002.

#### *2.1.2.4 Monitoring and Reporting*

The Energy Market Inspectorate has to implement the surveillance of the internal market in natural gas. EMI has competence to monitor compliance by fuel and energy traders with their activity and development obligations. Estonia's natural gas facilities are currently taken into consideration as a *dead-end system*. Harmonisation is partly reached.

### 2.1.3 Energy Taxation (92/81/EEC)

*The Estonian Act on Fuel and Excise Tax is basically covering the requirements concerning the EC Directive.*

#### *2.1.3.1 Objectives/Substantive Requirements*

**The Directive 92/81/EEC on the harmonisation of the structures of excise duties on mineral oils,** together with Directives 92/12/EEC and 92/82/EEC, regulates the taxation of mineral oils.

The Estonian Act on Fuel Excise Tax was passed on 17 June 1993, came into force on 1 July 1993; last amended on 21 October 1997; came into force on 1 December 1997 (State Gazette I 1997, 77, 1314).

The fuel excise tax is imposed on motor fuel as well as lubricated motor oil and fuel oil manufactured in Estonia and imported to Estonia. Excise tax rates on motor fuel as well

as lubricated motor oil and fuel oil are subject to excise taxes in accordance with the rates specified in the Appendix table to the Act on Fuel Excise Tax, see below.

*Table 1: Excise Tax Rates for Motor Fuel as well as Lubricated Motor Oil and Fuel Oil*

| | | 1.12.1997 | 1.12.1998 | 1.12.1999 | 1.12.2000 | 1.12.2001[1)] |
|---|---|---|---|---|---|---|
| | | - EURO -[2)] | | | | |
| Petrol | 1000 l | 159.78 | 191.73 | 223.69 | 255.65 | 274.82 |
| Diesel oil | kg | 0.10 | 0.15 | 0.19 | 0.24 | 0.28 |
| Aviation kerosene | kg | 0.20 | 0.22 | 0.25 | 0.27 | 0.29 |
| Aviation gasoline | kg | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| Liquid gas used as motor fuel | kg | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| Compressed gas used motor fuel | kg | 0.07 | 0.077 | 0.083 | 0.089 | 0.10 |
| Lubricated motor oil | kg | 0.017 | 0.023 | 0.031 | 0.038 | 0.045 |
| Light fuel oil | kg | 0.015 | 0.015 | 0.019 | 0.019 | 0.023 |

[1)] This column presents the numerical values of the minimum level for EU requested excise tax rate.
[2)] 1 EURO = 15,6466 EEK (Estonian Bank, June 30, 1999).

Considering the security of supply and the employment perspective, differentiated excise rates to the fuels and generated energy will be imposed according to the EU principles, which will provide competitiveness of indigenous fuels and create favourable conditions for the use of renewables and peat at the economically beneficial level.

Harmonisation with the EC Directive is not fully reached yet. The regulating requirements are partly in accordance to the EC Directive. The increase of excise tax rates in a period 1997 - 2001 corresponds to the schedule foreseen by the Directive.

#### *2.1.3.2 Institutional Requirements*

In order to fulfil the obligations of the Directive on the harmonisation of the structures of excise duties on mineral oils, a tax authority has to exist in each Member State to ensure that excise duties are charged and taxes are collected. The competent authorities in Estonia, which have the same obligations as required in the EU Directive, are the Customs Board and the Tax Board. The Energy Market Inspectorate supervises quality of fuels and energy being sold.

The regulating requirements are partly in accordance to the EC Directive, as the implementation still needs improvement.

#### *2.1.3.3 Procedural Requirement*

There are no specific procedural requirements in the EU Directive.

Estonia's procedural rules are fixed rather clearly. Excise tax is charged on motor fuel as well as lubricated motor oil and fuel oil manufactured in Estonia, as well as imported liquid and compressed gas used as motor fuel upon their realisation of self-consumption.

The period of taxation is a calendar month. The manufacturer of motor fuel as well as lubricated motor oil and fuel oil or importer of liquid and compressed gas used as motor fuel pays excise tax and files an excise tax return to the local office of the Tax Board by the 20$^{th}$ day of the month following the period of taxation. The Minister of Finance establishes the form and order of filing the excise tax return (State Gazette / 1996, 74, 1308). Payment of Excise Tax. Excise tax is charged on imported motor fuel as well as lubricated motor oil and fuel oil, except liquid and compressed gas used as motor fuel, when declaring the motor fuel as well as lubricated motor oil and fuel oil for free circulation, directly upon its conveyance into the customs territory of Estonia or after the application of the preceding customs procedure. The importer remits the excise tax to the bank account of the Customs Board pursuant to the customs regulations as defined in the Customs Law.

**Liquid Fuel Fiscal Marking.** For the regulation of liquid fuels market in Estonia, an Act on Fiscal Marking of Liquid Fuels was passed on 23 Sept 1997, came into effect as 1 Jan 1998 (State Gazette 1 1997, 73, 1201).

Under the Act, light fuel oil imported into Estonia and manufactured in Estonia, which has not borne excise tax at the rate applicable to diesel oil, shall be subject to fiscal marking. The use of light fuel oil as motor fuel in an automobile and in a vehicle designed for the transport of persons or goods (except in a tractor) is forbidden.

Fiscal marking means the adding of additives to light oil in order to distinguish the latter from other liquid fuels and the Customs Board shall, in the course of customs clearance, determine whether light fuel oil has been marked with a fiscal marker and supervise the fiscal marking carried out in the customs terminal or customs warehouse. Whereas, the Tax Board shall supervise the fiscal marking of light fuel oil manufactured in Estonia.

The harmonisation process of other specific procedures will be gradually continued. The regulating requirements are partly in accordance to the EC Directive.

#### *2.1.3.4 Monitoring and Reporting*

The competent authorities in Estonia are the Customs Board and Tax Board. The Competent Authorities have to monitor the charging and collection of excise duties. According to the proposed Directive on taxation of energy products, Member States will have to inform the Commission of the levels of taxation which they apply.

The regulating requirements are partly in accordance to the EC Directive.

### 2.1.4 Large Combustion Plant Directive (and Proposed Revision) (88/609/EEC)

Currently Estonia has a number of legislative documents justifying the air pollution control measures, which are relevant to Directive 88/609/EEC:

**International Agreements:**

Bilateral Agreement between the Government of the Republic of Estonia and the Government of the Republic of Finland on co-operation on Air Protection from 2.07.93;

**Acts:**

Ambient Air Protection Act, 1998 (AAPA) from 22 April 1998;

Act on Pollution Charges (adopted by Parliament on 10.02.1999)

**Regulations of the Minister of Environment:**

No. 60 of 26 October 1998 on Emission Limit Values for Pollutants in Waste Gases from Large Combustion Plants;

No. 33 of 17 March 1999 concerning establishment of orders and methods of calculation of concentrations of pollutants from combustion plants to the ambient air;

No. 58 of 8 September 1998 on Methods for Determining Carbon Dioxide Emissions;

Draft regulation on establishment of limit values for oil shale fly ash;

**Regulations of the Government of Estonia:**

No. 228 of 7 October 1998 on Establishment of Pollution Charge Rates for 1999, 2000 and 2001;

Draft (prepared by MoE) on establishing the Programme on Decreasing Emissions from Large Combustion Plants will be elaborated in order to meet the requirements under the Directive on Large Combustion Plants (88/609/EEC). Expected time for submitting the programme to the Government is the 1st quarter of year 2000.

It would be important to link this Directive with the Environmental Impact Assessment Directive, since certain new plants or alterations to existing plants may be likely to have significant effects on the environment.

#### *2.1.4.1 Objectives/Substantive Requirements*

The Directive on the limitation of emissions of certain pollutants into the air from large combustion plants 88/609/EEC aims to address the principle causes of acid rain by limiting emissions of sulphur dioxide ($SO_2$), nitrogen oxides ($NO_x$) and dust. The Directive applies to all combustion plants with a rated thermal input equal to or greater than 50 MW.

There is no direct Estonian legislation concerning plants as covered by the scope of Directive 88/609/EEC. However, several acts and regulations cover conditions and requirements given in the above EU Directive. For example, large combustion plants fall

under the Ambient Air Protection Act (AAPA), which was adopted in April 1998 and has been in force since 1st of January 1999. The AAPA sets up a framework for a whole range of regulations, including legislation on large combustion plants and Act on Pollution Charges. Still, the AAPA does not provide for some specific measures required by Directive 88/609/EEC, like the requirement to establish ambient air quality action plans.

The legislative basis for the full transposition is given by the Regulation of the MoE No. 60 of 26 October 1998 on *Emission Limit Values for Pollutants in Waste Gases from Large Combustion Plants.* The regulation enters into force on 1. January 2000 for new combustion plants, which building or operating permit enters into force 1. January 1999 and for existing combustion plants on 1. January 2003.

In general Estonian legislation is in harmony with the EC Directive 88/609/EEC. There is no exactly matching legislation in Estonia, however, it has been drafted to meet the EU requirements for large combustion plants in the Directive. The drafting of national legislation has been co-ordinated with the implementing branch (i.e. the officials within the MoE that will be responsible for permitting).

#### *2.1.4.2 Institutional Requirements*

Concerning the regulations of the Minister of Environment (MoE) the responsible institutions for implementation and enforcement are the MoE, and county Governments. In some cases the Regional Environmental Departments (REDs) are also included. The AAPA does not provide for required by Directive 88/609/EEC competent authorities, particularly - the roles of competent authorities under the AAPA are not specifically set out, also the sampling and analysis requirements are not set out in legislation but rather in pollution permits.

#### *2.1.4.3 Procedural Requirements*

Legislation is adopted to control the operation of all large combustion plants (as defined in the Directive) through a permitting procedure, notably to set out emission limit values for $SO_2$, $NO_x$ and dust (Draft regulation on establishment of limit values for oil shale fly ash is in the phase of accomplishment), to require certain measurement methods and equipment and set out requirements on actions in the case of a failure of control devices, etc.

*Permitting practices:* The air emission permit, issued by the relevant environmental authority (normally the REDs), determines the allowable emission limit values. The permit serves as the basis for the calculation of the allowed air emissions. In case the stack height is over 100 m, the Air Division of the Ministry of Environment is required to issue the permit (currently 13 such permits for 8 enterprises have been issued, the total number of air emission permits is 752). Air emissions have to be measured or calculated quarterly - this serves as basis for the pollution charge tax. Approximately 50 pollutants are considered in taxation.

#### *2.1.4.4 Monitoring and Reporting*

Monitoring is not based on continuous measurements, but performed mostly by the plants themselves. This means that the requirement of the EC Directive for regular monitoring of emissions by the competent body is not yet reached, due to a lack of equipment for continuous monitoring and the specially trained employees. Estonian legislation should establish criteria for selecting locations for monitoring stations, and clearly set adequate sampling and analytical methods to be used at the monitoring locations for sulphur dioxide, lead and nitrogen oxide. The capacity of existing laboratories is insufficient to follow the accepted EU approach. A substantial amount of monitoring is still lacking, instead of monitoring calculations are used. This could not give the value of real emissions and should be changed in near future. Environmental Information Centre does an annual emission inventory of $SO_2$ and $NO_x$ emissions.

*Monitoring Practice:* Emissions from combustion plants and boiler houses with capacity over 50 $MW_{th}$ are measured once per quarter (performed mostly by the Laboratory of the State enterprise *Eesti Energia AS*). Currently measured parameters are $SO_2$; $NO_x$; CO; (there is also data available about $CO_2$), sometimes also HCl and HF. In case of smaller boiler houses the standard practice is to apply emission calculations. Only licensed experts can perform these estimates. Also, Environmental Protection Inspectorate has one mobile laboratory for supervisory purposes and it is shared with the Environmental Research Centre, who uses it for air permitting purposes. Laboratory is accredited by Deutsches Akkreditierungssystem Prüfwesen GmbH (DAP) in Germany and corresponds to the EU Standards.

Considering above mentioned it could be said the harmonisation is only partly reached. However, adoption of a number of regulations and decrees and, also awareness of EU Directive requirements has ensured rather good compliance concerning Estonian laws.

### 2.1.5 SAVE Directive (93/76/EEC)

#### *2.1.5.1 Objectives/Substantive Requirements*

Currently Estonia's measures to reduce $CO_2$ emissions by improving energy efficiency fall under the Energy Act. The act confers upon the Energy Market Inspectorate the authority to organise co-operation among energy traders for conservation of energy and the environment (State Gazette 1 1998, 71, 1201 para. 26 (2)). Further amendment of the Energy Act is planned and a responsible MoEA expert-group has currently accomplished a new programme - “Energy Conservation Programme” (draft of 24 May 1999), to be adopted to the end of 1999. The first programme was issued in 1992 and the targets set are achieved.

#### *2.1.5.2 Institutional Requirements*

**The Directive 93/76/EEC to limit carbon dioxide ($CO_2$) emissions by improving energy efficiency (SAVE)** aims to get Member States (or States in the process of accession, e.g. Estonia) to limit their emissions of $CO_2$.

The MoEA will determine institutions' roles (co-ordination of activities between the Ministries) for the implementation of the *Energy Conservation Programme*. In MoEA The Energy Conservation Division has been established to prepare the programme and co-ordinate the process for conservation of energy and the environment. The Energy Act and the Construction Act are in the process of amendment at present to cover the targets of Directive 93/76/EEC. MoEA will establish the institution for implementation of the *Energy Conservation Programme*. In general there is partial accordance to EC Directive.

#### *2.1.5.3 Procedural Requirements*

Estonia, through PHARE Programme assistance (also see Chapter 5), has taken the following steps to move toward the principles of Directive 93/76/EEC:

- energy certification of buildings:

  In the building sector the energy saving objectives were rather poorly achieved due to the fact that mainly renovation projects were implemented. The energy saving calculations prior to the investments were often based on poor data or they were overly optimistic: e.g. one or two years after the “renovation investments” the comparable energy savings were about 20 - 30 % which is a rather common result with these kinds of measures (Learning 1998).

  Due to poor data certification that include the description of the buildings energy characteristics (Learning 1998) could not be achieved. Harmonisation is therefore not reached in this point.

- billing of heating, air-conditioning and hot-water costs calculated on the basis of actual consumption:

  After the privatisation of apartment houses (planned year 2002), new owners (tenants) will install water metering equipment, and renovate the windows, blocs, roofs, etc. Building service centres perform calculations and compile bills of heating and hot water, which can be checked by consumer's protection authorities. Tenants then should be able to regulate their consumption. Harmonisation of this issue will therefore approximately been reached by 2002. However, the overall implementation may take much longer.

- third party financing for energy efficiency investments in the public sector:

  Regional development plans and the analysis of energy systems to measure the effectiveness of previous and planned investments is underway. However, there is no pro-

gramme concerning third party financing. Only NUTEK (Sweden) EAES Programme could be suggested here.

- thermal insulation of new buildings:

  Under the new draft of Energy Conservation Programme, an Estonian expert-group of MoEA suggest amendments to the Energy Act, the Construction Act and compile the necessary projects of sub-acts and decrees. These will contain standards set by the government. Harmonisation is therefore partly reached.

- regular inspection of boilers with an effective rated output of 15 kW or more:

  There are good examples of renovation and modified technique invested in boilers. Under the new draft of "Energy Conservation Programme" MoEA suggests amendments to the Energy Act in accordance to Directive 93/76/EEC article 6 . Harmonisation is partly reached.

- energy audits of undertakings with high energy consumption:

  MoEA will establish the institution for implementation of this programme. According to the Long Term Development Plan for the Estonian Fuel and Energy Sector (1998), programmes are planned and implemented with the objective of promoting regular energy audits in energy intensive industries and other fields with high energy demands in order to improve energy efficiency and restrain $CO_2$ emissions. Draft Programme is planned to implement the harmonisation process step by step in accordance to Directive 93/76/EEC.

#### *2.1.5.4 Monitoring and Reporting*

Methods for the calculation of $CO_2$ in Estonia were accomplished and approved in September 1998 and the appropriate taxation acts were issued in September and October 1998. An incremental $CO_2$ (or carbon) taxation will be in force starting from 1 January 2000 for enterprises which have equipment for energy production with a total capacity of over 50 MW. In practice, this means that the small boiler houses with an average capacity of 5 to 10 MW, like the wood chips based boilers, will not be charged with a carbon tax, at least during few next years. The new draft programme *Energy Conservation Programme* shall draw up and implement harmonisation process step by step in accordance to Directive 93/76/EEC articles 1 - 8.

Member States (and States in the process of accession e.g. Estonia) must report to the Commission every two years on the results of the measures taken to implement the programmes provided in accordance to Directive 93/76/EEC article 9.

In general it could be said that Estonia does not fully respond the requirements of this Directive and needs a transition period. The full implementation should be reached.

*Evaluation of the state of harmonisation*: With the implementation of the envisaged programme harmonisation with the according requirements of the EC Directive will be

reached. Harmonisation will further be achieved via amendments of the Energy Act, which will specify the procedural responsibilities of the ministries and public institutions in the energy sector. Currently local county governments and municipalities are developing energy efficiency programmes under supervisory of MoEA. The planned transposition could be expected to 2002 and full implementation to the end of 2002.

### 2.1.6 Directives on the Labelling of the Consumption of Energy (92/75/EEC)

Presently Estonia has no legislation to cover the labelling and standard product information about the consumption of energy and other resources by household appliances. However, based on the Energy Act, the Electrical Safety Act (entered into force on 1 May 1999) and the Directive (92/75/ EEC) drafting a new piece of legislation – an Act on Energy Efficiency of Equipment which is in the process by the MoEA at present.

#### *2.1.6.1 Objectives/Substantive Requirements*

**Directive on the Labelling of the Consumption of Energy (92/75/EEC)** aims to product labelling for the purposes of enabling the consumer with data on energy efficiency.

The new Act will provide consumers with information about product energy consumption and is to be available to the consumers to choose an energy efficient product by means of a fiche and a label. The draft Act has been worked out following the requirements of Directive (92/75/EEC).

The harmonisation of Estonian legislative acts for the above Directive is foreseen to be completed by 2002. The draft Act will be in the process of horizontal review after receiving from international expertise.

#### *2.1.6.2 Institutional Requirements*

On the basis of the Energy Act, the Technical Inspectorate of MoEA is responsible for the drafting of technical rules and standards (Energy Act; para. 25 (1) State Gazette 1 1998, 71, 1201). For testing according to EC Directive technical data of domestic and imported from third countries electrical equipment, several institutions have been established. One out of them is *Elektrikontrollikeskus AS.* It has all relevant laboratories available. This is in accordance with the requirements of EC Directive, also with the draft Act on Energy Efficiency of Equipment mentioned above.

#### *2.1.6.3 Procedural Requirements*

Under the draft Act on Energy Efficiency of Equipment the *Regulation of Information about Energy Consumption by Energy Equipment* is compiled at present. Procedural requirements for labelling activities and information in this draft Act would be in concordance with the Directive requirements. Harmonisation is partly reached.

#### *2.1.6.4 Monitoring and Reporting*

The Technical Inspectorate realises the surveillance of the regulation. The harmonisation process of other specific regulations (in so called 'Daughter Directives'), monitoring and reporting requirements will be gradually developed to the year 2002 according to appropriate EC Directive. The work aimed towards transposition and full implementation of the Directive requirements is under way at present.

### 2.1.7 Directives on Energy Efficiency Requirements for Household Appliances (96/57/EC and 92/42/EEC)

**The Directive 96/57/EC together with the Directive 92/42/EEC aim** at increasing the energy efficiency of household appliances.

Although, there is currently no legislative structure for harmonising Estonian law with the EC Directives on Energy Efficiency Requirements for Household Appliances (96/57/EC and 92/42/EEC), a working-group in the MoEA is currently drafting, based on those directives, an Act on *Energy Efficiency of Equipment*. It will cover the requirements of those two EC Directives.

#### *2.1.7.1 Objectives/Substantive Requirements*

An effective enforcement system is necessary to ensure that the Directive is implemented properly, guarantee fair conditions of competition for producers and protect consumer rights concerning the modules for the various phases of the conformity assessment procedures and the rules for the affixing and use of the CE conformity marking.

A horizontal review of mentioned draft Act in Estonian ministries takes place before the end of 1999. This draft Act is specified as a “framework act” allowing for further pieces of legislation. Harmonisation of Estonian legislative acts with these Directives is planned to be completed by 2002. Harmonisation is partly reached.

#### *2.1.7.2 Institutional Requirements*

According to the Directive 92/42/EEC requirements MoEA appoints a responsible authority for the verification of the boilers with the efficiency requirements set out in the Directive. This authority is responsible for the procedures laid out in the Directive (92/42/EEC), like, e.g. the granting of the CE label. A responsible authority will be appointed by 2000 by the MoEA. The harmonisation is foreseen to be completed to the year 2001. There is a fixed date for full implementation - 2002. Harmonisation is partly reached.

#### *2.1.7.3 Procedural Requirements*

According to the procedures outlined in the above Directives, the draft Act of “Energy Efficiency of Equipment” fulfils the requirements for household appliances. Planned

deadline of harmonisation is 2001. Boilers and refrigerators which comply with the harmonised standards for production and measurement and with the efficiency requirements of the Directive must bear the "CE" marking", which indicates that the product fulfils the requirements of the Directives. The declaration of conformity proves that the boiler type has been examined in accordance with a specific procedure. Harmonisation is partly reached.

#### *2.1.7.4 Monitoring and Reporting*

Monitoring and reporting is currently being planned. A list of the appointed bodies will than be notified to the Commission and to other Member States and be referred to as "notified bodies" (92/42/EEC Art. 8 Annex V). The Estonian authorities plan to fulfil this measure by 2001.

In general the approximation is not yet reached, however, the process is in active mode and transposition is foreseen to year 2001 and full implementation to year 2002**.** Harmonisation is partly reached.

### 2.1.8 Directive on Integrated Pollution Prevention and Control (96/61/EC)

**The EU Directive 96/61/EC (IPPC Directive) aims at integrated control of pollution** from certain major (large-scale) industrial and similar activities and imposes far-reaching obligations on industry and governmental authorities at all levels.

Industrial pollution control policy in Estonia was set forth in 1991 by the *Act on Pollution Charges* (new amended act was adopted in February, 1999) which outlines a system of pollution permits and pollution charges. Related to this act, the *Environmental Fund Act* was adopted in 1994. A new *Act on Ambient Air Protection* was adopted in May 1998. Also the new *Waste Act* was adopted recently (May, 1998). These two acts are the first significant steps on the way towards the IPPC Directive. A *Water Act* was passed in 1994 (amended in 1994). The *Act on Environmental Monitoring* was adopted in January 1999. The *Act on Approval of National Environmental Strategy* and *National Environmental Action Plan*, which were adopted in 1998, and are playing also an important role in implementing the IPPC system in the near future.

#### *2.1.8.1 Objectives/Substantive Requirements*

To prepare for the implementation of the IPPC Directive in Estonia, the *IPPC project* (*Project to Assist Estonia in Approximation to EU Laws Concerning Integrated Pollution Prevention and Control,* January 1998 - December 1999, which is carried out by Carl Bro International A/S and Estonian Ministry of Environment) was agreed between the Danish and the Estonian Ministries of Environment. The aim of the project is to draft the legislation needed to transpose the IPPC Directive and assist the competent authorities in issuing the permits and industries in filling in applications (experience is gained through pilot projects/companies).

When comparing the current Estonian environmental legislation to the IPPC legal requirements is that it does not comply with the Directive since the integrated approach of the permitting system is lacking and the BAT concept is not properly defined. However, the recently adopted legislation (the *Waste Act* and *Act on Ambient Air Protection* and regulations related to these acts) does contain provisions, which demand that measures taken to reduce pollution of one medium can not increase pollution of another medium, and introduces a definition of the Best Available Technique (BAT) principles for the first time.

The drafted *Act on Integrated Environmental Permits* (expected entry into force in March 2000) will transpose the IPPC provisions. Also procedural regulation (*Regulation of the Minister of the Environment on Specifying the Requirements to the Content of Integrated Permits and Applications for Permits*) is drafted and will be adopted in 2000. Guidelines on integrated permitting will be ready by the end of year 1999. BAT guideline documents have been identified for all the Estonian IPPC sectors. These will show the BAT as defined by different countries and organisations including EU. IPPC project has compiled the list of Estonian IPPC enterprises.

After the new legislation needed to transpose the IPPC Directive has entered into force (planned in 2000), all new large-scale activities (mentioned in the Annex 1 of the IPPC Directive) will have to apply for an integrated permit. Existing installations will have to apply for an integrated permit if they have substantial changes or when they, according to the date mentioned in a governmental regulation (*The Regulation Listing the Industrial Activities Subject to Integrated Permits and Call-in Dates,* which is already drafted), are obliged to apply for an integrated permit. It is planned that all IPPC enterprises in Estonia will get integrated permits by the year 2007.

The objectives are in accordance with the IPPC Directive.

#### *2.1.8.2 Institutional Requirements*

The main competent authorities for issuing permits and ensuring enforcement in Estonia are: Estonian Ministry of Environment (MoE), Regional Environmental Departments (REDs), The Environmental Protection Inspectorate.

These institutions will have the key role in implementation of integrated permitting, enforcement and control and as they already deal with these activities, it is planned to have the same organisations responsible for these tasks. In addition, industry unit/office will be appointed in the Ministry of Environment.

*IPPC Committee:* To ensure high quality and nation wide consistency this committee, which will be located in the MoE, is planned. The committee will approve draft permits worked out by the competent authority (RED). The committee should consist of the IPPC experts and experts from the air, water, and waste departments of the MoE.

*Industry unit/office:* This unit in the MoE is planned to establish to offer expert assistance for issuing permits in the areas with heavy industry.

Full accordance with the IPPC Directive will be aimed and the implementation is foreseen the year 2007.

#### *2.1.8.3 Procedural Requirements*

There are three main types of environmental permits issued in Estonia: Solid Waste Permits, Water Permits, and Air Pollution Permits. Since the permitting regime is not based on BAT standards and also not on multi-media approach the IPPC Directive is not fully harmonised.

The approach to emission standards has been based on ambient quality criteria and not on the BAT principle. For instance, air emission limits are estimated for each polluting source (by individual pollutants), depending on the ambient pollution level. There is no limit to the emissions per unit of process or product - an approach, which would push for BAT or cleaner technology. The draft *Act on Integrated Environmental Permits* will set up the procedures for integrated permitting, control, enforcement, BAT, public access, obligations of the operator, etc., required by the IPPC Directive.

The current Estonian pollution control system has no tradition in offering information about applications and permits to the public. However, this is expected to change as recently adopted *Act on Ambient Air Protection Act* and *Act on Waste* allow public access. Also the draft *Act on Integrated Environmental Permits* is in concordance with the draft "Arhus Convention".

#### *2.1.8.4 Monitoring and Reporting*

Current Estonian environmental legislation does not require sufficient emission monitoring. Also control and monitoring of resource usage, treatment/abatement facilities and especially process equipment is not required sufficiently. However, recently adopted regulation on application and issuing of the air permit requires operators to carry out some self-monitoring and emission monitoring programmes. In practice permits do not specify monitoring requirements or concentration levels of pollutants in the emissions, except for the effluent of wastewater treatment plants where concentrations are indicated.

*Act on Environmental Monitoring* and *Act on Environmental Supervision* (November, 1997) provide a legal basis for enforcement and control of industry enterprises.

Currently there is no information flow about the permits issued, information on BAT and no countrywide register on permits issued, BAT-notes, etc. in Estonia. Also there is not established responsible authority or organisation, which could organise an exchange and sharing of such information with industry as well as other Member States and the Commission. The Environmental Information Centre (EIC) is gathering, processing and dis-

seminating all information about the environmental situation in Estonia. Therefore it is planned that EIC will be the centre (industry register/database) collecting all the information which is needed to ensure that all enterprises, subject the IPPC permits, are registered. EIC is planned also for keeping a record of the permits issued and the inspections performed.

In conclusion it could be said that there is still a certain gap to be overcome in the implementation of the directive. Planned year of full implementation is foreseen to2007.

## 2.2 Decisions and Programmes

### 2.2.1 R&D Programmes: Energy Framework Programme (1998 - 2002)

In the main document fixing the principles of Estonian energy policy – *The Long Term Development Plan for the Fuel and Energy Sector* (hereinafter called "Long Term Plan"; for more details see chapter 5) the need for comprehensive research and development in energy sector is pointed out. The issues of following fields are considered of high priority for Estonia:

Oil shale power engineering, oil shale industry and oil shale chemistry. In Estonia the unique in the whole world oil shale power engineering has been developed. The further development of this field is of strategic importance for Estonia;

Enhanced analysis and reduction of the environmental impact from energy sector;

Technical and economic analysis and implementation of financial management methods in the energy sector;

Market regulation of the energy sector and international co-operation between power systems;

Participation of Estonian specialists in international co-operation projects and research programmes under the control and support of the Government.

A part of financing for the research and development work comes from state budget, in part the funding comes from the Estonian Innovation Foundation. The Government co-ordinates and supports participation of the Estonian specialists and organisations in international co-operation programmes (PHARE, Inco-Copernicus, THERMIE, etc.).

Estonia has been co-operating with some energy-related EU programmes (like THERMIE and FEMOPET) for many years already. In the framework of THERMIE programme there was established *EC Energy Centre Tallinn* already in 1991.

After the rearrangement of OPET Network the new centre *FEMOPET-Estonia* was established in Estonia. *FEMOPET-Estonia* is a project supported by the European Commission focused on the promotion of efficient and environmentally clean energy technologies and application of the know-how for the assessment of specific energy technology needs available in Estonia and Europe by providing information about the possible

technology suppliers. The main task of FEMOPET system is to help the key stakeholders – industry, public sector and NGOs – to take up the technologies supported by JOULE-THERMIE and to assist them to become more involved in EC programmes.

Estonia has established contacts with institutions and programmes of EU for improving information dissemination and encouraging the efficient use of renewable energy. In Estonia the interest towards the ALTENER programme is great, as it will help to develop and promote the wider use of renewable energy sources. Estonia has participated in ALTENER seminars and information dissemination events. Up to now Estonia has not participated in the SAVE programme. The CARNOT programme has been devised in order to promote European technology relating to the clean and efficient use of solid fuels. This is an issue of major importance for Estonia also, as 98 % of electricity production in Estonia is based on use of solid fuel – Estonian indigenous oil shale and the combustion of oil shale in power plants causes complicated environmental problems.

Estonia is interested in participation in the EU programmes as the co-operation could play an important role in promotion of sustainable development of energy sector in Estonia. The participation will not need any modification in legal acts of the Republic of Estonia neither the enforcement of any new legislation or establishing new institutional structures. The main reasons for not taking part in programmes like SAVE, have been mainly of economical character. Due to urgent economical needs during the transition process in Estonia the authorities have considered not possible to allocate relevant financing from state budget for the annual contribution to the general budget of the EC to cover the costs of participation in these programmes.

### 2.2.2 Coal Subsidies

The items of *acquis communautaire* on coal are considered to be not relevant to Estonia as there are no natural reserves of coal in Estonia, therefore there are neither coal mines nor a coal industry in Estonia. The share of coal (together with coke, both only imported) is less than 1 % of the total primary energy supply in Estonia. This indicates clearly the minor importance of coal in Estonia.

The key issue that has been proposed to be treated under the item for solid fuels in Estonia is the oil shale. The oil shale is a low-grade indigenous solid fuel mined in Estonia since 1920. Estonia is the only country among the current EU Member States and applicant countries with the oil shale resources. The mined oil shale is used mainly in power plants (99 % of Estonia's electricity generation is based on oil shale firing), for producing of shale oil (similar to HFO liquid fuel) and to minor extent in cement industry.

Up to today no state aid has been given to oil shale industry but all problems related to restructuring of oil shale industry and oil shale-based power industry are very acute and of major importance for Estonia.

## 2.3 Environmental Agreements

Supplementing the regulatory measures of the EU *acquis* with some other policy instruments was one of the key objectives set out in the Fifth Environmental Action Programme. The promotion of environmental agreements with industry is one effort to broaden the range of policy instruments. Environmental agreements can bring about effective measures in advance of legislation and thus reduce the volume of regulatory and administrative actions.

In this context it is important to take into account that in Estonia there are no manufacturers of television or video equipment, neither washing machines nor dishwashers. However, to some extent relevant example can be given from Estonian industry assembling personal computers. Assembly parts are imported from different countries, including non-EU members. The aspects of energy efficiency (low energy consumption, stand-by regimes, etc.) are usually considered quite important to attract consumers. Still, there are no agreements made on environmental / efficiency improvement.

The environmental agreements, as voluntary initiatives, have not yet been practised in Estonia. In the case that voluntary commitments of this type can be treated in a wider scope (as for instance in COM(96) 561 final), i.e. not only in relation to household appliances, there may be some cases in Estonia, where some enterprises have committed to reduce pollution, to increase energy efficiency, etc. At present there is no overview available of this types of initiatives in Estonia.

## 2.4 General Policies and Strategies for the Future

In Estonia the general energy policy and strategy for development of the energy sector are fixed in the following documents:

- Sustainable Development Act;
- The Long-term Development Plan for the Fuel and Energy Sector (Long Term Plan);
- The Energy Act;
- The Environmental Strategy.

*Sustainable Development Act* (enforced on 1 April 1995) sets the general framework for sustainable development and has formed a firm basis for elaboration of legislation for the energy sector.

The Long Term Plan is a document that has been discussed and approved by the Parliament (Riigikogu) as a national level development plan for the energy sector. There are set targets for development of the fuel and energy sector to the year 2005 and given principal development trends till 2018. The target programme of high priority *Planning of the future scenarios for oil shale based energy sector* is foreseen in this plan. Also, the another target programme *The Euro-integration of Estonian Energy Sector* has been

foreseen for smooth work in the field of harmonisation of EU requirements. New updated version of the Long Term Plan will be elaborated in near future.

The *Energy Act* (enforced on 01.01.1998) regulates fuel and energy market and state supervision over fuel and energy supply. In the Act several principles are reflected, which were new for the Estonian energy sector:

- Obligatory differentiation (at least separate accounting) of the fields of activities;
- Third party access to energy networks;
- Banning of cross subsidisation of different activities;
- Transparency requirement to pricing and accounting;

Introduction of the regulation system and improvement of the supervision system.

Since the enforcement of the Energy Act in 1998 there have been issued several acts of secondary legislation based on the *Energy Act.*

Important aspects to the energy policy are added by the *National Environmental Strategy* (NES) for Estonia, which was approved by the Parliament in the beginning of 1997. It specifies the trends and priority goals of environmental management and protection in a new political and economic situation. The NES has set out ten priority goals for environmental policy and identified short, medium and long-term objectives to be achieved by 2000, 2005 and 2010 respectively.

For implementing the Strategy, a detailed *National Environmental Action Plan* (NEAP) was developed between April 1997 and April 1998. The NES proceeds from the main traditional goal of environmental protection which is to provide people with a healthy environment and natural resources necessary to promote economic development without causing significant damage to nature, to preserve diversity of landscapes and biodiversity while taking into account the level of economic development.

### 2.4.1 Combined Heat and Power (Co-generation)

District heating (DH) systems supply an essential part of the total heat production in Estonia. Heat is primarily supplied for residential heating in urban areas, but also (as hot water and steam) for process needs in industry. There are some large combined heat and power plants in Narva, Kohtla-Järve, Ahtme (all in an industrial region of the oil shale mining area) and in Tallinn. There are some industrial CHP plants in the pulp and paper industry and in the peat extraction industry. The biggest non-oil shale fired CHP plant is Iru EJ in Tallinn, which is a power plant supplying district heat for large district of Tallinn. Installed capacity of Iru EJ is 825 $MW_{th}$ and 190 $MW_{el}$, natural gas and/or HFO are used. The rest of Estonia's heating demand is met by a couple of thousands of boiler-houses with more than five thousand (heat only) boilers installed. In approximately 80 % of the public dwelling stock the heat is supplied by DH systems.

In 1998 in Estonia 13 % of total electricity production was generated in co-generation mode.

In the Long Term Plan it is projected that the existing district heating networks in Estonia would allow a step-by-step implementation of the efficient electricity and heat co-generation by reconstructing the aged boiler plants with the unit capacity from about half a MW (gas engines) to some tens of MW (gas turbines).

During 1998 and 1999 four small scale gas firing CHP plants with the total capacity of 7 $MW_e$ have been commissioned.

In harmony with the EU strategy to promote combined heat and power and to dismantle barriers to its development, the PHARE Multi-country Energy Programme funded the project *Promotion of Small-scale Co-generation Solutions (SSCS) in CEECs*. This project covered 10 Central and East European Countries, including Estonia and was carried out with the support of local consultants from September 1998 till November 1999. During the project the information about SSCS was disseminated to promote the awareness. As a result of situation analysis the main obstacles against wider introduction of co-generation were identified. For Estonia among main obstacles the following factors were mentioned:

- low electricity prices;
- non-completed restructuring (especially unbundling) of energy sector;
- lack of support by state;
- lack of relevant legislation;
- poorly developed third party financing (ESCO) schemes;
- lack of soft-loan facilities.

Some recommendations for overcoming the obstacles were proposed.

Up to now in Estonia there have been taken no measures to give any support to CHP. In Estonian legislation there is no direct reference to co-generation at all.

### 2.4.2 Renewable Energy Sources

Estonian renewable energy sources include biomass, hydro, wind and solar power.

The biggest of renewable energy resources in Estonia is the biomass. Approximately 44 % of Estonian territory is covered with forests. The total volume of the growing wood stock is approximately 300 million $m^3$ with the annual increase of 9 – 12 million $m^3$. The annual cut has been 5.5 million $m^3$ and it is planned to raise it up to 7 – 8 million $m^3$. In 1997 the consumption of wood fuel gave a share of total primary energy supply (TPES) of 7.2 % (16.7 PJ) and wood chips together with wood waste constituted 3.3 % (7.8 PJ). The annual biogas production is a minor one - 58 TJ in 1997. Up to present the

only energy use of waste is in the form of landfill gas, which is collected on Tallinn refuse dump and used in near-by boiler plants.

The use of wind energy can solve some problems with electricity supply of remote areas (e.g. small islands) in Estonia. On approximately 1 - 2 % of Estonian territory the annual average wind speed is higher than 6 m/s and on 15 % of territory between 5 - 6 m/s. In medium-term the technically highest capacity has been estimated as 50 MW, which could enable the annual production of 70 - 100 GWh (2.5 - 3.6 PJ).

The average actinometrical resource in Estonia is estimated at approx. 1000 kWh/m² which restricts the wider use of active solar energy. The possibilities for passive use of solar energy are usually considered in design and construction process of buildings.

The potential of hydro energy in Estonia is quite insignificant. The flatness of the territory of Estonia does not enable to use the energy of hundreds of rivers. At present there are some mini hydropower plants with total capacity of approximately 1 MW. In 1997 the total production of hydro electricity was 3 GWh. There are plans in near future to renovate several of old mini hydro plants with the total capacity of approx. 4 MW.

In 1997, according to official statistics the total share of renewable energy sources in primary energy supply in Estonia was 10.5 %.

As regards renewables, the main energy policy document – the Long Term Plan sets a goal (one out of 10) to promote wider use of renewables with applying tax allowances both for the respective investments and energy production based on those investments. It also sets a target to increase the share of renewables and peat in the primary energy supply by 2/3 to the year 2010 against 1996.

In the Long Term Plan it was also stated that the Government together with the Ministry of Economic Affairs would start and finance four target programmes for carrying out the development plan. The planned programmes include a particular one as regards to renewables - *Economically sound implementation of peat, biofuels and other renewables in energy production*. A special committee of experts was established by an order of Minister of Economic Affairs in June 1998 to elaborate a plan of measures for stimulating and subsidising the implementation of wind power and hydropower. The committee completed the task in the end of March 1999. No concrete measures have been taken yet.

### 2.4.3 Energy Efficiency

The general framework for improving energy efficiency has been created with the *Sustainable Development Act* (see Chapter 5).

In passing Energy Act it has been also considered with the views of EU energy policy.

The main ideas and planned in future measures for improving the energy efficiency are fixed in the Long Term Plan. The Plan states that taking into account the essential share of energy costs in the gross domestic product and low efficiency of energy production,

distribution and use, implementation of energy saving measures must become more efficient and targeted.

In the plan, it is considered that as a result of market regulation, almost half of the expected energy conservation can be obtained. In order to reach the maximum energy conservation level, the Government must implement active and planned stimulating energy saving policy, which requires financial allocations to be carried out. Greater and greater efforts are necessary for reaching any further level of energy conservation since the payback period of investments made in energy conservation becomes more extensive.

The formulated in the Long Term Plan goals of the national energy conservation policy can be described as follows:

- Introduction of a modern energy efficient technology;
- Reduction of the excessive energy consumption, first of all with better organisation of the work;

Changing the consumers' behaviour.

In order to reach the goals it is considered necessary:

- To make continuous efforts in finding the potentials and priorities for energy saving in order to improve the awareness of all the consumers and economic branches;
- To influence the decisions made on energy projects (regulation, taxes, tariffs, subsidies) towards more efficient energy use via the energy price reflecting all the cost elements;
- To enforce legal acts for providing more effective energy use;
- To promote the development work and training in energy saving;
- To create conditions for the better performance of the energy market;
- To carry out detailed targeting of different end-user sectors (household consumers, industry, agriculture, transport, service, etc.);
- To provide support to energy saving measures and projects from the budgetary allocations according to the Public Energy Conservation Programme;
- To monitor energy saving activities, analyse the results and based on this to develop further the energy conservation policy.

The energy conservation potential in Estonia is quite substantial in all fields of energy chain – in generation, distribution and in consumption as well.

In the heating sector energy saving measures are planned to be improved at the end users and for energy distribution. Reconstruction of energy production capacities anticipates reduced consumption resulting from the implementation of saving measures in the future. Regional development plans and the analysis of energy systems is taken for the basis to provide the effectiveness of earlier and planned investments.

Investments must be made for energy saving while constantly growing expenditures are required for obtaining additional energy conservation. With widening of economic potentials, investments with continuously more extensive pay-back period, but in the measures allowing higher energy saving yield are planned. Considering the economic situation and investment possibilities in the near future, the present energy saving potential is estimated about 30 %.

To start moving towards the goals set by the Long Term Plan several activities have been carried out to support higher energy efficiency:

- Introduction of higher norms for thermal insulation of buildings;
- Introduction of heat metering in dwelling houses and in apartments;
- Energy audits in industry and residential sector.

Since 1993 some funds from the state budget have been allocated annually for energy efficiency and conservation purposes, mainly for relevant projects in the public sector. Ministry of Economic Affairs has managed these annual energy conservation programs. Both the absolute and relative values of financing this program from state budget have decreased essentially – from EEK 19.0 million (EUR 1.2 million) in 1995 (0.22 % of the total volume of state budget) to EEK 1.7 million (EUR 0.11 million) in 1999 (0.009 %). Hence, several other sources have been used for investments in energy conservation, e.g. some other articles from the state budget and also quite numerous programmes of foreign aid.

As part of the *Energy Conservation Campaign* carried out in 1995, an *Energy Awareness Office* was established. The objective of the office was to disseminate information about energy efficiency measures to different target groups. However, due to a lack of resources, the office was merged with the Ministry of Economic Affairs in 1997.

PHARE national programme has given important assistance to the energy sector of Estonia. A project *Regional Energy Centres* (March 1996 - October 1999) assisted in establishing three regional energy centres in Estonia to assist municipalities, but also local energy utilities in energy development issues, e.g. planning energy conservation measures, preparation of energy plans and feasibility studies, etc.

Many counties and municipalities have started to prepare regional development plans for the local energy sector. In this process essential financial support (361 thousand EUR) to municipalities is given by PHARE project Investment Preparation Facility, regional Development and Energy Planning, which was started in April 1998 and was completed in October 1999. Due to high interest by municipalities, the project was given additional financing by PHARE up to March 2000.

At present there are no special legislation in force in Estonia regarding energy efficiency or equipment labelling. Although, Directives concerning energy efficiency (all together 10) will be harmonised with the new Equipment Efficiency Act on electric appliances and effective utilisation of energy resources. The target date for passing this act is 1 May

2000. The elaboration of the new national energy conservation programme was started in the beginning of 1999. The *Energy Conservation Target Programme* is planned for proposing concrete measures to ensure the achieving relevant objectives set by the Long Term Plan. The general targets of the program include:

- to increase competitiveness of Estonian products and services at international markets;
- to assist the economical development (through support of increasing GDP);
- to increase security of supply supporting optimal prices for consumers of fuel and energy;
- to optimise the environmental impacts of fuel and energy sector;
- to co-ordinate the development of energy sector with the regional policy.

The draft of the Programme together with the preliminary Action Plan was presented to the Government in October 1999.

## 2.5 Planned and Proposed Activities

### 2.5.1 Integrated Resource Planning Directive

The question of potential practice of Demand Side Management (DSM) in Estonia is quite complicated. In almost all energy sectors in Estonia there are over-capacities on the production side (electricity, district heating (DH)) and also in main (transmission) and in some cases also in distribution pipelines of natural gas.

Therefore the DSM (and integrated resource planning, etc.) has been almost unknown or at least not used by energy companies. These type of measures are known for energy consultants and proposed for introduction in the process of energy audits, as well as in development plans for local governments in cases this is relevant.

Up to now there have been created no economic incentives for making investments in energy efficiency in Estonia. Neither demand side management plans for low-income energy users have been drawn up.

Estonia is among few countries where there is no Energy Agency or any other institution carrying out relevant functions. In Estonia, all aspects of energy policy and strategy are concentrated into Energy Department of Ministry of Economic Affairs. The only other institutions working in this area are Energy Market Inspectorate and Technical Inspectorate.

*Monitoring and Reporting Requirements:* In Estonia it is too early to identify requirements for monitoring and reporting, as the principles of the system itself have not yet been discussed.

### 2.5.2 Feed-In Directive (Renewables)

In Estonia active discussions on different possibilities of feed-in tariffs to promote the use of renewable energy sources for electricity generation have taken place for a couple of years already. Only a half a year after enforcement (on 1 January 1998) of the new Energy Act in Estonia the amendment on feed-in tariffs had been prepared and was passed by the Parliament in June 1998 and enforced on 10 July 1998.

The amended article (in § 28[1]) provides obligation for an electricity trader to purchase alternatively produced electric power as follows:

An energy trader dominating the market is required to purchase electric power from traders connected to its network and who produce such power from water, wind or solar energy, biomass, waste gases or waste material.

An energy trader obligated under in subsection 1 of this section shall purchase alternatively produced electric power at a price which constitutes 90 % of the basic rate for residential customers provided that the sales volume of alternatively produced energy in the Republic of Estonia does not exceed 2 % of the amount of electric power utilised in Estonia during the previous year. If the sales volume of alternatively produced electric power exceeds 2 % of the electric power utilised in Estonia during the previous year, the Estonian Energy Market Inspectorate shall confirm a set sales price for the network operator of between 60 - 90 % of the basic rate for residential customers.

More indirect support to renewable electricity had been introduced even earlier – already in January 1997 an amendment to the Act on VAT was approved by the Parliament. In this amendment there has been introduced the tax allowance for electricity generated by hydro and wind turbines – the rate of 0 % is levied up to the end of 2006. However, in practice the effect is tends to be a small one as VAT is rebateable for almost all companies.

In the Long Term Plan it is foreseen considering the security of supply and the employment perspective, differentiated excise rates to the fuels and generated energy will be imposed according to the EU principles, which will provide competitiveness of indigenous fuels and create favourable conditions for the use of renewables and peat at the economically beneficial level.

A wider introduction of renewables in Estonia should be supported by relevant amendments in legislation:

- Biofuel purchases of heat producers should not be subject to the Act of government procurements.
- Heat produced with biofuels should remain exempt of VAT.

## 2.6 Conclusions

To harmonise Estonian legislation into EU legislative acts of energy and with the three main treaties (agreements), in 1997 a commission was formed, 18 specialists participate from different Estonian energy companies, experts from Estonian Energy Research Institute and representatives from Ministry of Economic Affairs. There are all together 42 elemental legal acts, which are the basis to harmonise Estonian energy related legislation. Eleven of them are regulations, whose applicability will take in place automatically and there are no special legal acts needed for further harmonisation. There are 31 directives where Estonian legislation still needs to be harmonised.

The Estonian Energy Act still needs to be further amended for full alignment with Electricity and Gas Directives, in particular in relation to third party access to networks, procedures for building new capacities and the definition of the role of the regulator in the future internal market. The government has adopted the regulation establishing the procedures to issue, extend and revoke licences in energy sector (see the *1999 Regular Report from the Commission on Estonia's Progress towards Accession*!). Further efforts are needed to prepare participation in the internal energy market (electricity and Gas Directives) including the adjustment of monopolies, access to networks, energy pricing (prices have increased, but still do not cover production costs!), and the further development towards an appropriate mechanism for regulation, and improvement of energy efficiency.

The further oil shale viability plan (Target Programme) is urgently needed, particularly in connection of privatisation of power production part of the energy sector. The same is valid for the gas market, where state has sold its shareholding in monopolistic gas company to small shareholders and legal persons. Much more transparent approach to privatisation of the sector could be pointed out. Urgent need for public information and fixed rules could be pointed out, otherwise it would be even hard to evaluate whether or not the processes are in line with the EU rules and the internal energy market *acquis*.

In December 1998 Estonia signed the Kyoto Protocol, which will put certain obligations mostly on energy sector, as oil shale is the major actor of GHG emissions. Energy efficiency has actually rather big potential, up to 30 %, in overall reduction of emissions. No legislation is in force at present regarding energy efficiency and labelling requirements. Estonia does not participate in the SAVE or THERMIE programs. However, participation could play an important activating role in improvement of energy efficiency and also to promote renewable energy.

As for the large combustion plants directive all the needed requirements have been transposed. The same could be said as for the IPPC directive.

The administrative structures in the ministries still remain weak and there is an obvious need for strengthening.

# 3 Patterns of Regulation and Implementation

The formal transposition of EU legislation and the mere existence of laws, policy plans and regulations do not automatically guarantee environmental success. Not only the transposition of the legislative framework, but also its practical application (implementation) and enforcement have been defined as key elements of the approximation process (European Commission 1997).

The following analysis tries to assess the effectiveness and innovativeness of existing environmental policies in the energy sector of Estonia the focus being on the electricity and district heating sector. The effectiveness of environmental policies and policy instruments cannot be analysed adequately, however, without taking into account the entire process of public decision-making. Such an effort requires rather a holistic perspective which reflects the complexity of policy formulation and implementation.

The analysis contains two major parts: a more *descriptive* one comprising the first four sub-sections which focus on the policy arena, the key actors, major policies, policy instruments and environmental expenditure. Sub-section 3.4 is more *analytical*: it will examine environmental policies in the energy sector by employing the concept of regulatory patterns. Policy instrumentation, policy styles and actor configurations are key variables under investigation. The major target is to investigate systematically policy variables which are crucial for the success of environmental policies and thus to identify institutional shortcomings with regard to the formulation and implementation of environmentally oriented policies. Due to its dominant position, the Estonian oil shale based electricity sector deserves special attention. Sub-section 3.6 refers to crucial socio- and macroeconomic constraints and the concluding section formulates points of action for further institutional capacity-building.

The study is mainly based on primary and secondary sources as well as on the findings of a series of non-standardised interviews with responsible officials from the Estonian energy and environmental sectors. These interviews had been conducted during a research internship at the Tallinn branch of the *Stockholm Environment Institute* (SEI) between August 18 and 27, 1999.[2]

## 3.1 Profile of the Oil Shale Mining and Electricity Sector in Estonia

Estonia stands out from the three Baltic countries with considerable deposits of domestic fossil fuel: oil shale. The main characteristics of oil shale are its low calorific value (2.100 kcal/kg), a high sulphur (ca. 2 %), high ash (up to 80 %) and heavy metal (Hg, Cd) content. The high content of mineral carbon distinguishes oil shale from other fossil fuels and

[2] I am very grateful to Mr. Tiit Kallaste and Mr. Markko Raul-Esop from the SEI-Tallinn both for providing me with this possibility and for their remarks.

increases its carbon emission factor from tC 22 to 29/TJ which is even slightly higher than that of peat.

Oil shale is mined in six underground and three open-cast mines which are located in North East Estonia in the county of *Ida-Viru* near the city of *Narva*. Active deposits are estimated at 1.4 billion tons. Given actual consumption, this would last for at least forty years. Oil shale mining operations are mostly obsolete and labour-intensive.

At present, oil shale represents 62 % of the primary energy balance. Estonia is the only country in the world with an electricity generation system relying almost exclusively on oil shale. 99 % of electricity generation and 25 % of heat production are based on oil shale combustion. In 1998, 84.6 % of the mined oil shale were used for electricity generation. Electricity production is heavily dominated by two big thermal power plants, *Eesti* and *Balti,* directly located in the mining area.

The two power plants have a total installed electric capacity of approx. 3.000 MW which makes for 92 % of the domestic electricity generating capacity. The electricity generation infrastructure is heavily oversized. The electricity sectors of the Baltic countries had been integrated into the *North West Unified Power System* of the USSR and the Estonian oil shale power plants were designed to supply the region with base load and off-peak electricity. The Baltic countries have a connected high voltage transmission network with a joint dispatch centre DC Baltija in Riga. In Soviet times approximately 50 % of electricity was exported to Russia and Latvia. Power generation is based on the pulverised combustion technology.

Oil shale mining, retorting and combustion are heavily polluting industrial operations. The two oil shale fired power plants range among the ten most polluting stationary sources in Europe. They are responsible for 70 % of domestic $SO_2$, 40 % of $NO_x$ and 50 % of particle emissions. The two plants are a major source of trans-boundary air pollution. A very serious problem are the high $CO_2$ emissions which are partly a result of the decomposition of the mineral carbonate in the combustion process.

Pilot projects supported by Finland with flue gas de-sulphurisation units turned out to face technical difficulties. To add such expensive end-of-pipe technologies to the equipment is rather problematic from an economical point of view. Modern and efficient combustion technologies such as the pressurised fluidised bed combustion technology (PFBC) with reduction of $SO_2$ by 10 to 18 times and $NO_x$ emissions by 2 times and highly reduced $CO_2$ emissions are considered the superior solution both from an economical and environmental point of view.

In addition, a pronounced energy conservation policy oriented to reduce the significant energy intensities, a transition to a more diversified and balanced fuel mix, a shift to less polluting fossil fuels, and an increased use of renewable energy sources should gain policy priority from an environmental and climate protection point of view. These issues are addressed by the most important policy documents (section 3.3 and 3.4).

## 3.2 Institutional Framework in the Field of Energy and Environment

### 3.2.1 Government Constellations since 1991

Since regaining independence in 1991, the Estonian spectre of parties showed a more or less uninterrupted dominance of reform-oriented, economic right wing and liberally oriented parties. Even between 1992 and 1995 when economically left leaning parties could increase their influence in the Parliament and a kind of middle-of-the road coalition consisting of the *Coalition Party, Rural Union* and the *Centre Party* came to power, the Prime Minister Tiit Vähi, head of the *Coalition Party*, turned out to be a proven reformer and the economic outlook and reform orientation remained more or less the same. The parliamentary elections in March 1999 led to a revival of the 1990 - 1992 coalition under Prime Minister Maart Laar (*Pro Patria Union*) whose government after regaining independence introduced "shock therapy" policies and implemented radical market reforms. The present three party coalition encompasses the *Reform Party*, the *Pro Patria Union*, and the *Moderate Party*. The left of centre wing of the political spectrum is rather sparse in Estonia.

### 3.2.2 Core Actors and Institutional Setting in the Field of Energy and Environment

Concerning the Estonian *energy sector* the main executive body is the *Ministry of Economic Affairs* (MoEA) with its *Energy Department*. Since 1990 the ministerial apparatus underwent several reorganisations the most recent having been completed in February 1999. The newly formed Energy Department has four divisions: Strategy Division, Efficiency Division, Division for Integration, and State Reserve Division. In 1998 the *Estonian Energy Research Institute*, formerly an institute of the *Estonian Academy of Science*s, has been incorporated into the MoEA and serves as a structural sub-unit. The institute serves as the Estonian FEMOPET office which started several years ago under the PHARE/OPET project. Funding through the Ministry, however, is rather weak. The *Deputy Secretary General* is co-ordinating the work of the *Energy Department* and the *Industry Department* within the MoEA.

In 1998 a new administrative body has been established by governmental decree: the *Energy Market Inspectorate* (EMI) which mainly performs regulatory functions such as licensing, approval of energy tariffs and the elaboration of tariff calculation methodologies. The EMI replaced the former State Price Commission, is organised as a governmental agency and reports to the MoEA. It is financed through the budget of the Ministry. The status of independence must be considered as weak, compared to other similar regulatory bodies in the CEE region (e.g. Lithuania). The *Estonian Privatisation Agency* is responsible for the privatisation of the energy sector.

With the support of the EU PHARE Programme, three *Regional Energy Centres* had been established in 1996 which assist and train local municipalities, utilities and consultants in all energy issues including energy planning, implementation of energy efficiency

measures, preparation of projects etc. The centres shall be privatised after financial support from PHARE will have run out.[3]

Oil shale mining is completely in the hands of the 100 % state owned joint stock company *Eesti Põlevkivi*. The electricity sector is dominated by the vertically integrated, 100 % state owned joint stock company *Eesti Energia AS. Eesti Energia* owns the major power plants including the oil shale based *Eesti* and *Balti* power plants, further the transmission network and five from seven regional distribution networks. In 1998 the *Eesti* and *Balti* power plants were merged into one structural sub-unit of *Eesti Energia AS*: the *Narva Power Plants*. In 1998 two smaller distribution networks formerly belonging to *Eesti Energia AS* were transformed into independent subsidiaries and in the following fully privatised. 100 % of the shares of *Läänemaa Power Network* were sold to *Fortum*, the *Narva Power Network* was sold to *Startekor Investments Ltd*. The market share of independent power producers in the electricity sector is still negligible. Figure 1 gives an overview of the current organisational structure of the electricity supply industry in Estonia.

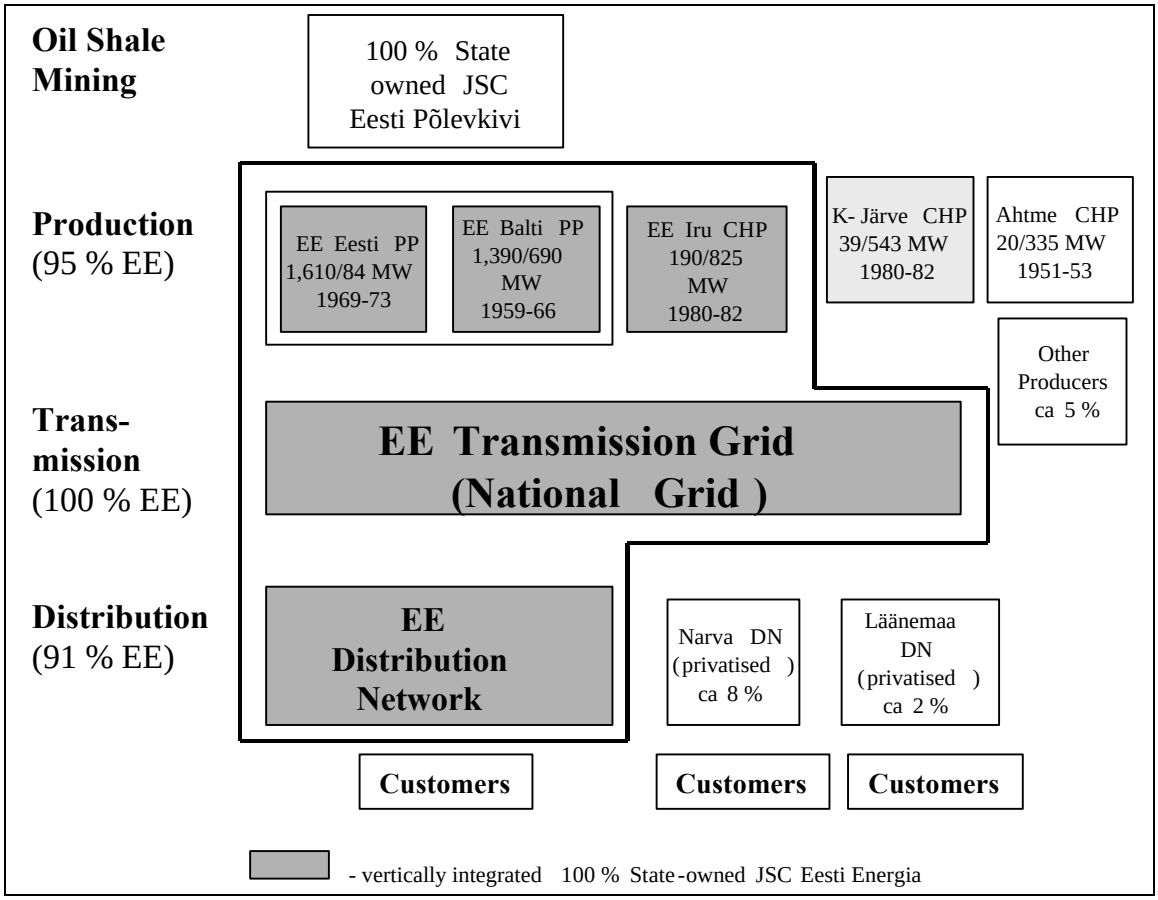
*NRG Energy Ltd*. which is a wholly-owned subsidiary of *Northern States Power Company*, Minneapolis must be considered as an influential actor in the policy arena. The utility is interested in obtaining shares in *Eesti Energia AS*. Since 1996, the Estonian Government is exclusively negotiating with this company on the terms of privatisation and has already submitted two business plans which have been rejected by the Government. The privatisation issue will be dealt with in more detail in chapter 5.

The *Ministry of Environment* (MoE) with the Air Division/Environmental Protection Department performs air pollution control, resource and climate protection functions. Climate protection responsibilities are performed by a so called “local focal point”, the recently established AIJ unit in the Department of Air Pollution and the Governmental Committee on the Implementation of the United Nations Framework Convention of Climate Change (UNFCCC). The responsibilities of the MoE in the area of energy, however, are rather limited.

19 *Regional Environmental Departments* on the county level perform implementing functions being under subordination of the Ministry of Internal Affairs. In June 1999 the Government decided to place the departments under direct subordination of the MoE. Further influential players in the energy sector are the trade unions and related business associations.

[3] Information provided by Ms. Ell-Mari Koppel, Ministry of Economic Affairs, Head of the Energy Department

*Figure 1: Organisation of the Estonian Electricity Supply Industry*




*Source: Reino 1999*

## 3.3 Existing Policies and Implementation Practices

### 3.3.1 Choice and Content of National Measures in the Area of Energy and Environment

#### *3.3.1.1 International Agreements and National Emission Reduction Targets*

Besides the EU *Aquis Communautaire* which mainly shapes the policy agenda, Estonian environmental policy in the energy sector follows the requirements set by a number of environmental agreements and conventions:

In 1993 a bilateral *Co-operation Agreement on Air Protection* was concluded by the Governments of Estonia and Finland. According to this agreement, Estonia is obliged to reduce the $SO_2$ emissions by 50 % in 1997 and by 80 % in 2005 compared to the emission level in 1980. The level of $NO_x$ emissions in 2005 must not exceed the 1987 level respectively.

In 1994 Estonia ratified the UN Framework Convention on Climate Change (UNFCCC). The Kyoto Protocol has been signed by the Government in December 1998 and is currently in the process of ratification. The Protocol requires Estonia to reduce the emissions of six GHG by 2008 - 2012 by an average of 8 % compared to 1990.

The Act on Accession to the ECE *Convention on Long Range Transboundary Air Pollution* (1979) and the respective protocols are currently being drafted.

In June 1998 the *Energy Charta Treaty* and respective *Energy Efficiency Protocol* were ratified by the Estonian Parliament.

#### *3.3.1.2 National Legislation*

##### *3.3.1.2.1 General Framework Acts*

Estonian environmental legislation is based on two main *framework laws*: the *Nature Protection Act* (adopted in 1990) sets principles regarding nature conservation, use of natural resources and pollution control. The *Act on Sustainable Development* (adopted in 1995) is the first of its kind in the ECE region. It establishes the principles upon which the national strategy for sustainable development in Estonia is to be based. It specifies guiding principles and makes general provisions for certain actions to be undertaken. The Act puts emphasis on the importance of integrating environmental considerations into sector policies and states that national development programmes and regional sustainable development plans should be established to accomplish this target. The Act, however, does not set out practical directions to be taken and does not impose any practical obligations (PHARE 1999).

##### *3.3.1.2.2 Estonian Ambient Air and Climate Protection Legislation*

In 1998 a new *Ambient Air Protection Act* was adopted which came into force on January 1st, 1999. It can be considered a framework law. In 1998 and 1999 the law has been concretised by subsidiary ministerial regulations.

With regard to large combustion plants (≥ 50 $MW_{th}$) there has been adopted a separate ministerial regulation setting up respective emission standards (*Regulation on Emission Limit Values for Pollutants in Waste Gases from Large Combustion Plants*). The regulation which has been adopted on October 26, 1998 partially transposes the requirements of the EU Directive on Large Combustion Plants (86/609/EEC) as it establishes respective emission standards for particulate, $SO_2$ and $NO_x$ for new plants. The regulation sets limit values for existing plants respectively which will enter into force on January 1st, 2003. Concerning the existing plants, the reduction of total national emissions of $SO_2$ and $NO_x$ shall be achieved by setting national emission ceilings.

Resource use and air pollution charges are a cornerstone in Estonian environmental policy since 1991. The present regulatory framework is provided by the new *Pollution Charges Act* which entered into force on March 21, 1999. The law sets up new annual

pollution charge rates for pollutants released into the ambient air and regulates the procedure for the calculation and payment of the charges. In addition to the "classical" air pollutants which are charged, the new pollution charge system contains also a charge on $CO_2$ emissions from combustion plants with a thermal output exceeding 50 MW which will take effect on January 1st, 2000.

#### *3.3.1.2.3 Energy Sector Legislation*

The new *Energy Act* (adopted in June 1997; taking effect from January 1st, 1998) sets up the regulatory framework for the fuel and energy market, rules state supervision over fuel and energy supply and partially transposes basic provisions of the respective EU Directives concerning the liberalisation on electricity and gas markets (unbundling, third party access). The Act has been amended in June 1998 and concretised by supplementary regulations. The amendments include the definition of eligible customers and an additional article (article 28/1) setting up the obligation of energy traders to purchase alternatively produced electric power from traders connected to the network at a level of 90 % of the basic rate for residential consumers. The law contains only few and very general environmental and energy conservation provisions. The *Energy Act* needs to be further concretised by secondary legislation.

### ***3.3.1.3 Long-term Strategies and Action Programmes***

#### *3.3.1.3.1 National Environmental Strategy (NES)*

The Estonian *National Environmental Strategy* (NES) has been adopted by the Parliament in 1997. It identifies 10 priority goals in the field of environmental protection and formulates short, medium and long term objectives and activities to be achieved by 2000, 2005 and 2010 respectively. Measures for reducing emissions of air pollutants are included and are mainly the same as set up in the bilateral environmental agreement with Finland from 1993.

#### *3.3.1.3.2 National Environmental Action Plan (NEAP)*

The *National Environmental Action Plan NEAP* has been approved by the Estonian Government in 1998 and serves as a comprehensive, executive plan for an effective implementation of the NES. It was developed by ten working groups and approved by the Parliament. The Plan defines 658 short-term, medium-term and long-term actions and contains administrative responsibilities, financing proposals and provisions for regular monitoring and evaluation.

"*Reduction of environmental impacts of the energy sector*" and "*Improvement of the air quality*" are explicit policy goals formulated by the Action Plan. The following policy objectives further concretise these goals:

- Introduction of new technologies to rise the efficiency of energy production, transmission and consumption
- Encourage energy saving by producers and consumers
- Support the use of renewable fuels and energy sources
- Reduction of emissions causing climate change, ozone depletion and reduction of radiation hazard

In total, 67 actions are directly related to the energy sector. The bulk of planned expenditure is directed to technological measures, such as the partial reconstruction of oil shale combusting power plants and the replacement of old boilers by fluidised bed combustion in the *Eesti* power plant and *Kohtla Järve* CHP plant (planned amount EEK 1.2 billion), the installation of electric filters, and the reconstruction of district-heating systems in major cities (EEK 1.2 billion). Further actions include the elaboration of feasibility studies, legal reforms, the introduction of economic instruments, training, education and institutional strengthening. Measures to encourage energy savings by producers and consumers include the development of a long-term low-rate loan scheme for the reconstruction of dwellings (EEK 530 million) and the establishment of a national energy conservation fund.

#### *3.3.1.3.3 Long-term Development Plan for the Estonian Fuel and Energy Sector*

The *Long Term Development Plan for the Estonian Fuel and Energy Sector* (LTDP) has been approved by the Parliament on 18th of February 1998. It sketches major development trends for the fuel and energy sector until 2005 and partly 2018 and formulates strategies concerning the future fuel mix, technology and policy choices. According to the Energy Act, the LTDP shall be periodically revised and complemented. The actual plan, however, is a only a rough policy outline, weak in its priority-setting with a low level of operability. At present, target programmes are developed under the of the Energy Department. in order to implement the Plan. Chapter 5 will refer to this policy document again.

#### *3.3.1.3.4 National Energy Conservation Programme*

In 1992 the Estonian Parliament adopted the *National Energy Conservation Programme*. The Programme provides for financial allocations from the state budget for energy efficiency measures, mainly in the DH sector. It must be considered rather as a crisis programme (Tebodin et al. 1997) than that of a systematic long-term oriented energy efficiency policy. The goals to reduce the need for imported fuel by 30 % in 1992 and by 50 % in 1997 have been accomplished. The Programme is currently under revision and shall be updated (section 3.3.3).

### 3.3.2 Assessment of Policy Instruments

The following section will provide a survey of the different environmental policy instruments which have been adopted in the energy sector so far. According to common classifications we differentiate between *regulatory* (or *command-and-control*) instruments, *economic* and *fiscal instruments*, *planning tools* and *communicative* instruments.

With regard to stationary sources, the Estonian ambient air protection regime is based on a *permit - pollution charge - fine system*. This means a combined application of *regulatory instruments* (permits, air quality standards, emission standards, supervision, enforcement and punishment procedures) and complementary *economic instruments* (mineral resource extraction tax, air emission charges, non-compliance fees).

Basic elements of this system are *environmental permits* such as permits for the utilisation and extraction of natural resources (e.g. oil shale, peat) and air pollution permits. A pollution permit is required if annual emission of a pollutant exceeds the limits provided by ambient air quality standards and air emission standards for large combustion plants set up in the respective ministerial regulations. These standards are used to define threshold levels for pollution permits. Air pollution emission and control requirements are derived from air quality standards and specified in the air pollution permit. Air quality standards for major pollutants such as $SO_2$, $NO_2$ and particulate correspond to the WHO and EU standards (PHARE 1999).

Characteristic for the Estonian air emission charge system is a *two-tired charge rate structure*: a base rate applying for emissions below the permitted level and non-compliance rate for emissions above this level. The permits set air pollution charges and non-compliance fees for excess emissions. At present fixed charge rates are applied to six pollutants ($SO_2$, $NO_x$, CO, Non- toxic dust, soot and coal dust, oil shale/flying ash). The rates were indexed for inflation in 1994, 1995 and 1996. Since 1997 air emission charge rates are annually set by the government.

Air pollution charges depend not only on the particular pollutant but also on the character of the polluted area. Direct charges have been established for six polluting substances. Charges for other pollutants are calculated on the basis of maximum permissible concentrations.

*Pollution charge allowances* play a special stimulating role. According to §19 of the Act on Pollution Charges, an enterprise can receive an allowance to facilitate investments that are expected to reduce pollution within three years by at least 25 % from the previous year's pollution level or if the polluter participates in the financing of national or regional environmental programmes or projects approved by the MoE.

*Non-compliance fees* are directly linked to the air emission charges with substantially higher levels varying between 5, 50 or 500 times of the respective base rates dependent on the hazard classes. The *Mineral Resource Extraction Taxes* are set by the Government at about 5 % of the sales price of the minerals. Tax rates were indexed for inflation in 1994 - 1996 and since 1997 they have been set by the Government (Kraav 1999a).

Revenues from air pollution charges and non-compliance fees are allocated to the *Estonian Environmental Fund*. The revenues from mineral resource extraction taxes are generally allocated to the municipal budget. Regarding the extraction of mineral deposits of national importance, 30 % of revenues are directed to the Environmental Fund.

The extra-budgetary *Estonian Environmental Fund* is a financial institution under authority of the Ministry of Environment, operating independently of the Ministry of Finance (MoF). It had been established already in 1983 as an all-union experiment (Kallaste 1994, p. 58) and underwent several reorganisations since. Its major revenue sources in 1997 were environmental pollution charges and non-compliance fees (46.2 %), mineral resource extraction taxes (17.8 %) and privatisation proceedings (27.4 %) (Kraav 1999a, p. 86). The Fund provides extra funding for environmental protection measures (section 3.3.3).

The Estonian air pollution control regime has so far been dominated by the traditional emission control approach and "end-of-pipe" solutions. Preventive measures to pollution control are still underdeveloped (PHARE 1999). Such an effort requires an effective integration of air pollution reduction strategies into energy policies. Fuel switching, promotion of supply and demand side energy efficiency and support to renewable energy sources are key elements of an preventive and sustainable strategy. The set of policy instruments applied in this field deserves likewise attention.

In the field of energy conservation and efficiency, diverse policy instrument have been applied so far including *regulatory* (energy efficiency standards for new buildings), *fiscal* (public expenditures/investments through the Energy Conservation Programme), and *communicative* instruments (e.g. energy conservation campaigns supported by the PHARE Programme). One has to mention also *organisational* measures such as the creation of the three Regional Energy Centres. Many activities in this field have been supported by foreign assistance.

Support to renewable energy sources is mainly achieved by *economic instruments*. The amended Estonian Energy Act introduces a new financing mechanism regulating the purchase conditions for alternatively generated electricity. The Law establishes *preferential purchase (feed-in) tariffs* for electricity from hydro, wind, solar, bio-masse, waste gas, waste material at a level of 90 % of the basic rate for residential customers provided that the sales volume of alternatively produced energy in Estonia does not exceed 2 % of electric power utilised in the previous year. At present this is the main mechanism applied for stimulating the use of renewable energy source. Additional instruments are $CO_2$ charge exemptions for combustion plants using renewable energy sources and VAT allowances for electricity generated by wind and hydro.

### 3.3.3 Environmental Expenditure Analysis

#### *3.3.3.1 Sources of Environmental Finance and Availability of Statistical Data*

The objective of the following section is an ex-post examination of financing priorities and resource allocations. We can distinguish different sources of finance for environmental protection measures:

- state, regional, municipal budgets
- extra-budgetary funds
- environmental investments of commercial enterprises (state and privately owned)
- commercial credit (domestic and foreign)
- foreign environmental investments
- foreign assistance Programmes

(Fancoj 1998).

A serious limitation factor for this analysis was the availability of statistical information on environmental expenditure, particularly in the energy sector. Available information is rather dispersed, fragmentary, and often inconsistent. There is a lack of comprehensive and systematic data collection in this field.

The Ministry of Environment provided some general data on environmental expenditure per media. Selected data can be found in the annual report of the Ministry (*Keskkond*), but on a rather irregular base. The Statistical Office publishes annual data on environmental investments by municipalities and enterprises. The integration of environmental parameters into official energy statistics is quite poor. To obtain reliable data on the expenditure of the Environmental Fund seems to be even a problem for local decision-makers. According to local officials, this institution is rather non-transparent. As a consequence, the information base for the country study is rather fragmentary and far from being sufficient for a systematic investigation. In the following, some general trends will be described.

#### *3.3.3.2 General Trends in Environmental Expenditure*

The amount and structure of environmental expenditures and investments are good indicators of what a government sees as pressing environmental problems. According to Peszko/Zylicz (1998), a reasonable condition for environmental recovery is to maintain a sufficiently high proportion of environmental investment expenditures in GDP– in the order of 1 - 2 %. According to the authors, it is often not the lack of money, but rather the inability to spend the money cost-efficiently which postpones recovery and makes environmental policies difficult to enforce.

Official statistics in Estonia do not calculate the share of environmental expenditures as a percentage of GDP. The following tables present comparative data of the three Baltic countries which were published in an OECD Report (OECD 1998). According to this report, environmental expenditures in Estonia have remained above 1 % of GDP for the past few years while Latvia and Lithuania have fallen below this level. Although environmental expenditure in Estonia outstrip Latvian and Lithuanian; spending is far from being sufficient.

Compliance with EU environmental standards will require significant investments. Estimates presented by the Estonian authorities place short term investment demands (1998 - 2000) at between USD 450 and 470 million, or annual investments of around 3 % of GDP during this period. Environment-related infrastructure is, therefore, the single most important public investment expenditure during the pre-accession period (The World Bank 1999). Under the Accession Partnership, Estonia and the other nine applicant countries are entitled to receive financial support through the EU PHARE Programme and other pre-accession funds.

*Table 2: Total Environmental Expenditures of the Baltic Countries in 1996*

| Country | Expenditures | Share of GDP |
|---|---|---|
| | - USD, million - | - % - |
| Estonia | 77.7 | 1.7 |
| Latvia | 27.6 | 0.5 |
| Lithuania | 31.1 | 0.4 |

*Source: Fancoj 1998*

Estonia has been particularly successful in attracting foreign assistance with some 35 - 40 % of environmental investments financed by international grants and loans, compared with an average of below 15 % in the CEE countries. With USD 105.8 per capita, Estonia has been leading the list of international assistance recipients in CEE countries between 1991 and 1994 (REC 1998). In 1997 Estonia ranked first among CEE countries in terms of per capita financial assistance to the environmental sector (Kratovits 1999). Investment financing mainly comes from Finland, complemented by loans from international financing organisations (WB, EBRD, NIB, NEFCO). The exact amounts are difficult to quantify but cumulative donor assistance through early 1995 was estimated at USD 40 million with almost half coming from Finland (OECD 1998, p. 21). The share of the EU PHARE Programme in tackling Estonian environmental problems has grown considerably since 1997. In 1995 the EU has allocated EEK 3.8 million, in 1998 the sum has increased up to EEK 320 million. Denmark and Sweden must be also mentioned as main donors (Kratovits 1999, p.101).

In 1998 Estonian enterprises spent EEK 845 million on environmental protection (1996: EEK 812 million, 1997: EEK 847 million). Investments amounted to EEK 509 million, which is 3.2 % of all investments made in this period. Maintenance costs of environmental protection installations were EEK 372.5 million and expenditure on development work was EEK 8.6 million.[4] From the invested EEK 508.7 million, EEK 490.1 million were spent on end-of-pipe equipment, 18.6 million EEK on new technologies. EEK 337.0 million (66.2 %) were allocated for the protection of soil and water and EEK 91.3 million (17.9 %) for air protection measures (Statistical Office of Estonia 1999).

In 1998 total environmental investments by enterprises in the electricity, gas, steam and hot water supply sector amounted to EEK 104.8 million, of which 95.8 million (91.4 %) were invested for end-of-pipe technologies and 8.9 million for integrated technologies (8.6 %). The respective investments for air pollution control measures amounted to EEK 70.1 million, of which 63.2 million (90.2 %) were spent for end-of-pipe equipment and 6.9 million (9.8 %) for integrated technologies (Statistical Office of Estonia 1999).

With regard to the expenditure per sector, the following tables clearly illustrate that the water sector absorbs the bulk of environmental expenditure in all three Baltic countries (construction of new municipal wastewater treatment plants and associated sewers). Substantially less money has been allocated to air protection measures. In other transition countries such as Poland or the Czech Republic the structure of environmental investments has gradually changed in favour of investments into air protection measures (Möller 1999).

*Table 3: Environmental Expenditures of the Baltic Countries by Media*

| Country | Environmental Expenditures | Share of Environmental Expenditures | | |
|---|---|---|---|---|
| | | Air Protection | Water and Wastewater | Waste |
| | - USD, million - | | - % - | |
| Estonia | 77.7 | 25 | 67 | 8 |
| Latvia | 27.6 | 8 | 83 | 6 |
| Lithuania | 31.1 | 6 | 88 | 4 |

*Source: Fancoj 1998*

In 1998, municipalities spent EEK 171 million on environmental protection of which 68 % was spent on water and soil protection, 13 % on waste management and 2 % on air protection measures.

[4] In developed countries environmental investment as a proportion of total investment varied between 4 % and 8 % during the period of installation of pollution control technologies in the 1970s and the first half of the eighties (KPMG 1999, p. 13).

Another indicator of the actual level of environmental investments may be the investments funnelled through the extra-budgetary Environmental Fund, which includes the 19 district and two municipal (Narva, Tallinn) environmental funds. Of the approximately EEK 3 million disbursed by these funds during 1995, the largest portion (almost 35 %) was allocated for relatively large, water related projects. Experience shows that the investments by national and regional funds usually constitute 30 - 40 % of total national environmental investments in economies in transition. If the situation in Estonia is typical of other CEE countries, even an optimistic scenario suggests that the total domestic national environmental investments in Estonia were probably on the order of USD 15 - 20 million.

The total expenditures of enterprises and municipalities on the environment has shown a remarkable increase growing from USD 26.8 million in 1993 to 77.7 million in 1996. The trend can be observed that the investments by enterprises are significantly increasing (from USD 19.0 million to 67.1 million) while investments from local governments, despite increasing (from USD 7.8 to 10.6 million) are declining as a percentage of total environmental expenditure.

*Table 4: Environmental Expenditures of Enterprises and Municipalities by Sector, 1996*

| Sector | Enterprises | Municipalities | Total |
|---|---|---|---|
| | - USD, million - | | |
| Air | 17.6 | 0.7 | 18.3 |
| Water and Soil | 41.7 | 6.9 | 48.6 |
| Waste | 5.4 | 0.6 | 6.0 |
| Other | 2.4 | 2.4 | 4.8 |
| **Total** | **67.1** | **10.6** | **77.7** |

*Source: REC 1998*

Table 4 indicates that 63 % of total environmental expenditure of enterprises and municipalities was allocated for water and soil protection. Whereas enterprises spent a significant amount (26 % of total expenditure) for air protection measures, the corresponding share is considerably less for municipalities. The largest air pollution reduction project in 1996 was the introduction of an electric precipitator on one of eight units of the *Eesti* power plant with an estimated project cost of USD 3.6 million (Sepp 1997).

### *3.3.3.3 Financing Priorities in the Field of Energy and Environment: Selected Findings*

#### *3.3.3.3.1 Finance from the State Budget: The Case of the Energy Conservation Programme*

The *Energy Conservation Programme* which was adopted in 1992 provides for financial allocations from the state budget for energy conservation measures. The budget for energy conservation measures increased between 1992 and 1995 from EEK 1.7 million to EEK 19.0 million. Between 1995 and 1997 the allocations from the state budget considerably decreased to a level of EEK 8.7 million. For 1998, the Ministry of Economic Affairs applied to the Ministry of Finance for allocating EEK 49 million for the programme, the real contribution, however, was again EEK 8.7 million. Also in 1999 this level remained unchanged[5] (1 USD = 15,2 EEK).

According to the *Guidelines for Implementing the Energy Conservation Programme* which have been approved by the Minister of Economic Affairs in 1995, beneficiaries are given grants or soft loans (interest rate 1 - 5 %, loan period up to 5 years). The beneficiaries are mainly state or municipal owned organisations. The private sector and producers of energy efficiency equipment are not supported by the programme.

From the allocated annual budgets the major share has been provided for investment projects improving energy efficiency in buildings (renovation of district-heating networks and substations, reconstruction of heat supply systems in public buildings, fuel conversion in heat-only boilers). A smaller part has been allocated for non-investment activities (preparation of energy development plans for municipalities and counties, energy efficiency campaigns, energy legislation, workshops etc.).

The programme has been co-financed by complementary foreign soft loans schemes such as the District-Heating and Energy Conservation Loan of the World Bank approved in 1994.

#### *3.3.3.3.2 The Estonian Environmental Fund*

The extra-budgetary *Estonian Environmental Fund* generates its revenue mainly from economic instruments for environmental protection (resource use and extraction taxes, pollution charges, non-compliance fees). Additional sources of income are donations, grants, interest on loans provided by the Fund, allocations from national and local budgets, privatisation (Kraav 1999a, REC 1998). The expenditures financed by EF include grants, subsidies and loans and provide for additional funding for environmental protection activities (co-financing).

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[5] Information provided by Mr. Heikki Kulbas, Ministry of Economic Affairs, Energy Department, Head of Energy Efficiency Division.

In 1996 water, air and waste charges contributed equally to the bulk of the Fund's income whilst the water sector was the major recipient of the Fund. In 1995, the environmental charges and taxes paid by *Eesti Energia* contributed to approximately 27 % of the total revenue of the Fund, air pollution charges being the revenue leader. Ambient air protection, climate protection and energy efficiency, however, are not a priority of the Fund. In 1997, only 1.9 % of the fund's total expenditure has been spent on air protection measures. This ratio is rather low compared to that of other CEE countries (Kraav 1999). The Fund has a considerable re-distributive effect and the interviews revealed that there is some need for corrections.

*Table 5: Expenditures of the Estonian Environmental Fund, 1994 - 1996*

| | 1994 | 1995 | 1996 |
|---|---|---|---|
| | - USD, million - | | |
| Water Protection Programme | 1.49 | 2.32 | 2.81 |
| Waste Management Programme | | | 0.90 |
| Air and Radiation Programme | | | 0.29 |
| Nature Conservation Programme | 0.14 | 0.24 | 0.32 |
| Mineral Resources Programme | - | - | 0.40 |
| Planning/Construction/Investment Programme | - | - | 0.74 |
| Game Management Programme | 0.02 | 0.16 | 0.17 |
| Nature Use Programme | - | - | 0.18 |
| Monitoring and Information Programme | 0.13 | 0.09 | 0.23 |
| Training and Public Awareness Programme | 0.09 | 0.19 | |
| Supervision Programme | 0.18 | 0.39 | 0.45 |
| Administrative Costs | 0.03 | 0.06 | 0.07 |
| Reserve Fund | 0.31 | 0.33 | 0.02 |
| **Total Expenditure** | **2.39** | **3.78** | **6.58** |

*Source: REC 1998, Kraav 1995*

On the other side, the interviews revealed that the level of transparency and effectiveness of the Fund has to be considered as rather low in fact. On June 18, 1999 the Baltic News Service (BNS) reported, that the Government decided to close the Fund from October 1999 due to financial misuse. According to BNS, the State Audit Office stated that neither the government nor the Parliament had control over the use of the fund's resources. The fund's reputation has been damaged by financial scandals such as a EEK 32.3 million transfer by the Fund's ex-director to a Bahamas-based offshore company under the guise of environmental projects (Baltic News Service, 18.6.1999). Currently this institution is being re-organised and shall be set under administrative subordination of the Ministry of Finance.

#### *3.3.3.3.3 Environmental Investments of Commercial Enterprises (State and Privately Owned)*

In general, private environmental expenditures are financed out of own equity of economic agents (profits, depreciation, savings) or out of externally raised debt or equity.

Concerning the electricity sector, the Ministry of Economic Affairs (MoEA) states in a recent survey on the Estonian Economy, that in 1997 a significant change has occurred in the structure of investment directed to electricity generation. While in previous years investments were mainly allocated for the maintenance of assets and the reliability of the power system, since 1997 basic stress is put on investments into the efficiency of the system as well as into environmental protection measures. (Ministry of Economic Affairs 1999, p. 38). In 1998 the investments of *Eesti Energia* grew significantly, exceeding those of the previous year approximately three times (Eesti Energia 1999a).

According to the recently published Environmental Report of *Eesti Energia AS*, in 1997 the direct environmental investments for the power plants increased by 51 % compared to 1996 reaching the level of EEK 15.9 million. This makes for approximately 16 % in the total amount of investments directed to the power plants (Eesti Energia 1999b). So far, additive end-of-pipe measures were the pre-dominant type of environmental investments.

One of the biggest environmental investments so far has been the refurbishment of the stack in Iru CHP near Tallinn. Further investments include the installation of a 50 MW test de-sulphurisation unit at the Balti power plant by *Eesti Energia AS* and *Ahlström* in 1993 which has been financed by the Finish Government, the installation of alkaline water treatment installation at the *Balti* power plant and the refurbishment of single ash precipitators in *Eesti* power plant. For 1998 environmental investments were planned to increase by approx. 5 times compared to 1997. Of a total planned amount of EEK 78 million, EEK 60 million are envisaged for precipitator refurbishment in unit 4 of the *Eesti* power plant. Alkaline water treatment absorbs also significant financial resources.

Besides technical problems, the installation of flue-gas desulphurisation equipment must be considered problematic from an economical point of view due to the high investment cost and the limited technical lifetime of the power plants. There seems to exist a general consensus among managers from *Eesti Energia*, policy–makers and the scientific community that both from an economical and environmental/climate protection point of view, the future development strategy of *Eesti Energia AS* should be rather based on the replacement of existing boilers and the pulverised combustion technology with modern and efficient technologies such as fluidised bed combustion (FBC).

FBC allows to increase the efficiency of $SO_2$ capturing and facilitates substantial reduction of in the decomposition rate of mineral carbonate and thus of the $CO_2$ content in the flue gases. However, the reconstruction of the existing boilers requires massive investments. The actual investment programme includes the gradual replacement of existing

boilers by atmospheric fluidised bed combustion boilers. Preparations for reconstructing the first 200 MW unit have started.

#### *3.3.3.3.4 Foreign Loans and Assistance Programmes*

With regard to the energy sector, the following loans provided by International Financing Institutions deserve special attention:

The purpose of the *World Bank Rehabilitation Loan* (USD 28.6 million, approved in 1992) was to finance emergency needs in different sectors (financing critical imports, technical assistance). A bigger share was on-lent by the Government to municipalities. 52 % of the total sum were allocated for fuel purchases. The loan was co-financed with another loan from *JexIm Bank* and with a grant by the Government of Finland. According to Tenno and Veski (1994), in 1991 Estonia used foreign loans to purchase imported fuels USD 375 million worth and in 1992 USD 210 million worth. Of the imported fuels intended for producing energy, 75 % was used to produce heat.

The *World Bank District Heating and Energy Conservation Loan* (USD 38.4 million, approved in 1994) served to finance the rehabilitation of DH systems in *Tallinn*, *Tartu* and *Pärnu*, the reconstruction of the *Iru* CHP plant (stack reconstruction, retrofit with modern control systems, replacement of boiler equipment to use sulphur-free natural gas), and reconstruction and the conversion of small municipal boiler houses. The respective projects were co-financed by a loan from the European Investment Bank (USD 4.4 million), additional grants from the Governments of Sweden, Denmark and Finland, small portions of the Energy Conservation Programme and on account of net assets.

*EBRD Energy Sector Emergency Loan* (USD 31 million, approved in 1992). The loan was aimed to enable urgent repairs to power and heating supply and improvement of energy efficiency. In fact, only about half of the original size of the loan was used by Estonia.[6]

Of importance are also the investments in the Estonian energy sector under the *EAES Programme for an Environmentally Adapted Energy System* financed by the Swedish Government.[7] This is the largest AIJ project officially registered at the Climate Secretariat with focus on the Baltic countries, Poland, and Russia. The purpose of the programme is to implement cost-efficient projects through energy efficiency measures and increased use of renewable fuels. It concentrates on investments in the municipal sector with a foreseeable and long-term energy consumption and supports the conversion of

[6] Information provided by Mr. Kristjan Kitvel, Tallinn branch of the World Bank Regional Mission Baltic Countries.

[7] The Programme has been administered by the Swedish National Board of Industry and Technology NUTEK which has been reorganised in 1998 (now Swedish National Energy Administration STEM).

heat-only-boilers from fossil fuels to wood, retrofitting of DH networks, and energy conservation measures in buildings.

Between 1993 and 1996 NUTEK invested a total of USD 11.2 million in Estonia. Projects are financed by loans. The economy of the project shall allow for repayment of the loan and also generate profits. The conditions are in conformity with those applied by international financing institutions with a maximum repayment time of 10 years and usually 2 years grace period.

#### *3.3.3.4 Résumé*

The water sector still absorbs the major share of environmental expenditure in Estonia. 80 % of annual environmental investments are channelled into the construction of new municipal wastewater treatment, treatment plants and associated sewers. Domestic investment in air pollution control technology is rather low. Some industrial plants, however, such as the *Kunda Tsement* factory, have made considerable investments after privatisation. Total environmental expenditure for air pollution control is not known.

Environmental investments in the oil shale fired power plants so far included a few end-of-pipe measures (50 MW flue gas de-sulphurisation test unit, installation of ash precipitators). The reconstruction of one 200 MW unit and installation of efficient and less polluting fluidised bed combustion boilers has recently started. In the electricity, gas, steam and hot water supply sectors, end-of-pipe technologies are clearly dominating.

A considerable part of foreign loans and grants especially during the first years of transition, has been absorbed for financing fuel purchases energy supply measures. Generally speaking, however, the Estonian Government can be characterised as comparatively "conservative" and reserved with regard to its borrowing activities. Several accounts as the EBRD loan have not been used up to the full amount originally foreseen.

Progress has been achieved with regard to the rehabilitation of DH systems and conversion from fossil to local renewable fuels (mainly wood). This has been supported by several foreign assistance programmes and loans. However, many of these activities have concentrated on the supply side. The end-use sector has been neglected but bears a vast potential for cost-effective conservation measures. Allocations in this area have been made for the installation of metering equipment and devices. Additional organisational and financing instruments need to be developed.

Numerous projects have been financed by multilateral and bilateral foreign assistance. A fundamental problem is that only modest amounts of the state budget are made available to implement energy efficiency measures. The budget of the Energy Conservation Programme has been considerably reduced since 1995. Complementary financing mechanisms are required.

The Estonian Environmental Fund re-shifts considerable financial resources from the energy sector to other sectors (pollution charges, non-compliance fines, resource taxes).

On the other hand, energy efficiency and climate protection are not a financing priority of the Fund. Additional resources should be earmarked for air pollution control and energy conservation measures. The main advantage of such extra-budgetary funds is that they do not compete with other sectors and programmes for limited state resources. The Environmental Fund could serve as an instrument allowing for an effective integration of environmental and energy policies. It is rather difficult to assess the performance of this institution. There seems to be a transparency and control deficit. The establishment of an extra-budgetary energy conservation fund as it has been set up in other transition countries (e.g. Slovenia, Lithuania, Latvia) should be considered. In order to reduce transaction costs, its functions could be likewise managed by a reorganised Environmental Fund.

### 3.3.4 Level of Compliance with International Emission Reduction Targets

One of the most serious environmental challenges for the Estonian oil shale mining and power complex is to achieve compliance with the requirements set by the environmental agreement with Finland. This demands that $SO_2$ emissions must be reduced to 20 % of the 1980 level by 2005. Reducing the emissions from the oil shale burning power stations is of particular importance. The Eesti and Balti power plants produce more than 70 % of $SO_2$ and 50 % of $NO_x$ emissions. According to Andreas Keltmann, Environmental Manager of *Eesti Energia AS*, to achieve compliance would require to replace the pulverised combustion equipment by fluidised bed combustion technology at least in three 200 MW units. Due to the huge investments, the deadline is likely to be exceeded and negotiations to prolong the year of compliance to 2008 will be necessary.

The previous goal to reduce $SO_2$ emissions by 50 % by 1997 has been achieved without any special emission reduction activities or investments at these power plants with the exception of small pilot projects to test flue gas de-sulphurisation, which were not very successful. The $SO_2$ emissions of the oil shale power plants decreased to 39 % of the 1980 level mainly due to declining power exports and reduced domestic electricity consumption.

The oil shale based power sector will be heavily affected by the harmonisation with two EU Directives. The Large Combustion Plant Directive (88/609/EEC) sets emission standards for new combustion plants and emission ceilings for the reduction of total national emissions of $SO_2$ and $NO_x$ from existing plants, based on 1980 emissions. The IPPC Directive (Integrated Pollution Prevention and Control Directive 91/61/EEC) requires the introduction of an integrated environmental permitting system for industrial enterprises and the application of the BAT (Best Available Technology) principle.

The Estonian Government has started to transpose these requirements into national law. Table 6 illustrates the current level of compliance of the oil shale power plants with the requirements of the EU Directives and current national emission limit values.

*Table 6: Level of compliance of the oil shale power plants with national and EU legislation*

| | EC Council Directive (24.11.1988) | EU Commission proposal 98/C300/04 (31.08.1998) | Emission standards for new plants according to national legislation (in force from 2000, Ministerial Regulation 26.10.1998) | Emission standards for existing plants according to national legislation (in force from 2003) | Present level of emissions in the oil shale power plants |
|---|---|---|---|---|---|
| | - mg/Nm³ - | | | | |
| $SO_2$ for solid fuels incl. oil shale | 400 | 200 | 400 | 2,000 | 1,700 |
| $NO_x$ for solid fuels | 650 | 200 | 400 | 450 | 190 |
| Fly Ash for solid fuels | 50 | 30 | 50 | 400 | 1,440 |

*Source: Eesti Energia AS 1999*

The Large Combustion Plant Directive has been partly transposed into national law. Emission standards for new combustion plants will be in full compliance with the requirements of the Directive from 1.1.2000. However, with regard to the existing plants, emission ceilings will be implemented during the next two years according to Estonia's Progress Report for the Commission Review 1999. An inter-ministerial working group has been recently established to elaborate respective regulations. The table clearly illustrates that besides the $SO_2$ emissions, the fly ash emissions are a very serious problem.

Regarding the transposition of the IPPC Directive, Estonia is at the forefront of the first-wave EU accession countries. A project funded by the Danish Environmental Protection Agency is currently implemented preparing the transposition and implementation of this Directive. The implementation of the IPPC would require that all large combustion plants including the existing ones would apply BAT after 2004. The IPPC basically would replace this directive after 2003. Compliance with the Large Combustion Plants Directive would require investments more than ECU 300 million, of which 80 % would be needed in the period 2005 - 2010.

A reconstruction of the 200 MW units and replacement of pulverised combustion by CFB combined with retrofitting of turbines would allow to increase the net efficiency of the units to 36.5 %. Estimated costs of an overall modernisation of one 200 MW unit is EEK 1.2 billion which is approximately DEM 150 million (Eesti Energia 1998).

The Kyoto Protocol requires an average reduction of GHG emissions of 8 % for the period 2008 - 2012 compared to the 1990 level. Between 1990 and 1998, the total amount

of $CO_2$ emissions in Estonia has decreased by 50 %. The annual $CO_2$ emissions from the two main oil shale fired power plants have decreased by 43 %, whereas the specific emissions have slightly increased due to the degradation of the equipment (Eesti Energia 1999b).

## 3.4 Environmental Policy-Making in the Energy Sector: an Assessment of Policy Performance by Employing the Concept of Regulatory Patterns

### 3.4.1 Introduction

The following sections include an in-depth investigation of environmental policy-making in the Estonian energy sector. Comparative environmental policy analyses convincingly demonstrated that environmental innovations and the effectiveness of environmental policies are closely related to the interaction of several crucial policy variables. The concept of regulatory patterns, which has been developed by scholars of comparative environmental policy research, and derived from case-studies of environmental innovations, reflects the complexity of "successful" and "innovative" environmental policy-making. This concept serves as the analytical screen along which the performance of environmental policy-making in the Estonian energy sector shall be explored.

The term regulation pattern includes the following major policy dimensions which serve as the leading research variables for this country report: policy instrumentation, policy style and actor configurations. These dimensions have been identified as crucial in influencing the success of environmental policies. They were further specified and made operational by further indicators.[8]

This multi-factor approach allows for a systematic analysis of institutional strengths and shortcomings and for developing policy recommendations for future institutional capacity-building. Not all policy variables could be dealt with in the same analytical depth and the results are somewhat selective. Special focus will be on *cross-sector policy integration*.

### 3.4.2 Analysis of Policy Instrumentation

By the term *policy instrumentation* we mean not only the type and design of the instruments applied but also their performance, their inter-action, combination and the overall consistency of the policy mix.

The *variety of instruments* applied for environmental policies the energy sector is not very high. The policy mix in Estonia includes regulatory instruments, economic and financial incentives, fiscal and communicative instruments. The dominant instrument type,

[8] For more information on the conceptualisation, we refer to the methodological outline of Work Package 4.

however, are command-and-control instruments with economic instruments performing a complementary function. Particularly, in the field of energy conservation, instrumentation needs further to be developed. So far fiscal instruments (budgetary allocations) have been the dominant instrument type. The repertoire of policy instruments offers room for further diversification. The institutional framework needs to be strengthened. Many other transition countries have developed supplementary organisational and legislative measures. Labelling and additional financing instruments such as tax reduction schemes, contracting, third party finance or energy conservation funds are still underdeveloped in Estonia (OECD/IEA 1997, van Harmelen 1997).

On the other hand, one has to be sceptical about the future: Current EU legislation is dominated by command-and-control measures. The accession negotiations centre on those and seem to have little room for flexible mechanisms. The negotiation talks focus mainly on transposing technological standards and emission limits. The environmental funds, which are a common financing instrument in many transition countries are partly incompatible with respective EU regulations on State Aid (Möller 1999).

*Economic instruments* and incentives are core elements of innovation-friendly environmental policies. The significance of economic instruments for an effective integration of environmental concerns into sector policies has been convincingly demonstrated (UN ECE 1998, EEA 1997). A crucial pre-requisite, however, is to *remove* counteracting *price subsidies* and achieve *cost recovery*. In this respect Estonia has made considerable progress.

Estonia was at the forefront of transition countries to remove state subsidies to energy producers. There are no direct state subsidies in oil shale production. Prior to 1999 the price for oil shale has been set by the Government and kept artificially low. Since beginning of 1999 the oil shale price is set on a bilateral base between *Eesti Põlevkivi* and *Eesti Energia AS*.[9] Average production cost is estimated at EEK 111/t according to the management and is reported to range from about EEK 80/t to EEK 136/t. The average sales price is EEK 133/t. According to the management of *Eesti Energia*, the current price is regarded too high to be competitive for electricity exports. In order to increase the profitability of exports, the management demands price reductions to a level of EEK 100/t (Baltic News Service, 13.5.1999).

The level of electricity prices is the lowest in Europe. However, during the last three years there have been considerable real price increases. Electricity tariffs have risen by almost 25 % from EEK 0.51 to 0.63/kWh in October 1998 due to a sharp increase in the transport cost of oil shale, the rise of capital market interest rates and asset re-evaluation. Tariffs for residential customers (including VAT) rose from EEK 0.45 to 0.60/kWh in May 1997 and grew by a further EEK 0.05 to 0.65/kWh in January 1998 (Baltic News

[9] Information provided by Anton Laur, Tallinn Technical University, Estonian Institute for Economics.

Service, 03.03.1998). From 1st of January 1999, the residential tariff is EEK 0.75/kWh which is approximately DEM 0.094/kWh. Oil shale purchase and transportation costs make for 2/3 of the electricity production costs. Cost recovery in the electricity sector has not been fully achieved yet. The electricity tariffs, however, include at least a small proportion allowing for diverse investments.

The *economic incentive* effect of the air pollution charges has been quite low so far. The charge rates have been too low to have an incentive effect as it was partly the case for the Estonian water effluent charges (Kraav 1999b). The competitiveness of the companies and socio-economical considerations have dominated over practical environmental needs. The level of air pollution charges is very low compared to the pollution abatement costs. Charges and fines did not have any perceivable impact on the investment behaviour of polluting enterprises in the energy sector. In 1994 pollution charges made for 0.4 % of the electricity price and 0.15 % of oil shale price (Kraav 1995). The charge levels have constantly increased, however, and in 1997 pollution charges amounted to 0.5 %-2 % of the price of the end products (Kraav 1999a). The revenue raising character of economic instruments has been dominating so far. The share of the resource use charges in the municipal budgets of several municipalities was remarkable (Kraav/Gornaja 1996).

*Table 7: Selected Air Pollution Charge Rates in Different CEE countries, as of end 1997*

| Country | $SO_2$ | | $NO_x$ | |
|---|---|---|---|---|
| | Emission charge | Non-compliance fee | Emission charge | Non-compliance fee |
| | - USD/t - | | | |
| Estonia | 2 | 116 | 5 | 265 |
| Latvia | 17 | 51 | 17 | 51 |
| Lithuania | 52 | (Linear-Progr.) | 97 | (Linear-Progr.) |
| Poland | 94 | 940 | 94 | 940 |
| Czech Republic | 29 | 44 | 24 | 36 |
| Slovakia | 29 | (Fine not linked) | 23 | (Fine not linked) |

*Source: REC 1999, p. 35*

The rates of the *mineral resource extraction tax* were low in the past and represented a small proportion of the sales price of the resources. In 1994 this ratio was 0.5 % for peat and 1.8 % for oil shale (UN ECE 1995, p. 60). However, in recent years the rates have been substantially increased. On regional policy grounds the tax rate on oil shale has been doubled in 1997 from EEK 2 to 4/t due to which the tax revenues allocated to local budgets of six municipalities had a significant increase. Revenue leader is oil shale which contributes to more than 90 % of total tax revenue. The major resource charge payer is

*Eesti Põlevkivi*. The charge represents 1.7 % of the sales price of oil shale (Kraav 1999b).

The level of pollution charges is too limited to force companies to build new purification and abatement facilities but are perceivable for big polluters. In the last two years the level of charge rates has been constantly increased. The $CO_2$ emission charge which will be introduced next year is based on very low but constantly increasing base rates. From January 1st 2000, *Eesti Energia AS* will have to pay EEK 5 for each ton of carbon dioxide released. In 2001 the charge will rise to EEK 7.5 per ton. Currently the company pays EEK 42.8 million in emission charges and taxes for other pollutants (*Eesti Energia* 1999a). In 2000 the environmental costs are expected to triple (Baltic News Service, 10.2.1999). For this reason, the recent charge increases and the introduction of the $CO_2$ charge face substantial opposition by the management of *Eesti Energia AS*.

There is an *indirect incentive effect* as the electricity generation costs in the oil shale-fired power plants have reached the level of inexpensive Norwegian hydropower based electricity (*Long Term Development Plan for the Estonian Fuel and Power Sector* 1998). All environmentally motivated cost increases negatively influence the competitiveness of oil shale based electricity, affect the competitiveness of electricity exports to neighbouring countries, and increase the profitability of electricity imports from NORDEL countries.[10]

On the domestic electricity market, *Eesti Energia AS* is currently being forced to reduce wholesale electricity prices to large industrial power consumers such as *AS Nitrofert*, *Kunda Nordic Tsement, and Kiviter AS* which are unsatisfied with the price level and threatened to set up their own electricity generating facilities. The new owners of the two privatised distribution networks have also announced plans to set up their own power plants. According to Anton Laur, energy specialist of the *Estonian Institute of Economics*, the winter 1998/99 can be considered as a turning point considering oil shale based electricity generation costs which have reached the same level as electricity generated in the Tallinn-based *Iru* CHP plant.

The *strategic orientation* of the policy instruments examined is rather low. The transition period can be mainly characterised by crisis management and casual, short-sighted policy approaches. The institutional capacities for long term energy planning have been rather limited. Economic instruments were not created systematically and there are discrepancies between the proclaimed and their real functions. Revenue-raising has been the underlying rationale so far. Only recently have strategic sector policies been endorsed for the environment and energy sector. It is too early, however, to assess their effectiveness. The measures proposed by the National Environmental Action Plan have to be fully har-

[10] In September 1998 *Eesti Energia AS* concluded an agreement with *ABB, Pohjalan Voima OY, Graningenverkens AB* and *Helsingin Energia* concerning the construction of a HVDC submarine cable connecting Estonia's power grid with that of Finland. The agreement envisages respective electricity exports from Estonia to Finland *(The Baltic Times,* Sep 17 - 23, 1998).

monised by a complementary energy sector strategy. Restructuring and privatisation of the energy sector needs to be matched with the environmental objectives and instruments. The *Long Term Development Plan for the Fuel and Energy Sector* needs further elaboration and must be concretised by target programs and corresponding actions which are consistent with the Environmental Action Plan.

The new carbon emission charge is a promising approach but needs to be matched consistently with other policies. It needs supporting measures and embedded into a comprehensive environmental strategy for the energy sector. So far, it has got more the character of an isolated measure than that of an integral element of a systematic and strategic concept directed towards a gradual restructuring of the electricity sector and effective energy conservation policy. There is no comprehensive and systematic strategy to encourage energy efficiency and the use of renewable energy sources.

Despite the Energy Conservation Programme of 1992, energy conservation in Estonia has not been stimulated as part of a dedicated effort. Until now, lack of stability in the responsible ministry and the resulting absence of a long term strategy caused a *haphazard* approach (Tebodin et al. 1997). A passive, *laissez-faire* approach has been criticised by Vares (1999b) regarding government policies towards renewable energy sources and co-generation. Considering the low electricity price level, the current purchase (feed-in) tariffs for electricity based on renewable energy sources is insufficient to have a stimulating effect. The financial barriers for renewable energy sources were hardly removed and long payback times for respective facilities are still the consequence. The current mechanism should be supported by additional taxation policy measures. The use of biomass (wood, peat) for heating purposes needs further support. According to Villu Vares from the Estonian Energy Research Institute, the enthusiasm of private actors is the main driving force in this area (Vares 1999a). Co-generation does not get any policy support. The impression from the interviews is that support to renewable sources and co-generation facilities is of subordinate priority in the Energy Department. Policy commitment is heavily in favour of the oil shale mining and power complex due to the socio-economic burden. Energy related Research and Development has been completely supply oriented so far.

### 3.4.3 Analysis of Policy Styles

By the term policy style we understand the type of target setting, formulation and implementation of environmental policies in the field of energy. Core elements of an innovative and effective decision-making are dialogue and consensus orientation, participation and incorporation of affected stakeholders, pro-activity, calculability, and management orientation.

In order to examine national patterns of policy-making styles we also tried to compare the process of elaborating the *National Environmental Strategy* (NES) and the *National Environmental Action Plan* (NEAP) on the one hand and the elaboration of the *Long Term Development Plan for the Fuel and Energy Sector* (LTDP) on the other hand. So

far, the NES/NEAP documents can be regarded the core policy documents setting up numerous measures and actions for environmental protection in the energy sector derived from short, medium and long-term targets. The Ministry of Environment is responsible for the co-ordination, implementation and monitoring of the NES/NEAP.

Selected experts who have been involved in the process of elaborating the respective documents were interviewed, partly with co-ordinating functions, partly having stakeholder status. The conclusions, however, can be only tentative. The interviews revealed that the NES/NEAP process itself reflects some of the elements characteristic of innovative policy-making described above. The process has been characterised as a very open, discursive, dialogue/consensus and management oriented process including a broad spectrum of stakeholders and interest groups from society, science and industry. It was based on a clear and transparent management structure including a steering committee, and several task forces and working groups. A public discussion forum consisting of more than 250 persons played a key role in the development of the NEAP (National Environmental Action Plan 1998).

The NES/NEAP documents frequently use a vocabulary which is indicating this innovative policy style. On the other hand, some of the respondents criticised both the number of participants being obviously too big and hampered decision-making and a low general implementation orientation of the participants. One has to bear in mind that the process of elaborating the NES/NEAP was strongly supported, co-financed and partly co-ordinated through the EU PHARE Programme. The process has been created artificially and initiated by external actors. Policy styles, however, are directly connected to the political culture of a country and reflect behavioural and cognitive factors such as perceptions of policy-makers in a country. Mostly these factors are subject to changes only in the long run. Nevertheless, the NES/NEAP process, which incorporated policy-makers, industry and business representatives and non-governmental organisations, provided for a "stage-floor" for the different actors and stakeholders and reveals some basic elements forming policy styles.

The competencies of the MoE in the field of energy are restricted to air pollution control but very limited in the field of general energy policy-making being the *domain* of the MoEA and the *Energy Department.* Thus we had to compare the type of policy formulation and implementation in both institutions. Common policy patterns are *legalistic* and *hierarchical* policy-making, a more or less *re-active* style of policy-making and a low level of co-ordination and *calculability*. Pro-active policy-making is exceptional, but is a characteristic rather ascribed to the MoE than to MoEA. One respondent obtaining a co-ordinating role within the NES/NEAP process characterised the Energy Department as "definitely not pro-active". The case of the newly adopted carbon emission charge seems to indicate a somewhat increasing pro-active role played by the MoE. The EU *Acquis Communautaire* does not include any carbon taxes so far which serves as a counter-argument put forward by the management of *Eesti Energia AS* which exerts strong opposition against this charge.

In general, much of Estonian environmental law focuses on responding to accidents rather than taking preventive or pre-cautionary measures. The precautionary principle is not directly prescribed in any Estonian legislation (PHARE 1999). There is also a somewhat *technocratic* policy-making approach in favour of the oil shale mining and power complex. Expensive technological solutions such as the fluidised bed combustion technology are given priority. Supporting measures and policies aimed at a sustainable restructuring of the energy sector and favouring *integrated problem solving approaches* addressing the complex environmental, economic and social challenges of the Ida-Viru county have been poorly developed so far.

The dominant type of co-ordination between the ministries is based on an *ad hoc* basis. Several interviews revealed that the process of including the new carbon emission charge for combustion plants into the existing air pollution charge system has been poorly co-ordinated with the Energy Department. The continuous reorganisations in the ministerial apparatus negatively influence the *calculability* of policy-making which is rather low. Policy-making has been subject to day-to-day business. A carbon emission charge has not been explicitly included into the NES/NEAP. The pollution charge rates especially for carbon emissions, have been set only for the next two years and the policy makers in the MoE do not have a clear picture yet about the future development of the charge rates.

A vivid example for the low level of calculability of policy-making in the energy sector is the restructuring and privatisation of the oil shale-mining and electricity industry. Although there has been adopted a privatisation programme on December 31st 1997 by the Government, which in principle foresaw the vertical disintegration of *Eesti Energia AS* and separate privatisation of the oil shale mines, the *Narva*-based power plants, distribution networks and even the transmission network, this decision has been revoked ten months later by the same government and an almost opposite restructuring and privatisation scheme has been approved (section 3.4.4.2).

The practice of participation in environmental decision-making has developed strongly in Estonia. In 1996/97 non governmental organisations (NGOs) participated quite extensively in the drafting processes of the NES and NEAP. In November 1996 the Estonian Green Movement together with GLOBE organised a public hearing on the Estonian Energy Strategy involving both NGOs and parliamentarians in a common discussion. In 1997, this led to the inclusion of many passages on renewable energy sources into the Energy Strategy – an event that seemed to be quite impossible just one year ago (REC 1998).

These cases, however, seem to be rather exceptional. There are perceivable differences between the ministries in terms of *dialogue orientation*, and *participation* of stakeholders. The respondents involved in the NES/NEAP process ascribed a comparatively low level of dialogue orientation to the MoEA, whereas the opposite was the case regarding the MoE. Regarding the participation of interest and target groups there seem to be also clear differences both in terms of the *group* of stakeholders gaining access to

the policy arena, in terms of the *form* of participation and also referring to the *stage* of the policy-making process at which participation is made possible.

There is a stronger reluctance against such participatory mechanisms in the MoEA where the representation of interests is more selective. Access is mainly reserved to the industry stakeholders and experts from the scientific community, whereas NGOs have only restricted access. The elaboration process of the Long Term Development Plan which was under responsibility of the MoEA, has been characterised by the respondents as more closed and exclusive than the corresponding NEAP process. Environmental interest-groups and other stakeholders had been invited to send comments to the drafts but were not invited into the drafting process itself. The environmental chapter of the Long Term Development Plan has been considerably reduced in the drafting process and the environmental commitment of the MoEA must be considered as rather poor. The decision-making process concerning the restructuring and privatisation of the oil shale and electricity sector seems to be a highly closed, non-transparent process involving a very small group of top level actors. Access to this policy arena is highly restrictive.

### 3.4.4 Analysis of Actor Configurations and Institutional Arrangements

#### *3.4.4.1 Intra-Policy Integration*

In the following we shall differentiate between intra and inter (i.e. cross-sector) policy integration.

Because of its small size Estonia offers favourable conditions for effective intra-policy integration and co-ordination. However, the interviews revealed that the capacities and resources for an effective co-ordination of energy policy on the state level have continuously decreased during the reform process. This can be illustrated by the gradual reduction of staff within the Ministry of Economic Affairs. A very serious problem is that the private sector absorbs qualified staff due to the low level of wages in the public sector. There is a large difference between public and private wages in Estonia. On average, public sector remuneration is 60 % of wages in the financial sector. The difference is even higher in certain professional categories, such as accountants and lawyers, where the private sector pays up to four times more than the civil service.

This has become a serious problem in the recruitment and retention of higher level officials and specialists. This leads to a high civil service turnover (The World Bank 1999), but also increases the susceptibility for corruption

The current institutional structure, especially in the field of energy conservation, is considered as inadequate for effective policy co-ordination. The Energy Agency, because of its detached position, pre-eminently an institution suited for maintaining conservation efforts amidst the turmoil of every day policy matters, has been kept in operation for a short period only (Tebodin et al. 1997). The Energy Research Institute does not get much support from the MoEA and neither the Institute nor the Energy Department can

perform the functions of a national energy agency due to the lack of respective capacities and capabilities. The recently established regional energy centres are a promising institutional approach, but should have a corresponding counterpart on the national state level. The future of the centres is insecure. Coherence and co-ordination between institutions of different state level should be strengthened.

In general, laws are passed with little in the way of requirements for post-implementation evaluation. There is no mandated requirement on the implementers of a law to subsequently review their impact (The World Bank 1999). Methods and timing for post-implementation evaluation should be attached to the policy submission or contained in the implementation chapter of the law.

#### *3.4.4.2 Cross-Sector Policy Integration*

In the following, we will deal with this important policy variable in more detail. Cross-sector policy integration can be improved by set of different instruments and institutional mechanisms. We distinguish between legislative provisions, institutional and procedural arrangements and integrative/sustainable planning tools (UN ECE 1996).

##### *3.4.4.2.1 Legislative provisions*

The Estonian *Act on Sustainable Development* contains in Article 12 several provisions concerning policy integration. According to the Law, *national programmes* are to be set up "in order to balance economic activities in sectors with the greatest impact on human and natural environment, such as industry, energy, transport, agriculture, tourism development with environmental needs"(§1). §3 includes the additional obligation to set up complementary *regional development plans* in order to balance economic activity with environmental needs in environmentally most threatened regions, such as the region of *Ida-Virumaa* where the oil shale mining and power industry is concentrated.

Whereas not any national programme has been developed so far which would meet the requirements set by §1, there has been developed a regional *Programme of Sustainable Development of the Ida-Viru-County* in 1994. This programme has been initiated by the *Stockholm Environment Institute* with active participation of local self-governments. We will again refer to this programme below.

The *Energy Act* contains only very few and general provisions concerning environmental protection. Energy conservation and energy efficiency are also poorly mentioned in the Act.

##### *3.4.4.2.2 Institutional and Procedural Arrangements for Cross-Sector Co-ordination and Integration*

In the first years of transition, Estonia has been quite successful in setting up institutional arrangements suitable to overcome traditional insulated and segmented policy making.

In November 1996 a high-level governmental *Commission on Sustainable Development* has been established. In 1999 this commission had 28 members including the Prime Minister as Chairman and the Minister of Environment and the Minister of Economy as Vice-Chairs. The members include representatives of various ministries, members of the Parliament and from the scientific community.

The Commission is working as an advisory institution for the Government. The participating authorities and organisations are determined by the Government and the individual members are nominated by the respective institutions. Meetings are hold twice a year. The Commission does not have any secretary or administrative base and disposes only over a very small budget. The activities have so far concentrated on advising the Government particularly in developing a national position for the negotiations regarding the UN Framework Convention on Climate Change and the Baltic 21 process.[11]

This commission could play a strategic role in promoting the integration of environmental considerations in the economic reform process and in sector decision-making. Senior representatives of business and industry, and non-governmental organisations should also be invited to participate. Strategic planning expertise needs to be included. The responsibilities of the commission should be extended and should include the following tasks: setting of environmental objectives for the main economic sectors, ensuring the environmental assessment of economic and sector programmes and plans including privatisation programmes and prioritising environmental investments, internalising external costs (UN ECE 1996).

Crucial for the effectiveness of policies, is the type of co-operation and policy co-ordination between the different ministries and departments responsible for energy and environmental policy-making. In general, the level of inter-ministerial co-operation and co-ordination can be described as rather low. This has been also a major finding from the interviews. The main co-ordination type are informal working-groups between the responsible Ministries of Environment and Economic Affairs, mainly on an *ad hoc* basis (*Ernst & Young Denmark* 1997). There has not been any institutionalised dialogue be-

[11] Information provided by Ms. Ülle Vaht, Ministry of Environment. She is responsible for the preparation of the commission meetings, and acts as a contact person.

tween both actors such as inter-ministerial project units or task forces. *Negative co-ordination*[12] seems to be the pre-dominant administrative co-ordination mechanism.

The case of the carbon emission charge illustrates the low level of co-ordination between both actors. The impression from the interviews is that there is has been rather a competitive relationship so far than a dialogue oriented, consensus-based one. The interviews revealed, however, that the commitment towards an intensified dialogue between MoEA and MoE is increasing. A joint working group consisting of representatives from both ministries and *Eesti Energia AS* has been established quite recently in order to elaborate an action plan for restructuring of the emissions from large combustion plants.

The position of the MoE in the process of restructuring and privatisation the oil shale and electric power industry is very weak. Privatisation and de-regulation policies, however, have a profound impact on investment decisions, technology choice and the operation of the electricity sector. The privatisation schemes did not include any environmental requirements so far. Only very recently the Estonian Privatisation Agency launched a tender for environmental audit of the oil shale power plants under privatisation.[13] The role and involvement of the MoE in the privatisation process should be strengthened, e.g. by establishing an inter-ministerial unit between the Ministry of Environment, the Ministry of Economic Affairs and the Estonian Privatisation Agency.

#### *3.4.4.2.3 Integrative/Sustainable Planning Tools*

The core policy documents for environmental protection in the energy sector are the National Environmental Strategy (NES) and the National Environmental Action Plan (NEAP). A crucial question is to what extent the respective targets and measures are consistent with and reflected in the corresponding energy sector strategy, the recently *Long Term Development Plan for the Fuel and Energy Sector* (LTDP), which has been approved in 1998. As we have already mentioned, the LTDP provides only a general outline of the development trends energy policy including general objectives. It includes only few and very general cross-references to the NES/NEAP documents. At present,

[12] In Administration Science, a distinction is made between negative and positive co-ordination. Negative co-ordination can be regarded as the traditional mode of reconciling different sector interests in the process of policy formulation. An administrative unit being responsible for drafting a certain policy or bill acts mostly on its own initiative and independently from other affected units. Before being approved, the bill or draft is submitted to the other affected units for reviewing. Their guiding rationale, however, is often less the improvement of the draft, but rather to avert those elements which have disturbing effects for the own domain. In opposition to this, positive co-ordination is mainly based on multilateral negotiations in inter-ministerial working-groups and project teams which have the mandate to include all acting options of all administrative units affected. It is obvious that this type of co-ordination increases the efficiency and effectiveness of policies (Enquete-Kommission 1998).

[13] Information provided by Toomas Pallo, Tallinn branch of the Stockholm Environment Institute.

respective target programmes for euro-integration, renewable fuels and energy sources, energy conservation and oil shale power engineering are being elaborated.

Prior to 1997, the absence of a development strategy for the energy sector and the lack of clear, binding energy policy objectives has been characterised as a crucial weakness of Estonian energy policy (Tebodin et al. 1997, UN ECE 1996, Tenno/Veski 1994). To our view, this deficit is only hardly overcome by the LTDP.

In 1997, an *Integrated Energy Strategy* has been elaborated by the Dutch consulting company *Tebodin BV* in the framework of the EU PHARE Programme. The purpose of the study was to assist the Government of Estonia and the MoEA in the preparation of an energy strategy capable to reconcile energy policy objectives with environmental, socio- and macro-economic demands. *Tebodin* was assisted by two further organisations from the Netherlands, the *ECN Foundation for Energy Research* and *Novem*, the Dutch Agency for Environment and Energy.

The final document strongly pronounced energy conservation, equal consideration of demand side and supply side measures, a strong stimulation of co-generation, and a pronounced fuel shift to natural gas. This strategy document, however, has not been adopted, but served as a base for the elaboration of the new LTDP instead.[14] Compared to the initial strategy, the LTDP shows crucial weaknesses.

The principal target of the LTDP is to "*provide stable and high quality energy supply to consumers at optimum prices and with such a development of the fuel and energy sector that Estonia's GDP could reach the level necessary for the accession of the European Union*" (*Long Term Development Plan for the Estonian Fuel and Energy Sector* 1998). This traditional, supply oriented definition contrasts with the formulation suggested by the *Integrated Energy Strategy* where energy demand itself is considered a variable to be influenced and the central objective has been defined as "*a guaranteed provision of the demand for energy which in itself is the result of an efficient as possible use of energy, at least costs to society and balanced against the demands from a sustainable development*." (Tebodin et al. 1997). The initial strategy had a explicit environmental bias with emphasis on energy conservation and sustainable development.

The initial strategy demanded "an active and stimulating energy conservation policy going far beyond the present activities of the government in terms of activity and financial allocations" (Tebodin et al. 1997). The document included a broad set of policy instruments based on a rough time-table and financing proposals. The proposed measures include preferential treatment of CHP systems, gas fired combined cycle units, gas turbine based CHP plants, enhanced utilisation of waste heat from existing steam turbines at the *Balti PP*, a substantial reduction of electricity generating capacity from the current level (3,000 MW) to 1,800 - 2,050 MW around 2005, support for energy service companies, a

[14] Information provided by Ms. Ell-Mari Koppel, Ministry of Economic Affairs, Head of the Energy Department.

$CO_2$ emission tax, a small levy on energy consumption, active promotion of bio-mass to the technical and economically feasible maximum, and a balance of supply and demand side measures. The share of oil shale in the energy balance was expected to drop significantly from 60 % to 30 % or less within one decade.

Even if one may argue that the original strategy perhaps did not adequately take into account the severe socio-economic constraints and repercussions of a radical diversification of the fuel balance its strengths are evident: the pronounced support for energy conservation and a balanced application of supply-side and demand side oriented policy measures.

Compared to the original strategy document, the finally approved LTDP presents a rather vague and loose policy framework. Its main structural weaknesses are poor priority setting, lacking sub-targets and measures, lacking operability and implementation orientation. According to the LTDP, oil shale will also have a dominant share in the fuel balance in 2010. Its relative share, however, is expected to decrease modestly from 62 % in 1995 to 47 - 50 % in 2010. The share of renewable energy sources together with peat projected for 2010 (13 %) has been already achieved in 1998 (Kallaste et al. 1999). According to the LTDP, "*efficiency improvements in fuel and energy production, conversion and distribution must practically compensate for the projected annual 2 % increase of energy demand*" The underlying assumptions are explained only superficially. It is difficult to evaluate the plan unless it has not been concretised by the respective target programmes. Another weakness is that the restructuring and privatisation issues are excluded.

*Table 8: Expected changes in the Estonian primary energy supply*

| | 1995 | 2005 | 2010 |
|---|---|---|---|
| | | - % - | |
| Oil Shale | 62 | 52 - 54 | 47 - 50 |
| Peat, wood, renewables | 8 | 11 | 13 |
| Fuel Oils | 6 | 5 | 4 - 5 |
| Motor Fuels | 13 | 14 | 14 |
| Natural gas | 11 | 16 - 18 | 18 - 22 |

*Source: Long-term Development Plan for the Estonian Fuel and Energy Sector (1998)*

In 1992 the *Stockholm Environment Institute* and its Tallinn branch launched a regional programme to find possibilities for a sustainable and balanced development of the *Ida-Viru* County, the region where oil shale mining, processing and combustion are concentrated and which is the main environmental hot spot in Estonia (*Programme of Sustainable Development of the Ida-Viru-County*). This initiative has been supported by the Estonian Ministry of Environment, local authorities, and the *United Nations Development Program*. The process led to the publication of newsletters and other publications

defining the problem and suggesting policy approaches but has gradually lost momentum. A main weakness has been that industry and business stakeholders and other affected ministries were not incorporated into the process. Furthermore interest conflicts among local governments emerged which turned out to be unbridgeable.[15] Recently, the *World Bank* has signalled interest to support a regional problem-solving approach to energy sector restructuring simultaneously tackling with the complex socio-economic, environmental and regional development problems in *Ida-Viru.*[16]

#### *3.4.4.2.4 Integrating Environmental Concerns into Energy Policy – the Case of Restructuring the Estonian Oil Shale Mining and Electric Power Industry*

In the following, we refer to the assumption that consequent de-regulation and introduction of competition in the Estonian electricity generation sector is suited to have positive environmental effects particularly if combined with well designed supporting environmental policy instruments. Vertical disintegration (unbundling) of *Eesti Energia AS* and a consequent removal of market entry barriers for independent power producers and auto-producers would facilitate the displacement of oil shale based electricity by electricity based on less polluting fossil fuels, co-generation, renewable energy sources, and electricity imports. The designation of an independent transmission system operator and third party access to the transmission and distribution networks are core requirements imposed by the EU Electricity Directive (96/92/EC). The transposition of these requirements has started in Estonia by means of the Energy Act. *Eesti Energia* has introduced separate accounts for electricity generation, transmission and distribution on January 1st, 1999 and third party access has been formally set up by the Energy Act. However, the access conditions have not been concretised and there is no regulation for transit fees and public service obligations.

The initial restructuring and privatisation plan for *Eesti Energia AS* and *Eesti Põlevkivi* which has been approved by the Parliament of Estonia on December 31st 1997, envisaged a vertical disintegration of *Eesti Energia* and a separate privatisation of the oil shale mines, the power plants, the distribution networks and the transmission network. This plan has been only partially implemented (privatisation of two distribution networks). Since 1998 an almost opposite trend seems to be prevailing in the privatisation policy of the Government.

On June 1st 1999, the Estonian Government decided to distribute the shares of the fully state owned JSC *Eesti Põlevkivi* between *Narva Elektrijamaad AS*, a (future) subsidiary of *Eesti Energia AS* which shall be based on the two Narva based oil shale fired power plants, on the one hand and the state on the other hand. *Narva Elektrijamaad AS* (JSC

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[15] Information provided by Ms. Mari Jüssi, Tallinn branch of the Stockholm Environment Institute.

[16] Information provided by Mr. Kristjan Kitvel, Tallinn Branch of the World Bank Regional Mission Baltic Countries

Narva Power Plants) is to receive 51 and the state 49 of the shares of *Eesti Põlevkivi*. 49 of the shares of the future *Narva Elektrijamaad AS* will be sold to a strategic investor to be selected through negotiations. The state owned power utility *Eesti Energia AS* will keep 51 of the shares of its subsidiary (Baltic News Service, 2.6.1999).

The negotiations with *NRG Energy Inc*., a subsidiary of Minnesota-based *Northern States Power* on the privatisation of *Eesti Energia AS* started in 1996. NRG has submitted already two business plans which have been rejected by the Government. According to the Baltic News Service, a company representative assured that NRG would continue using oil shale for electricity production for at least 15 - 20 more years. NRG would like to sign agreements on oil shale deliveries for this period. The representative denied reports that NRG would use natural gas from Russia instead of oil shale once it gains control over the power stations. According to the representative, a long-term local supply of fuel is a cornerstone of the business strategy of *NRG Energy Inc*. (Baltic News Service 8.1.1999). In September 1999, *NRG Energy* and the Estonian Government have reached an agreement under which the state will secure a market for the entire output of the power stations by a wholesale agreement (Baltic News Service, 13.9.1999).

Compared with the initial privatisation concept, the current developments are rather to increase the degree of vertical integration and to interfere competition in the sector. The oil shale mines shall be merged into one subsidiary with the two Narva based oil shale fired power plants, the privatisation of distribution networks has been considered a mistake, *Eesti Energia AS* favours the integration of the transmission network (national grid) and the remaining distribution network companies into one grid company. The leading rationale behind these processes is to integrate the oil shale mining business and oil shale power plants into one single value chain, to keep the oil shale price under control and raise the competitiveness of oil shale based electricity (Vali 1999). Further motives are to preserve the economies of scale, stabilise the position of *Eesti Energia AS* in a future competitive electricity market and to expand the market share by increasing electricity exports (Eesti Energia 1998).

These developments are conflicting with the requirements of the EU Electricity Directive. A merger of the oil shale mines with the electricity generation sector might be considered economically reasonable. One may argue, instead, that competition in the mining sector should be facilitated because *Eesti Energia AS* is the main, but not the only domestic consumer of oil shale. The integration of NRG Energy as a strategic investor will probably lead to a considerable inflow of capital and facilitate the modernisation of the oil shale based power plants. On the other hand, the structural weaknesses of the energy system will hardly be removed and its ecological modernisation retarded. Particularly, the export drive of the energy industry has to be seen critical from an environmental point of view.

#### *3.4.4.3 Networking of Actors*

Crucial for effective and innovative policies is the question whether, and to what extent relevant stakeholders are incorporated into policy-making. Furthermore, the development of multipartite patterns of environmental governance has been proven to be facilitator for effective environmental policies. Multi-actor governance networks seem particularly well suited to the structural characteristics of environmental problems which are both complex and dynamic and which crosscut traditional jurisdictional divides (Meadowcroft 1999, p. 227).

From the foregoing chapters follows that we have to differentiate networking strategies and practices of the different ministries involved in environmental and energy policy-making. Whereas environmental policy-making which is the responsibility of the Estonian Ministry of Environment is increasingly based on *pluralistic-inclusive* actor configurations, energy policies which are the domain of the Ministry of Economic Affairs can be described by rather *exclusive* actor configurations. In order to adequately assess the specific networking activities and coalition building processes, one has to investigate the respective government/business, government/NGO, business/NGO and government/business/NGO inter-relationships and interaction in more detail (Meadowcroft 1999). Such an effort, however, requires complex and time-consuming research methods the application of which lies beyond the scope of this study. We can only refer to some very general observations.

So far the Government has performed a triple function in the energy sector (owner, policy-maker, regulator). Ownership interests should not dictate how a sector is regulated and for that reason it is essential that regulatory functions should be separated more clearly and transparently from the shareholding function (Ernst & Young et al. 1997). The personal, communicative economic and financial relationships and interactions between the Ministry of Economy, the Energy Market Inspectorate and the mining and electricity industry are rather non-transparent but must be considered as highly developed.

The interviews revealed strong links between the energy industry and the financial and service sector. The former *Hoiupank* (Savings Bank) senior manager and administrative director of the national energy company *Eesti Energia AS*, has been elected new chairman of the board of the JSC *Eesti Põlevkivi*. This and further important changes in the top executive management of *Eesti Energia* and *Eesti Põlevkivi* are reported to have induced a profound change in the business culture and corporate identity of these state-owned companies (Eesti Energia 1999a). Values such as rationality, cost-effectiveness, profitability, self-regulation and competition are increasingly replacing traditional socialist and technocratic values. The energy industry has well established relationships with national business associations, particularly the Estonian Chamber of Industry and Commerce which is a rather influential actor in Estonia. The energy trade union proved to be a relatively powerful actor, too, exerting a high mobilisation power in organising protest actions and demonstrations against the closure of oil shale mines during 1999.

We have already pointed out to the shortcomings of the current institutional structure in the area of energy conservation. An energy conservation agency on the central state level could serve as a crystallisation point performing important co-ordination and networking functions. The current institutional setting does not facilitate networking among investors and energy efficiency business stakeholders. The regional energy centres which assist municipalities and local utilities in energy conservation and energy planning have a rather isolated position. The organisations on the central administrative level do not have the capacities and capabilities to perform this function. On the other side, Estonia is involved in numerous *international initiatives and networks* in the field of energy conservation.[17]

## 3.5 Socio-Economic Constraints

There are severe short term and particularly structural socio-economic constraints which have to be adequately taken into account when assessing the effectiveness of environmental policies in the Estonian energy sector.

Although the Baltic countries have made considerable progress in restructuring their foreign trade structure, the Russian financial and economic crisis has put a severe burden on the Baltic economies, particularly affecting those industries oriented to the Russian market and the financial sector. This resulted in a cut of public expenditures by means of supplementary budgets for 1999 succeeding the surplus budgets of the previous two years. In June 1999, the Estonian Parliament decided to cut EEK 1 billion (USD 66.5 million) from the initial EEK 18.45 billion state budget which has been based on a 4 GDP growth estimate (The Baltic Times, April 29 - May 5, 1999). After rapid economic growth in 1997 when the GDP growth rate reached 10.6, economic recovery is expected to take place slowly.

A fundamental restructuring of the Estonian oil shale and electricity complex faces serious structural socio-economic challenges. Policies need to tackle the problem of overemployment in these industries which are concentrated in the main industrial area of the country. The Ida-Viru county has suffered already heavily from economic restructuring with the official unemployment rate reaching 13 - 14.9 in 1998. The average unemployment rate in Estonia was 9.6 in the second quarter of 1998 (Ministry of Economic Affairs 1999, p. 16).

The situation is further complicated by the fact, that the workforce in the oil shale mines and the oils hale based power plants consists mainly of non indigenous, Russian immigrants. The oil shale and oil shale based power complex employs approximately 10.000 persons which makes for 1/6 of the region's workforce (Kallaste et al. 1999, p. 176).

[17] Important to mention are the following initiatives and networking activities: Agenda 21 for the Baltic Sea Region (Baltic 21), Baltic Energy Efficiency Group, Baltic Energy Task Force, Baltic Action Group on CHP, Baltic Sustainable Energy Co-operation, Baltic CHAIN Project (Hammar 1999).

The Russian speakers represent almost 85 of the total workforce, 80 of them being without nationality. Social and political tensions are already present. This makes restructuring of this industry a highly sensitive issue also on an international level. The complexity of the problem calls for a *regionally focused* problem solving approach addressing the environmental, social and privatisation/restructuring issues. Multipartite actor configuration incorporating all affected stakeholders should be therefore considered.

The costs for energy carriers put a severe burden for the structural adjustment of the national economy and foreign trade balance. In 1994, of all CEE and EU countries the share of the national costs in national GDP has been the highest for the Baltic countries. In Estonia this ratio was close to 25, whereas in Latvia it even exceeded 30. The CEE average was close to 17, the EU average between 2 - 3 (PHARE Multi-Country Energy Programme 1997). In 1996 fuel imports amounted to EEK 3.7 billion or 9.5 of total imports. A shift to a more balanced fuel mix and climate change mitigation strategies, which would imply an increasing reliance on less polluting fossil and renewable energy sources, particularly natural gas, are likely to cause severe negative effects on the foreign trade balance and the balance of payments which already show considerable distortions.[18]

## 3.6 Points of Action for Future Institutional Capacity-Building

This policy analysis tried to assess current environmental policies in the Estonian energy sector. The first part described the core actors, the major policies endorsed, the respective policy instruments, and general trends of environmental expenditure. In the analytical part of the study we examined selected policy variables which are crucial in facilitating effective and innovative policies. This included an in-depth analysis of policy instrumentation, policy styles, and actor configurations in the Estonian energy sector. In the following, we summarise central findings of the study and formulate points of action for future capacity building.

Estonia is well advanced in designing an environmental strategy for the pre-accession period. The National Energy Strategy and the National Environmental Action Plan enclose a policy framework for the energy sector. However, environmental and energy policies require more co-ordinated efforts. Particularly, in the beginning of the transition period 1992 - 1995, Estonia has developed promising legislative, institutional and planning tools in order to overcome insulated sector decision-making and promote cross-sector policy integration. However, these institutions remain rather weak in fact and policy integration in the area of energy and environment is still a major drawback. Environmental commitment seems to be rather low in the Ministry of Economic Affairs. There is still a lack of an *integrated* energy policy matching economic targets and de-

[18] A recent monography which has been published by the Tallinn branch of the Stockholm Environment Institute contains a comprehensive macro-economic assessment of different climate change mitigation options based on MARKAL models (Kallaste et al. 1999).

mands (security of supply, price policy, restructuring, privatisation) with environmental and resource protection requirements.

Oil shale seems to remain the dominant fuel for the short and medium term. Restructuring of the oil shale mining and oil shale based electricity sector is a highly complex task. Such an effort requires a balanced problem-solving approach addressing the socio-economic, regional and economic challenges. Regional approaches should be reinforced and combined with an engagement of international financing organisations. Multipartite actor configurations incorporating the relevant stakeholders facilitate the efficiency and effectiveness of restructuring policies.

Despite the energy conservation program, energy conservation measures are rather based on a haphazard approach. So far there has not been any systematic, target oriented energy conservation policy (not to speak of a consistent comprehensive climate change policy). The current institutional framework is inadequate. The interviews clearly revealed that a public institution for guiding energy saving activities is needed on the central state level. This institution should be relieved of daily administrative tasks and enjoy sufficient freedom of action. An energy conservation agency on the central state level could perform important co-ordination and networking functions.

Compared to many other transition countries, instrumentation in the field of energy efficiency and renewable energy sources is generally underdeveloped. There is a lack of demonstration projects in the field of energy conservation, and particularly with regard to renewable energy sources. Promising capacity-building measures on the local state level include the foundation of three regional energy centres and the development of an investment preparation facility for regional development and energy planning. These initiatives are supported by the EU PHARE Programme.

Local experts recommend the establishment of a separate energy conservation/efficiency fund which could be co-financed by the state budget and a part of the pollution charges. This organisation could support research programmes, soft loans, regional energy conservation plans, energy audits and energy saving campaigns (Vares 1999a, AX Consulting 1998). These functions could be also performed by the Environmental Fund, a respective reorganisation of this organisation provided. In any case, measures should be undertaken oriented to re-shift a part of the pollution charge revenues for energy conservation projects.

Numerous small-scale energy investment projects have been implemented in Estonia since 1991. However, the targeted energy saving objectives have not always been achieved and a recent post implementation analysis of selected energy (conservation) projects which have been mostly implemented with foreign assistance draws a rather critical picture (AX Consulting 1998). Another drawback is that the bulk of projects focus on the supply side. State support for especially for utilising the vast energy conservation potential in the end use sector is very weak. Additional financing mechanisms need to be developed. In order to strengthen policy implementation the introduction of

performance monitoring procedures and post implementation evaluation policies should be secured.

# 4 Existing Co-operation

As a post-soviet country, Estonia shares now the same problems with other post soviet counterparts – unjustified lavish energy use and careless attitude towards the ambient environment. As a matter of fact, Estonia is not bestowed with mild climate and lavish environmentally benign energy resources to lessen the energy need and exempt Estonians from many environmental problems, always accompanying concentrated energy use and excessive consumption. To obtain the needed resources and know how for alleviating the situation and preparing itself for the accession, Estonia has always been in favour of developing a large-scale co-operation with other European countries. In the field of environment and energy, Estonia has had state level co-operation links with six current EU member states and in addition with Norway, Switzerland and USA. Co-operation policy in Estonia is not only focused for gaining benefits from the partners but the main trend in co-operation policy is to build it on equal partnership principle, giving to the partners in return Estonian long time local experience and creative attitude in the given subject.

The main environmental problems in Estonia are caused by the oil shale based energy sector. While other environmental problems in Estonia have more or less a local character, the problems, concerning big thermal power stations in the north-east of Estonia, providing almost all the electrical power in Estonia, encompass the whole country and go even beyond the state borders. Therefore talking about the successful co-operation projects in the field of environment and energy, the main topic to be discussed should be the methods to decrease the harmful effect of oil shale mining and oil shale based energy production to the ambient environment. It means that oil shale based air pollution should be tackled as the main priority. Very important is also the landscape restoration of the oil shale mining area. One of the major environmental problems is undoubtedly the renovation of sewage systems. Especially import is to carry out this renovation in places with unique vulnerable nature systems. Talking about problems in the energy sector itself, the efficiency of energy production and energy conservation are the main areas of interest one should focus one's attention to get the most tangible effect for improving the situation in the energy sector from the economical point of view. To make the energy system more sustainable, it is needed to concentrate one's attention on local renewable energy resource. As almost half of the Estonian territory is covered by forest, the biomass is undoubtedly the main renewable energy resource. On the western coastline an in the archipelago of Estonia wind energy has considerable potential for commercial use to generate power and space heating. In big cities, renovation of district heating systems is one of the main targets for enhancing the efficiency of energy distribution. The picture of main environmental and energy problems in Estonia would not be complete without paying the needed attention on tertiary education and legislation problems in the accession process in the fields of environment and energy. To wrap up into a short list the main items in the field of environment and energy in Estonia, which should be repre-

sented in the co-operation process during the accession period, one comes up with the following list:

1. Tertiary education in the field of environment protection and sustainable energy application.
2. Oil shale industry and mining.
3. Promotion of renewable energy application (biomass and wind energy).
4. Efficiency of energy production and consumption.
5. Redevelopment of mining areas in oil shale regions.
6. Renovation of waste water treatment facilities and dumping grounds.
7. Reduction of $CO_2$ emission into the atmosphere from the stationary objects.
8. Energy conservation measures and campaigns.
9. Increase of renewable energy share in the primary energy supply.
10. Decrease of air pollution from stationary sources (oil shale mining and power production).
11. Adjustment of environmental and energy related legislation to the EU legal acts.

## 4.1 Existing Co-operation Links

*Table 9: The Estonian most important export collaborates*

| | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|
| | - % of the whole turn over - | | | | |
| Finland | 20.7 | 18.1 | 21.5 | 18.3 | 15.7 |
| Russia | 22.6 | 23.4 | 17.7 | 16.6 | 18.8 |
| Sweden | 9.5 | 10.8 | 10.9 | 11.6 | 13.5 |
| Latvia | 8.6 | 8.3 | 7.5 | 8.3 | 8.6 |
| Ukraine | 3.6 | 3.1 | 3.7 | 5.0 | 5.0 |
| Germany | 8.0 | 6.9 | 7.2 | 7.1 | 6.1 |
| Lithuania | 3.7 | 5.4 | 4.7 | 5.7 | 5.6 |
| **Total (in billion EURO)** | **0.7** | **1.1** | **1.3** | **1.6** | **2.6** |

*Table 10: The Estonian most important import collaborates*

| | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|
| | - % of the whole turn over - | | | | |
| Finland | 27.9 | 30.1 | 32.8 | 29.2 | 23.4 |
| Russia | 17.2 | 16.7 | 16.3 | 13.5 | 14.4 |
| Germany | 10.7 | 9.9 | 9.5 | 10.0 | 10.1 |
| Sweden | 8.9 | 9.0 | 8.5 | 8.2 | 9.1 |
| United Kingdom | 3.6 | 3.2 | 8.5 | 3.3 | 3.1 |
| **Total (in billion EURO)** | **0.8** | **1.4** | **1.9** | **2.5** | **3.9** |

*Table 11: Co-operation Projects on Environmental Issues*

| No | Country | Number of projects | Total budget | Total budget per capita |
|---|---|---|---|---|
| | | | - EURO - | |
| 1 | Finland | 116 | 35,133,503 | 6.892 |
| 2 | Denmark | 51 | 23,905,148 | 4.581 |
| 3 | Switzerland | 3 | 22,553,479 | 3.206 |
| 4 | Sweden | 54 | 8,716,063 | 1.002 |
| 5 | Norway | 3 | 1,939,870 | 0.460 |
| 6 | European Union | 43 | 59,293,747 | 0.159 |
| 7 | Germany | 8 | 2,187,864 | 0.026 |
| 8 | Netherlands | 1 | 192,677 | 0.015 |
| 9 | USA | 2 | 339,246 | 0.002 |
| 10 | United Kingdom | 3 | 37,262 | 0.001 |

*Table 12: Co-operation Projects on Energy*

| No | Country | Number of projects | Total budget | Total budget per capita |
|---|---|---|---|---|
| | | | - DEM - | |
| 1 | Denmark | 32 | 14,901,696 | 2.857 |
| 2 | Finland | 9 | 2,615,221 | 0.513 |
| 3 | Sweden | 15 | 3,011,501 | 0.346 |
| 4 | European Union | 19 | 13,560,015 | 0.036 |
| 5 | United States | 1 | 1,333,872 | 0.006 |
| 6 | United Kingdom | 1 | 83,239 | 0.001 |
| Remark: | Germany is not represented in this break-down of co-operation because energy projects has not been in the list of subsidised by German Government co-operation projects with Estonia. | | | |

## 4.2 Best Practice Projects

Co-operation projects are very versatile in subjects, style, parties involved etc. To make a choice for finding the projects that can be called success stories we need certain criteria which can help us in our demanding task of coming up with the choice of positive projects. The selection criteria for this report are as follows:

1. Bright, major impact: many organisations involved, the effect large scale and long lasting.
2. Replicable: the major features can be copied easily in other places and it can be tailored to work under different circumstances and conditions.
3. Innovative: should be ground breaking in the particular field it is related to.
4. Building internal country capacity: should enhance the internal capacity of coping with similar problems in the future.

Using the above given criteria, the next five co-operation projects have been selected as the best practise examples in co-operation process.

### 4.2.1 Procurement of Ambient Air Quality Monitoring Equipment

#### *4.2.1.1 Overview*

*Donor programme:* PHARE national programme

*Project duration:* March 2000 – December 2000

*Background:* The air quality in Estonia is not uniform. There is a big difference between the air pollution level in the North East of Estonia where the big thermal power stations run on oil shale are situated and in the rest of the country. About three quarters of air pollution in Estonia has its origin in the North East. The air pollution problem is aggravated because of the difficult social situation in the oil shale region. The employment rate in the North East of Estonia is the lowest in the country and local people are prone to hide the environmental problems being afraid to lose their jobs if the production load comes down. Therefore, it is hard to get the reliable information about the local air conditions. As to the situation in big polluting factories, then outside the North East oil shale region there is only Kunda Cement factory in Kunda settlement whose pollution level goes up to the oil shale fired power plants. During the last years, the situation in the premises of Kunda Cement factory is much improved due to the new filters but the need for a regular monitoring in this particular region is still there. Reliable information about the air conditions in Kunda region poses again a problem as people involved in the cement production process are reluctant to disclose it due to an apprehension about the security of their employment. All the above said points to the need to have good automatic devices for air monitoring to decide about the real environmental situation in the problematic regions in Estonia. Unfortunately, most of the monitors in use at the present are more than 16 years old and in bad condition. The data collection system used is ineffective and does not allow the automatic generation of reports in required EU formats. Therefore there exists an urgent need for investment to keep the existing air quality monitoring system in operation, to increase the number of sites monitored and to extend the list of measured pollutants to comply with the EU directives.

*Compliance:* The project is the investment item of Air Accession Project for implementing the Environmental Accession Programme.

*Description of the project:* Preparation and delivery of the equipment and material together with arranging the operational training.

*General Goal:* Provision of equipment and software for monitoring the ambient air quality in Estonia for improving public awareness about the air quality.

*Objectives:*

- To obtain and set up an independently operated complete integrated set of equipment, accessories, hardware and software to provide air quality data associated with meteorological data in acceptable form and quality for Estonia.
- To be able to generate suitable public reports about the results of air quality measurements, especially in case of exceeding the limit values and thresholds.
- To be able to send the information on monitoring results in the required format to the relevant European Unions structures responsible for data collection.

- To fulfil the requirements of EU Framework Directive on Air Quality according to which the measurement of air quality must be carried out in agglomeration with population higher than 250,000.

#### *4.2.1.2 Compliance with the selection criteria*

*Bright, major impact:* The outcome of the project makes the air quality data all over Estonia available in public not only in regular form on paper but online as well. It would be a radical step forward to put the air quality in Estonia under an overwhelming close public control and therefore guarantee the improvement of the environmental situation in critical regions.

*Replicable:* The main outlines of the project can be easily copied in other countries as well tailoring these to the local conditions and this way contributing for setting up a broad air quality monitoring set in Central and Eastern Europe. It would be very welcomed to have the air monitored at the EU level in the neighbouring Eastern European countries as well, giving to the Estonian air quality data a good background comparison.

*Innovative:* The project is ground breaking in changing public awareness about the air quality situation in Estonia. If up to now only some professional people involved in air quality monitoring and an handful of fully dedicated environmentalists were aware of the air quality situation in Estonia then after the implementation of this project the situation would be quite different. From this project on all people in Estonia notwithstanding to there walk of life or educational background would be able to put themselves in the picture about the real air quality figures in Estonia and keep the situation under their close surveillance in the future. The outcome of the project gives us the potential to provide all the weather concerning information in Estonian newspapers in addition to the temperature and some general qualitative weather linked data with the air pollution data for different regions in Estonia as well. Therefore, it would be a big leap upward in environmental education for the whole population of Estonia.

*Building internal country capacity:* The positive effect of focusing public attention to the air quality would enable for the years to come to use more tax payers money for maintenance and refurbishing the air quality monitoring system in Estonia and therefore make the air monitoring business self sustainable in the future.

#### *4.2.1.3 Summary*

There are many parameters determining the environmental situation for a certain region. Some of these parameters are local, but the air condition is one which does not leave anyone untouched not only in the very region but it may be rather influential for the adjacent regions as well. Therefore talking about the environment, air quality is one of the decisive factors one should pay an outmost attention concerning the welfare of the people involved. As the air quality is the concern of everyone in the particular region, the enhancement of public awareness about the air pollution is one of the first priorities in

the environmental education and it should be kept under as broad as possible public control. As these above-mentioned aspects are just the main tasks the project serves for, the choice of this project as one of the very best is justified.

### 4.2.2 Capacity 21 in Estonia

#### *4.2.2.1 Overview*

*Donor programme:* United Nations Development Programme

*Project duration:* August 1997 – March 2000

*Background:* In spite of rather active and vehement campaign for sustainable lifestyle by the green minded people, the concept is not yet well rooted among the bulk of population in Estonia. The transition process in Estonian economy has made the material side of life for many people in Estonia rather difficult to cope with and therefore the noble ideas of sustainable development have not got the best soil to get rooted among all social layers of people. To improve the situation, a lot of hard effort and personal initiative is needed to make the concept of sustainable lifestyle well known and popular not only among the nature conscious people but literary to every citizen of Estonia.

*Description of the project:* The overall strategy of the project is focused to strengthen Estonia's capacity for entering the 21the century, characterised by a sustainable economic development, solution of social problems and proper use of natural resources. This capacity will be achieved through integration of principles of sustainable development into state, sectional and local strategies and master plans. This improves communication and co-ordination between essential persons and institutions of the development process and promotes broad participation of different social groups for creating the Estonian Agenda 21 as a national development strategy.

*Objectives:*

- To develop the Estonian Agenda 21 as the Estonian National Long Term Sustainable Human Development Strategy for the 21st century.
- To promote local community planning and Local Agenda 21 development processes.
- To enhance environmental and sustainable human development awareness ensuring that sustainable development principles will be commonly understood through shared analysed knowledge and experiences.

*Main Outputs:*

- Composing, publishing and distributing the second edition of the Local Agenda 21 Guidebook.
- Creating a WEB site in the Internet based on the current Estonian Sustainable Development Database (www.agenda21.ee).

- Establishing an online information distribution through an email discussion forum in the Internet.

#### *4.2.2.2 Compliance with the selection criteria*

*Bright, major impact:* Following the guidelines of the Rio process, the project is targeted on enhancing public awareness on the main features of sustainable lifestyle,. It is focused to all social layers and to a wide age range of population, using all the contemporary means of media to reach the established goals.

*Replicable:* The project can be easily copied in other countries and tailored to various special local conditions.

*Innovative:* In spite of many limited efforts to call the public attention to the drawbacks of the consumption-oriented life style, Estonia has missed a major large-scale campaign for sustainable development principles. This project serves as the first of such large-scale efforts to change the public attitudes from the consumption lifestyle to other options not conflicting so much with our ambient environment and the welfare of the future generations.

*Building internal country capacity:* Material side of our life is a rather important factor of determining the welfare of people. But it should not be prevailing. Our attention should not be focused so much on gaining material welfare but developing one's educational level and having a share in all the mental values created by the humankind over the last millennium. If we cannot to do away with the prolific consumer oriented lifestyle, no progress in economy would help us to avoid the catastrophic consequences of this trend to the future generations. Therefore, change of public attitudes should be considered as the major internal capacity on our path towards sustainable lifestyle. This is just the very goal of the project.

#### *4.2.2.3 Summary*

Literally in a couple of days the humankind is about entering a new millennium. A long history is left behind there to go through again but in our minds. It is high time to think about the long path beaten and learn the lessons to be better prepared to conduct our lives in the next century. It is clear that the industrial countries cannot continue with their consumption-oriented style of life. The attitudes should be changed if there is still anything that helps. One cannot expect the change of our lifestyle to take place spontaneously without an external assistance for drawing our attention to the aspects of behaviour that should not be taken with to the next millennium to be given as a legacy to the future generations. We need a strong public pressure to change our well-rooted principles of behaviour and therefore this project is more than welcomed.

### 4.2.3 National Environmental Action Programme

#### *4.2.3.1 Overview*

*Donor programme*: April 1997 – June 1998

*Project duration*: PHARE National Programme

*Background:* The planned centralised economy is a long trotted path for Central and Eastern European countries. Negative experience of this common history still fresh in the minds of people. It has made the adjective "planned" rather unpopular in every context. But to avoid common planning altogether would be the other extreme and not better from the previous first. Therefore, it is extremely important to come up with projects that help people to overcome the psychological barrier of apprehension against envisaging in a common plan our future actions.

*Description of the project:* The methodology of the project is based on the experience of carrying out Central and Eastern Europe Environmental Action Plan (Lucern) and other national environmental action plans in some Central and Eastern Europe states. There was formed 10 ad hoc groups to work out the main trends of the Plan, with involving altogether 264 specialist all over the Estonia. A uniform preference system was applied to all actions evaluated.

*Objectives:*

- To provide a consensus-based list of needed state level environmental actions lined up according to their preference, factoring in the needed financial means and indispensable expenses.
- To be used as a communication tool between the Government and stakeholders, giving a clear pattern of the attached importance to various environmental problems by all major interest groups in Estonia.
- To be used as a guideline for working out various environmental projects.
- To be applied as a co-ordination tool for multiparty environmental projects.
- To enhance the democratic development processes in Estonia for reaching consensus between a broad range of interest groups in Estonia.

*Results*: On 26th of May 1998, the Government adopted the Estonian Environmental Action Plan.

#### *4.2.3.2 Compliance with the selection criteria*

*Bright, major impact:* In general, the number of people involved in co-operation projects is about from five to ten. Therefore, the experience of organising the teamwork for this size of group is in full confidence there. But this project is unique in the sense that more than quarter of hundred people was not only actively involved but also highly organised

for working as a team. This was a real break through considering the governing individualistic character of Estonian farmer origin people, acquired in a constant fight against foreign invaders and the fury of the elements. As all major stakeholders in the environmental field were involved in the project, the accomplished plan can be considered as a document about the collective knowledge of the environmental situation in Estonia and a common vision about the needed actions to improve it. One cannot expect this document to solve all the problems but it serves as a paragon guideline to inspire good ideas for future effective projects.

*Replicable:* There is absolutely no problem of making something similar in style in other countries as well. The co-operation technique applied is universal and does not depend on concrete peculiarities of different places and social structures much.

*Innovative:* This project is the first attempt to formulate a common picture of Estonian environmental situation supported by all the potential stakeholders. The actions envisaged in the document can be considered as the common will of Estonian people to be implemented.

*Building internal country capacity:* The Estonian Environmental Action Plan as the outcome of this project is a very relevant official document determining the broadly accepted priorities for various environmental problems to be tackled in the years to come.

#### *4.2.3.3 Summary*

Estonia is not void of environmental problems. To tackle all these problems different tactics should be applied. In some cases, individual approach is the best, based on the experience and knowledge of local people. But there are quite a few serious problems requiring a consensus between all the environmental specialists to find the best strategy for overcoming all the snags and bottlenecks for eliminating the problem. For the latter mentioned problems, the outcome of the project is an outmost important tool to base one's actions upon.

### 4.2.4 Establishment of Regional Energy Centres

#### *4.2.4.1 Overview*

*Donor programme:* PHARE national programme

*Project duration:* May 1995 – September 1999

*Background:* Estonian energy sector is in the period of transition for living up to the EU level of energy efficiency and quality. Quite a few good projects have been accomplished to contribute to this transition. But as a rule all this projects have been planned and carried out centrally, through the Ministry of Economic Affairs and under the guidance and co-ordination of some central consultancy offices with foreign experts involved. Because of that, many local but rather urgent and relevant energy problems have been neglected.

Besides that consultancy in the energy field is not yet well rooted in Estonia at present. Therefore, many wrong decisions are made due to ignorance and lack of experience in choice of right people for asking advice from. For solving these local problems, another strategy different from a central one is needed. In many cases the best solution is rely on local specialists but assist them with some needed knowledge about new energy technologies and production methods. It is import that this energy related aid should be available on the spot, avoiding the mistakes of getting a wrong advise from people not having any knowledge about the local conditions and being focused only on profit making.

*Description of the project:* Establishment of three regular energy centres staffed by local personnel who will train and advise the local municipalities in restructuring of the existing energy systems and in implementing of energy efficiency measures.

*Objectives:*

- Reduction of emission levels and improvement of environmental situation through assisting and training local municipalities, companies and consultants in the restructuring process of existing energy systems and in implementing of energy efficiency measures. The regional energy centres should:
- Provide information on energy issues to local institutions and companies.
- Select and train members of municipalities and companies on energy related topics in order to improve their skills on project identification, project description and loan application.
- Assist and collaborate with other institutions to carry out energy related projects in the designated regions. The information should be transferred from the central level to local levels.
- Assist the target group with initial and technical audits.

*Progress:* During the first stage of the project more than 60 local projects have been consulted, financial support was given to 14 projects, local governments have been trained in energy efficiency project management issues.

*Main results:*

- Enhanced local capability, especially in less developed regions, to define and prepare feasible projects.
- Facilities have been created for securing a substantially quicker implementation of projects in co-operation with national and international financial institutions.
- A newsletter was introduced and an Internet homepage was opened in order to increase the efficiency of information dissemination.
- Contribution in several projects for Ministry of Economic Affairs (project preselection), Ministry of Finance (feasibility studies for the Public Investment Pro-

gramme), Ministry of Environment (preparation of National Environmental Action Plan) and also in bilateral projects with Danish Energy Agency, USAID, the World Pank, Nutek and PHARE.

- Organisation of training sessions Energy Planning for municipal key persons, Energy Conservation in Domestic Buildings for home owner associations personnel and Energy Conservation for School Teachers for elementary and secondary school teachers.

*Plans for the future:*

- Assistance in preparation of loan secure projects.
- Institutional issues, management and organisation of local energy supply utilities.
- Energy related legislation in Estonia and in the Nordic countries.
- Meter instrument handling and simple energy auditing.

#### *4.2.4.2 Compliance with the selection criteria*

*Bright, major impact:* Though, only three energy centres have been established as a result of the project, the number is sufficient to cover the whole Estonian territory with professional energy consultancy. It is hard to overestimate the roll of these centres as institutions, bringing the innovate thinking of the world's best brains in energy field figuratively speaking to every village in Estonia. This strategy is also rather inexpensive compared with sending all the energy specialists in the municipalities of Estonia to some sort of tertiary education courses outside of Estonia, which choice is rather problematic for the language reasons as well. One very valuable positive feature of these energy centres is that these centres are not passive consultancy offices waiting the local people to come for some advise but these centres are very active on suggesting new methods and technical solutions by themselves. Therefore, this approach has a considerable impact to the efficiency of local energy systems.

*Replicable:* As this approach would not assume a large number of highly educated specialists to be involved, it is easily reiterated in other countries. The only subtlety is that the specialists in these centres should be familiar with the local situation, which is different from country to country.

*Innovative:* Up to now all the tertiary education and consultancy work in the energy sector have been carried out only in some central place and therefore not well adjusted to the local conditions. Through this project, for the first time in the history of energy sector co-operation projects an on site consultancy and advice on energy issues is practically possible to everyone in Estonia.

*Building internal country capacity:* As a result of this project, the promotion of the educational level in power engineering would reach the outmost remote areas in Estonia. It

would be a major contribution to the end that the whole territory of Estonia would be covered with energy specialists having in hand all the best practises of the EU energy sector to accelerate the accession process in the field of energy considerable.

#### *4.2.4.3 Summary*

Energy sector is a strategic one in the economy of any country. In reorganising the energy sector during the accession process for making it more effective and benign to the nature, it is not sufficient to use only centralised methods and apply these to the big centralised energy systems. A real break through is possible only if the energy specialists in charge of local boiler houses and district heating systems are involved in the process.

### 4.2.5 Local and regional energy planning

#### *4.2.5.1 Overview*

*Donor programme*: PHARE national programme

*Project duration:* May 1998 – December 1999

*Background:* The accession process in energy sector in Estonia is a very complicated process. In the past when the fuels have been heavily subsidised, no one was much interested about energy efficiency and saving. Now when the situation is radically changed, local people are still rather passive, waiting only for orders from the leading central organisations without being prepared to take one's one initiative. Therefore to solve local problems, one stands in need to make the local governments active through encouraging them to come up with their own vision of the local situation and to find only some fiscal aid to put these ideas into practise.

*Description of the project:* The idea of the project is to support investment projects, which are part of an overall energy efficiency improvement programme. The project support will include project preparation, an elaboration of local energy plans in order to identify the needed investments, feasibility studies, technical designs etc.

*Objectives:*

- To build up know-how and competency required for effective energy planning in communities.
- To provide assistance to local communities and cities in the energy planning activities.
- To give planned energy efficiency projects rapid and flexible technical assistance, tailored according to the actual needs.

*Progress:*

- During the initial stage of the project, 61 expressions of interest have been received from municipalities wishing to participate in the programme.

- By 1st of January 1999, already 14 projects had been launched and 9 were in the preparation state to be started soon.
- An Energy Planning Manual has been prepared by the project team and reviewed by a focus group, consisting of Estonian experts and representatives from municipalities.

#### *4.2.5.2 Compliance with the selection criteria*

*Bright, major impact:* The scope of the project is rather wide, encompassing more than twenty municipalities all over Estonia. It is important to emphasise that in principle, all municipalities had a chance to be involved and the selection made was based only on the quality and relevance of their proposals. The wide geography of the project allows to make far-reaching conclusions about the Estonian energy situation at regional level and to classify the main problems there to be solved during the accession process.

*Replicable:* The main features of the project can also easily copied in other countries. In spite of the fact that the problems are for sure different from country to country, the country level consultancy offices are prepared to know the subtleties of the local energy systems. Therefore, they should, for sure, be ready to find the needed answers to all of the local problems that have cropped up.

*Innovative:* The project is innovative from many aspects. It is the first energy project to rely entirely on the local initiative in the choice of the problems to be solved within the framework of a co-operation project. It is the first co-operation project, relying only on Estonian expertise provided by different consultancy offices all over Estonia without linking to it some foreign experts. It is the first project in which only the fiscal means are coming from abroad but Estonian firms do all the technical work with the initiative coming from the local people.

*Building internal country capacity:* There are several facets of internal capacity building involved in this project. First, it is an important milestone in enhancing the local initiative, giving to the local energy specialists a good incentive to promote their professional skills as there is a real chance to take advantage of it rather soon. Second, it is a very good incentive to Estonian energy consultant firms, promoting competition between the firms and through it giving a good impetus for them to raise their level of expertise. Third but not least, it contributes for getting more people in Estonia involved in solving energy problems and therefore raising public awareness about the energy situation, being the only guarantee for the Estonian energy sector to reach the needed level of sophistication by the end of the accession period.

#### *4.2.5.3 Summary*

The central planned economy in the past did not require much of one's personal initiative. Not having a chance to find an application to one's initiative have somehow made many potentially capable people rather passive, only waiting for some orders from the governing organisations to be implemented without contributing themselves into the

preparation of these projects. Now in the midstream of the transition period into a market governed economy, unfortunately, there is still quite a few of these people in administrative posts in the energy system. To make these people again active and interested in the transformation process, it is important to give them a chance to show their initiative and put on trial their knowledge and expertise. Only through this wide front of initiative people one can expect to change the Estonian energy sector from using fossil fuels into a more sustainable energy oriented one, relying as much as possible on local renewable energy sources and using the converted energy the most effective way.

## 4.3 Conclusions

### 4.3.1 Environmental Problems Covered by the German – Estonian Co-operation

In spite of the fact that the German – Estonian co-operation is not comprehensive and large scale, it covers the bulk of the most urgent items for the accession process. The covered areas include:

1. Environmental education.
2. Improvement of waste water treatment.
3. Oil shale industry and mining.
4. Redevelopment and ecological planning of the oil shale region.
5. Training of workers in the field of environmental protection.
6. Air pollution assessment and monitoring.

The only main area of environmental problems, relevant in the accession process, not covered by the German – Estonian co-operation projects is the *adjustment of environmental legislation to the EU legal acts.*

### 4.3.2 Evaluation of German – Estonian Co-operation

1. The German – Estonian co-operation potential in the field of energy and environment is not fully realised because of the following reasons:
   - In Germany energy sector has not been in the list of potential fields of co-operation with Estonia.
   - Estonian energy functionaries have shown little interest in co-operation in the field of energy (especially in wind energy).
   - Historic links with Scandinavian countries have been stronger (The Second World War emigrants and ethnical similarities).

2. The German – Estonian co-operation in the field of energy has been limited to some partnership in EC scientific programmes and in the field of environment the state level co-operation has been up to now only marginal compared with other Western countries:
   - share in the total expenditure – 1.4%;
   - share in the expenditure per capita – 0.16%.
3. The most perspective fields for the future co-operation:
   - In the field of environment: air pollution from stationary sources (oil shale industry);
   - In the field of energy: wind energy applications to reduce the dominance of fossil fuel based energy in the primary energy supply in Estonia.

### 4.3.3 Niches for Future Co-operation

Problems not tackled or only insufficiently represented in the co-operation process up to now:

1. Soil pollution in the premises of oil shale mining and oil shale based power production (areas of sedimentation of ash).
2. Wind energy application (especially stand-alone demonstration turbines for households in the countryside).
3. Solar panels for summer time outdoor sporting facilities (swimming pools, shower systems).
4. Appropriate legislation for renewable energy application.
5. Agricultural fallow land use for growing biofuels.
6. Biofuels from wetlands.
7. Oil production from rape and other agricultural plants.
8. CHP technology on gas and biofuels.
9. Ecotourism – critical carrying loads for various forms of the ambient environment.
10. Choice of areas and norms for the products in soft agriculture.
11. Approximation of EU legislation and norms for recreation areas.
12. Recultivation of oil shale mining sites for recreation areas.

### 4.3.4 Lessons Learnt

Lessons Learnt from the Experiences of the Track Beaten in Co-operation Process:

1. Local interest is very crucial factor for success of a project. If a project has been initiated and conducted only by high officials in a ministry without involving local interest groups, the outcome of the project has been often poor.
2. Appropriate communication tools are necessary for starting a successful co-operation project. Sometimes the lack of contemporary communication tools (digital telephone line, Internet) has made the progress of the project slow and cumbersome.
3. Financing mechanism should function smoothly to ensure the proper progress for a project. Delays in money delivery works hard on the local people involved in the project because of lack of the appropriate alternative sources for getting the needed money to go on with running the project.
4. Existing initial personal contacts are a major prerequisite for a good outcome of a project. In some cases a project has been initiated in a hurry, finding the partners only at the eleventh hour without having any personal beforehand knowledge of them. If during the project work has been discovered that the choice has not been the right one, it usually has fired back rather hard on the outcome of the project.

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# 6 Appendix

## 6.1 Energy and Environment Data

*Table 13: Energy Data, Energy and Electricty Balance*

| | Unit | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|
| **TPES (Gross Inland Consumption)** | mtoe | 10.4 | 9.5 | 6.7 | 5.6 | 5.7 | 5.4 | 5.2 | 5.5 |
| Solids | mtoe | 6.4 | 5.9 | 4.9 | 3.8 | 3.8 | 3.6 | 3.1 | 4.2 |
| Oil | mtoe | 3.1 | 2.6 | 1.2 | 1.3 | 1.2 | 1.0 | 1.2 | 0.2 |
| Natural gas | mtoe | 1.3 | 1.2 | 0.7 | 0.4 | 0.5 | 0.6 | 0.6 | 0.6 |
| Other (1) | mtoe | -0.4 | -0.2 | -0.1 | 0.0 | 0.2 | 0.3 | 0.3 | 0.6 |
| **Net Imports** | mtoe | 4.6 | 4.1 | 2.3 | 2.1 | 2.2 | 2.0 | 2.3 | -0.9 |
| Solids | mtoe | 0.8 | 0.8 | 0.6 | 0.4 | 0.4 | 0.3 | 0.5 | -0.1 |
| Oil | mtoe | 3.1 | 2.5 | 1.3 | 1.5 | 1.3 | 1.1 | 1.2 | -0.2 |
| Natural gas | mtoe | 1.3 | 1.2 | 0.7 | 0.4 | 0.5 | 0.6 | 0.6 | -0.2 |
| **Gross Electricity Generation** | TWh | 17.2 | 14.6 | 11.8 | 9.1 | 9.2 | 8.7 | 9.1 | 9.2 |
| Nuclear | TWh | | | | | | | | |
| Hydro & wind | TWh | | | 0.0 | 0.0 | 0.0 | 0.0 | | |
| Thermal | TWh | 17.2 | 14.6 | 11.8 | 9.1 | 9.1 | 8.7 | 9.1 | 9.2 |
| Own use | % | | | -15.4 | -20.7 | -17.3 | -17.8 | -17.2 | -18.7 |
| Distribution losses | % | | | -8.7 | -16.1 | -16.6 | -20.3 | -18.8 | -16.4 |
| Electricity Plants | TWh | | | | 0.0 | 0.0 | 0.0 | 0.0 | |
| CHP Plants | TWh | | | | 9.1 | 9.1 | 8.7 | 9.1 | |
| **Electricity Import & Export Balance** | TWh | | | -3.2 | -1.6 | -1.2 | -0.8 | -0.8 | -1.0 |
| Import | TWh | | | 0.3 | | 0.3 | 0.2 | 0.2 | 0.2 |
| Export | TWh | | | -3.5 | -1.6 | -1.5 | -1.0 | -1.0 | -1.2 |
| **Generation Capacity** | GW | 3.4 | 3.4 | 3.4 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 |
| Nuclear | GW | | | | | | | | |
| Hydro & wind | GW | | | | | | | | |
| Thermal | GW | 3.4 | 3.4 | 3.4 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 |
| **Fuel Inputs for Thermal Power Generation** | mtoe | 5.5 | 5.1 | 3.9 | 3.1 | 3.2 | 3.0 | 2.8 | 2.7 |
| Solids | mtoe | 4.8 | 4.3 | 3.6 | 2.7 | 3.0 | 2.8 | 2.6 | 2.6 |
| Oil | mtoe | 0.5 | 0.5 | 0.2 | 0.2 | 0.1 | 0.1 | 0.0 | 0.0 |
| Gas | mtoe | 0.3 | 0.3 | 0.2 | 0.3 | 0.1 | 0.1 | 0.2 | 0.1 |
| Other | mtoe | | | | | | | 0.0 | 0.0 |
| Net Electricity Generation by Fuel | TWh | | 14,627 | 11,830 | 9,117 | 9,133 | 8,667 | | |
| Solids | TWh | | 12,584 | 10,649 | 8,171 | 8,660 | 8,368 | | |
| Oil | TWh | | 1,271 | 529 | 620 | 130 | 107 | | |
| Gas | TWh | | 772 | 652 | 326 | 343 | 192 | | |
| **Total Final Energy Demand** | mtoe | 6.2 | 5.0 | 3.0 | 2.5 | 2.7 | 2.6 | 2.7 | 2.7 |
| Solids | mtoe | 0.7 | 0.4 | 0.2 | 0.1 | 0.1 | 0.1 | 0.6 | 0.6 |
| Oil | mtoe | 2.6 | 1.4 | 0.7 | 0.7 | 0.8 | 0.7 | 0.7 | 0.7 |
| Gas | mtoe | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Electricity | mtoe | 0.6 | 0.6 | 0.5 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| Heat | mtoe | 2.0 | 2.1 | 1.3 | 1.0 | 1.0 | 0.9 | 0.9 | 0.9 |
| Other | mtoe | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.0 | 0.0 |
| **Final Energy Consumption** | mtoe | 6.5 | 5.2 | 3.2 | 2.6 | 2.7 | 2.6 | 2.7 | 2.7 |
| Industry | mtoe | 2.0 | 2.2 | 1.3 | 1.0 | 1.0 | 0.8 | 0.8 | 0.7 |
| Transport | mtoe | 0.6 | 0.9 | 0.4 | 0.3 | 0.4 | 0.4 | 0.3 | 0.3 |
| Tertiary-Domestic | mtoe | 3.8 | 2.2 | 1.5 | 1.2 | 1.4 | 1.4 | 1.6 | 1.6 |
| **Heat Generation** | PJ | | | | 48.4 | 46.8 | 30.6 | 33.1 | 45.3 |
| CHP Plants | PJ | | | | 13.0 | 13.6 | 11.9 | 12.9 | 15.7 |
| Heat Plants | PJ | | | | 35.4 | 33.1 | 18.7 | 20.2 | 29.6 |

*Source: DG XVII 1998, IEA 1998a, 1997, 1996, Statistical Office of Estonia*

*Table 14: Energy Markets*

| | Unit | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|
| **Energy prices, constant US$@PPP1995** | | | | | | | | | |
| Electricity | | | | | | | | | |
| Residential | $/kWh | | | 0.03 | 0.04 | 0.04 | 0.05 | 0.04 | 0.06 |
| Services, Commercial | $/kWh | | | | | | | | |
| Industry | $/kWh | | | 0.05 | 0.05 | 0.04 | 0.05 | 0.05 | 0.05 |
| Fuel Oil | | | | | | | | | |
| Residential | $/GJ | | | | 13.4 | 9.5 | 7.7 | 6.7 | 7.6 |
| Services, Commercial | $/GJ | | | | | | | | |
| Industry | $/GJ | | | | 7.0 | 4.7 | 3.9 | 3.4 | 3.2 |
| Natural Gas | | | | | | | | | |
| Residential | $/GJ | | | | 7.9 | 6.2 | 4.8 | 3.9 | 3.6 |
| Services, Commercial | $/GJ | | | | | | | | |
| Industry | $/GJ | | | | | | | | |
| Heat | | | | | | | | | |
| Residential | $/GJ | | | | 14.6 | 13.8 | 11.7 | 10.8 | 10.5 |
| Services, Commercial | $/GJ | | | | | | | | |
| Industry | $/GJ | | | | | | | | |

*Source: IEA 1998b, World Bank 1999, calculations by Oeko-Institut*

*Table 15: Greenhousegas and Airborne Emissions*

| | Unit | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|
| **$CO_2$** | 1,000 t | 37,797 | 36,956 | 27,766 | 21,979 | 22,852 | 20,859 | 21,423 | 20,716 |
| Fuel Combustion (Sectoral Approach) | 1,000 t | 37,184 | 36,342 | 27,453 | 21,786 | 22,668 | 20,638 | 21,216 | 20,362 |
| Fugitive Emissions from Fuels | 1,000 t | | | | | | | | |
| Industrial Processes | 1,000 t | 613 | 614 | 313 | 193 | 215 | 222 | 206 | 354 |
| Solvent and Other Product Use | 1,000 t | | | | | | | | |
| Agriculture | 1,000 t | | | | | | | | |
| Land-Use Change & Forestry | 1,000 t | -11,317 | | | | -11,125 | -13,266 | | 7,993 |
| Waste | 1,000 t | | | | | | | | |
| Other | 1,000 t | | | | | | | | |
| Memo Item: International Bunkers | 1,000 t | | | | | | | | 312 |
| **$CH_4$ (Methane)** | 1,000 t | 105 | 102 | 91 | 80 | 80 | 68 | 63 | 103 |
| Fuel Combustion (Sectoral Approach) | 1,000 t | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 3 |
| Fugitive Emissions from Fuels | 1,000 t | | | | | | | | 32 |
| Industrial Processes | 1,000 t | | | | | | | | |
| Solvent and Other Product Use | 1,000 t | | | | | | | | |
| Agriculture | 1,000 t | 60 | 60 | 55 | 47 | 46 | 34 | 30 | 35 |
| Land-Use Change & Forestry | 1,000 t | 0 | | | | 0 | 0 | | 0 |
| Waste | 1,000 t | 42 | 39 | 35 | 31 | 31 | 32 | 31 | 33 |
| Other | 1,000 t | | | | | | | | |
| Memo Item: International Bunkers | 1,000 t | | | | | | | | |
| **$N_2O$** | 1,000 t | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 |
| Fuel Combustion (Sectoral Approach) | 1,000 t | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Fugitive Emissions from Fuels | 1,000 t | | | | | | | | |
| Industrial Processes | 1,000 t | | | | | | | | |
| Solvent and Other Product Use | 1,000 t | | | | | | | | |
| Agriculture | 1,000 t | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 |
| Land-Use Change & Forestry | 1,000 t | 0 | | | | 0 | | | |
| Waste | 1,000 t | | | | | | | | |
| Other | 1,000 t | | | | | | | | |
| Memo Item: International Bunkers | 1,000 t | | | | | | | | |
| **$SO_2$** | 1,000 t | | | | | | | | 157 |
| Fuel Combustion (Sectoral Approach) | 1,000 t | | | | | | | | 156 |
| Fugitive Emissions from Fuels | 1,000 t | | | | | | | | |
| Industrial Processes | 1,000 t | | | | | | | | 0 |
| Solvent and Other Product Use | 1,000 t | | | | | | | | |
| Agriculture | 1,000 t | | | | | | | | |
| Land-Use Change & Forestry | 1,000 t | | | | | | | | |
| Waste | 1,000 t | | | | | | | | |
| Other | 1,000 t | | | | | | | | |
| Memo Item: International Bunkers | 1,000 t | | | | | | | | |
| **$NO_X$** | 1,000 t | 79 | | | | | | | 50 |
| Fuel Combustion (Sectoral Approach) | 1,000 t | 79 | | | | | | | 50 |
| Fugitive Emissions from Fuels | 1,000 t | | | | | | | | |
| Industrial Processes | 1,000 t | | | | | | | | |
| Solvent and Other Product Use | 1,000 t | | | | | | | | |
| Agriculture | 1,000 t | | | | | | | | |
| Land-Use Change & Forestry | 1,000 t | 0 | | | | 0 | 0 | | |
| Waste | 1,000 t | | | | | | | | |
| Other | 1,000 t | | | | | | | | |
| Memo Item: International Bunkers | 1,000 t | | | | | | | | |
| **VOC** | 1,000 t | 23 | | | | | | | 10 |
| Fuel Combustion (Sectoral Approach) | 1,000 t | 23 | | | | | | | 10 |
| Fugitive Emissions from Fuels | 1,000 t | | | | | | | | |
| Industrial Processes | 1,000 t | | | | | | | | 0 |
| Solvent and Other Product Use | 1,000 t | | | | | | | | |
| Agriculture | 1,000 t | | | | | | | | |
| Land-Use Change & Forestry | 1,000 t | | | | | | | | |
| Waste | 1,000 t | | | | | | | | |
| Other | 1,000 t | | | | | | | | |
| Memo Item: International Bunkers | 1,000 t | | | | | | | | |

*Source: UNFCCC 1999*

*Table 16: Socio-demographic and Economic Data*

| | Unit | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Socio-demographic Data** | | | | | | | | | | | |
| Population | Million | 1.6 | 1.6 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.4 |
| Population aged 15-64, total | Million | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | |
| Labor force, total | Million | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | | |
| workers in the civil sector,total | | | | | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | |
| Appartments | | | | | | | | | | | |
| Apartments | 1,000 | | | | | | 618 | 620 | 622 | 623 | |
| Occupants | No./App. | | | | | | 2.4 | 2.4 | 2.4 | 2.3 | |
| Average Size | m²/App. | | | | | | 53.5 | 53.6 | 53.5 | 53.6 | |
| **Gross Domestic Product at Market Prices** | | | | | | | | | | | |
| Current Prices | | | | | | | | | | | |
| EEK | Billion | 1 | 2 | 13 | 22 | 30 | 41 | 52 | 65 | | |
| US$ | Billion | 8 | 6 | 4 | 4 | 4 | 5 | 4 | 5 | | |
| Purchasing Power Parities (PPP) | Billion | 8 | 8 | 7 | 6 | 6 | 7 | 7 | 8 | | |
| Constant Prices 1995 | | | | | | | | | | | |
| EEK | Billion | 60 | 55 | 43 | 40 | 39 | 41 | 42 | 47 | | |
| US$ | Billion | 7 | 6 | 5 | 5 | 5 | 5 | 5 | 6 | | |
| PPP US$ | Billion | 10 | 9 | 7 | 6 | 6 | 7 | 7 | 8 | | |
| GDP Deflator | 1995 = 100 | 1 | 3 | 30 | 55 | 78 | 100 | 124 | 138 | | |
| **Money** | | | | | | | | | | | |
| Exchange Rate | EEK/US$ | | | | 13.2 | 13.0 | 11.5 | 12.0 | 13.9 | | |
| Inflation (Consumer Price Index) | % | | | | 89.0 | 47.7 | 28.9 | 23.1 | 11.2 | 8.1 | |

*Source: World Bank 1999, Statistical Office of Estonia, calculations by Oeko-Institut*

*Table 17: Environment and Energy Indicators, Driving Forces*

| | Unit | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Energy Intensity** | | | | | | | | | | | |
| TPES per Capita | toe/Cap. | 6.6 | 6.1 | 4.4 | 3.7 | 3.8 | 3.7 | 3.6 | 3.8 | | |
| TPES per GDP (PPP) | kg/US$1995 | 1.08 | 1.07 | 0.96 | 0.87 | 0.91 | 0.83 | 0.77 | 0.73 | | |
| **Energy Prices, Current Local Currency** | | | | | | | | | | | |
| Electricity | | | | | | | | | | | |
| Residential | EEK/kWh | | | 0.07 | 0.13 | 0.18 | 0.29 | 0.33 | 0.51 | 0.60 | 0.75 |
| Services, Commercial | EEK/kWh | | | | | | | | | | 0.72 |
| Industry | EEK/kWh | | | 0.09 | 0.18 | 0.21 | 0.32 | 0.37 | 0.42 | | 0.48 |
| Fuel Oil | | | | | | | | | | | |
| Residential | EEJ/GJ | | | | 48 | 47 | 47 | 51 | 65 | | |
| Industry | EEJ/GJ | | | | 25 | 23 | 24 | 26 | 27 | | |
| Natural Gas | | | | | | | | | | | |
| Residential | EEJ/GJ | | | | 29 | 30 | 30 | 30 | 31 | | 107 |
| Services, Commercial | EEJ/GJ | | | | | | | | | | 71 |
| Industry | EEJ/GJ | | | | | | | | | | 55 |
| Heat | | | | | | | | | | | |
| Residential | EEJ/GJ | | | | 53 | 68 | 73 | 82 | 89 | | |
| **Greenhouse Gas Emissions (GHG)** | | | | | | | | | | | |
| GHG by Gas | 1,000 t GHGE | 40,719 | 39,813 | 30,210 | 24,087 | 24,925 | 22,653 | 23,122 | 23,097 | | |
| $CO_2$ | 1,000 t GHGE | 37,797 | 36,956 | 27,766 | 21,979 | 22,852 | 20,859 | 21,423 | 20,716 | | |
| $CH_4$ | 1,000 t GHGE | 2,209 | 2,144 | 1,917 | 1,674 | 1,670 | 1,422 | 1,327 | 2,164 | | |
| $N_2O$ | 1,000 t GHGE | 713 | 713 | 527 | 434 | 403 | 372 | 372 | 217 | | |
| GHG per Capita | t/Cap. | 25.9 | 25.4 | 19.6 | 15.9 | 16.6 | 15.3 | 15.8 | 15.8 | | |
| GHG per GDP@PPP95 | kg/US$ | 4.2 | 4.5 | 4.3 | 3.8 | 4.0 | 3.5 | 3.4 | 3.0 | | |
| **Driving Forces** | | 1 | | | | | | | | | |
| $CO_2$/TPES | t $CO_2$/toe | 3.6 | 3.9 | 4.1 | 3.9 | 4.0 | 3.8 | 4.1 | 3.7 | | |
| TPES/FEC | toe/toe | 1.7 | 1.9 | 2.2 | 2.2 | 2.2 | 2.1 | 1.9 | 2.1 | | |
| TFC/GDP | kgoe/US$ | 0.6 | 0.6 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | | |
| GDP/POP | 1,000 US$/Cap. | 6.1 | 5.7 | 4.5 | 4.2 | 4.2 | 4.4 | 4.7 | 5.2 | | |

*Source: Calculations by Oeko-Institut*

## 6.2 Monitoring of Accession Process

*Table 18: Accession Process Monitoring Table*

| National responces to ... | Existing national law (name, date of adoption) | Fully in accord? (yes/no) | If not, how will transposing occur? [1] | Status of trans-position [2] | Planned year of full trans-position | Planned year of full imple-mentation |
|---|---|---|---|---|---|---|
| **Directives** | | | | | | |
| ***Directive concerning common rules for the internal market in electricity (96/92/EC)*** | | | | | | |
| Objectives/substantive requirements | Energy Act, 1997 | yes | L5 | 3 | 2002 | 2002 |
| Institutional requirements | Energy Act, 1997 | yes | L5 | 3 | 2002 | 2002 |
| Procedural requirements | Technical and safety requirements;Rights, obligations and liabilities of network operators; Protection zones; Procedure for activity licences; Procedure for connection; Principles of income calculation; Guidelines for calculation of th amount of energy used without authorisation. | yes/no | GO5 ; MO3 - MO5 | 3 | 2002 | 2002 |
| Monitoring and Reporting | Ministerial Regulation | yes/no | MO3-MO5 | 3 | 2002 | 2002 |
| ***Directive concerning common rules for the internal market in natural gas (98/30/EC)*** | | | | | | |
| Objectives/substantive requirements | Energy Act, 1997 | yes | L5 | 3 | 2002 | 2002 |
| Institutional requirements | Energy Act, 1997 | yes | L5 | 3 | 2002 | 2002 |
| Procedural requirements | Technical and safety requirements; Rights, obligations and liabilities of network operators; Protection zones; Procedure for activity licences; Procedure for connection; Principles of calculation of income; Guidelines for calculation of the amount of energy used without authorisation | yes/no | GO5 ; MO3 - MO5 | 3 | 2002 | 2002 |
| Monitoring and Reporting | Regulation | yes/no | MO3-MO5 | 3 | 2002 | 2002 |

*Source: SEI Tallinn*

*Table 18: Accession Process Monitoring Table, contiued*

| National responces to ... | Existing national law (name, date of adoption) | Fully in accord? (yes/no) | If not, how will transposing occur? [1] | Status of trans-position [2] | Planned year of full trans-position | Planned year of full imple-mentation |
|---|---|---|---|---|---|---|
| ***Large Combustion Plant Directive (88/609/EEC)*** | | | | | | |
| Objectives/substantive requirements | Ambient Air Protection Act (01.01.99), Regulation of the Minister of Environment No.60 (26.10.98) | yes | GO2; MO3 | 4 | 2000 | 2002 |
| Institutional requirements | Ambient Air Protection Act (01.01.99), Regulation of the Minister of Environment No.60 (26.10.98) | yes | GO2; MO3 | 4 | 2000 | 2002 |
| Procedural requirements | Ambient Air Protection Act (01.01.99), Regulation of the Minister of Environment No.60 (26.10.98) | yes | GO2; MO3 | 4 | 2000 | 2002 |
| Monitoring and Reporting | Ambient Air Protection Act (01.01.99), Regulation of the Minister of Environment No.60 (26.10.98) | yes | GO2; MO3 | 4 | 2000 | 2002 |
| ***Directive to limit carbon dioxide emissions by improving energy efficiency (SAVE) (93/76/EEC)*** | | | | | | |
| Objectives/substantive requirements | Sustainable Development Act , 1995; Pollution Charges Act, 1999 | yes/no | L3 | 3 | 2002 | 2002 |
| Institutional requirements | | yes/no | L3 | 3 | | |
| Procedural requirements | | yes/no | L3 | 3 | | |
| Monitoring and Reporting | | yes/no | L3 | 3 | | |
| ***Directive on the indication by labelling and standard product information of the consumption of energy and other resources by household appliances (and daughter Directives) (92/75/EEC)*** | | | | | | |
| Objectives/substantive requirements | ( Draft Act of Energy Efficiency of Equipment ) | no | L1 | 1 | 2001 | 2002 |
| Institutional requirements | | no | L0;GO1 | | | |
| Procedural requirements | | no | GO1,MO0 | | | |
| Monitoring and Reporting | | no | MO0 | | | |

*Source: SEI Tallinn*

*Table 18: Accession Process Monitoring Table, contiued*

| National responces to ... | Existing national law (name, date of adoption) | Fully in accord? (yes/no) | If not, how will transposing occur? [1] | Status of trans-position [2] | Planned year of full trans-position | Planned year of full imple-mentation |
|---|---|---|---|---|---|---|
| ***Directive on efficiency requirements for new hot-water boilers fired with liquid or gaseous fuels (92/42/EEC)*** | | | | | | |
| Objectives/substantive requirements | (Draft Act of Energy Efficiency of Equipment) | no | L1 | 1 | 2001 | 2002 |
| Institutional requirements | | no | | | | |
| Procedural requirements | | no | | | | |
| Monitoring and Reporting | | no | | | | |
| ***Directive on energy efficiency requirements for household electric refrigerators, freezers and combinations thereof (96/57/EC)*** | | | | | | |
| Objectives/substantive requirements | (Draft Act of Energy Efficiency of Equipment) | no | L1 | 1 | 2001 | 2002 |
| Institutional requirements | | no | L0;GO1 | | | |
| Procedural requirements | | no | GO1;MO0 | | | |
| Monitoring and Reporting | | | MO0 | | | |
| ***Directive concerning integrated pollution prevention and control (IPPC) (96/61/EC)*** | | | | | 2000 | 2007 |
| Objectives/substantive requirements | Draft Act on Integrated Environmental Permits | | L1 (Act) | 1 | | |
| Institutional requirements | Draft Act on Integrated Environmental Permits | | L1 (Act) | 1 | | |
| Procedural requirements | Draft Act on Environmental Permits, draft Regulation of the Minister of Environment on Specifying the Requirements to the Content of Integrated Permit and Application Form | | MO2 | 1 | | |
| Monitoring and Reporting | Draft Act on Integrated Environmental Permits, Ministerial regulation | | MO2 | 1 | | |
| ***Directive on the harmonisation of the structures of excise duties on mineral oils (92/81/EEC)*** | | | | | | |
| Objectives/substantive requirements | Fuel Excise Tax Act , 1993;3 (last amendment 1997); Fiscal Marking of Liquid Fuels Act,1997 | yes | L5 | 3 | 2001 | 2002 |
| Institutional requirements | | yes | L5 | | | |
| Procedural requirements | Nomenclature of Goods for Fuel Excise Tax , 1996 ; Last Amendment 1999 ; Form and Order of filing the Excise Tax return | yes | MO5 | 3 | 2001 | 2002 |
| Monitoring and Reporting | | yes | | | | |

*Source: SEI Tallinn*

*Table 18: Accession Process Monitoring Table, contiued*

| National responces to ... | Existing national law (name, date of adoption) | Fully in accord? (yes/no) | If not, how will transposing occur? [1] | Status of trans-position [2] | Planned year of full trans-position | Planned year of full imple-mentation |
|---|---|---|---|---|---|---|
| **Planned and Proposed Directives** | | | | | | |
| ***Proposal for a integrated resource planning directive)*** | | no | ? | | 2003? | 2003? |
| Objectives/substantive requirements | | | ? | | | |
| Institutional requirements | | | ? | | | |
| Procedural requirements | | | ? | | | |
| Monitoring and Reporting | | | ? | | | |
| ***Feed-In Directive (Renewables) (COM(*** | Energy Act | yes | | 5 | 1998 | 1998 |
| Objectives/substantive requirements | | | | | | |
| Institutional requirements | | | | | | |
| Procedural requirements | | | | | | |
| Monitoring and Reporting | | | | | | |

**[1] How will transpostion occur?**

| Legislative act (L) | Government order (GO) | Ministerial order (MO) |
|---|---|---|
| L0 No steps taken to date | GO1 No steps taken to date | MO0 No steps taken to date |
| L1 Draft in process | GO2 Draft in process | MO1 Draft in process |
| L2 Ministry approves | GO3 Ministry approves | MO2 Draft in consultation |
| L3 Government approves | GO4 Other relevant ministries approve | MO3 Ministry approves and publishes |
| L4 After first reading in Parliament | GO5 Government approves and publishes | |
| L5 Fully transposed and publishes | | |

**[2] Status or transposition**

| | |
|---|---|
| 0 | No steps taken to date |
| 1 | Draft in process |
| 2 | ... |
| 3 | ... |
| 4 | ... |
| 5 | Fully transposed and in force |
| - | No transpostion needed |

*Source: SEI Tallinn*

*Table 19: National Law or Policy Initiatives*

| | existing | proposed | planned |
|---|---|---|---|
| **Decisions and Programmes** | | | |
| Energy Framework Programme | no | no | no |
| Coal Subsidies | no | no | no |
| **Environmental Agreements, General Policies and Strategies** | | | |
| Combined Heat and Power | yes | yes | no |
| Renewable Energy Sources | yes | yes | yes |
| Energy Efficiency | yes | yes | yes |
| **Further National Decisions, Programmes, Policies and Strategies with regard to 'Environment and Energy'** | | | |
| Energy Conservation Targeted Programme | no | yes | yes |

*Source: SEI Tallinn*

## 6.3 Screening of Co-operation Project

### 6.3.1 Co-operation Process in the Field of Environment

*Table 20: Co-operation Projects in the Field of Environment with Denmark*

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| **Request** | | | | | |
| 1 | Environmental improvement in Tallinn Soojus Ltd | General environmental protection | 0.33 | 10.1999 - 10.2001 | Technical co-operation |
| **Underway** | | | | | |
| 1 | Hazardous waste management system in Estonia | Waste management, disposal | 1.500 | 12.1994 - 08.1999 | Economic and technical assessment, study |
| 2 | Solid waste management improvements in Järva County | Waste management, disposal | 0.490 | 09.996 - 10.999 | Technical co-operation |
| 3 | Co-operation between the Estonian Ministry of Environment and the Danish Environmental Protection Agency | Environmental policy and administrative management | 0.050 | 10.1996 - 10.1999 | Technical co-operation |
| 4 | Project to assist Estonia in approximation of EU laws concerning industrial pollution prevention and control | EU integration | 0.760 | 01.1998 - 01.2000 | Technical co-operation |
| 5 | Point source pollution control in the Matsalu Bay catchment area | Water and sanitation | 0.940 | 08.1997 - 09.1999 | Investment project |
| 6 | Construction of Keila Wastewater Treatment Plant | Water and sanitation | 1.740 | 09.1998 - 06.2001 | Equipment |
| 7 | Protection of biodiversity in the Soomaa National Park | Biodiversity | 0.940 | 05.1998 - 06.2000 | Technical co-operation |
| 8 | National inventories of internationally important species and habitats in relation to international conventions and directives | Environmental policy and administrative management | 0.540 | 05.1998 - 08.2000 | Technical co-operation |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 9 | EU approximation of directives on waste registration and regulation | Waste management, disposal | 0.150 | 07.1998 - 07.2000 | Technical co-operation |
| 10 | Emergency groundwater supply project and water supply and wastewater coverage project | Water and sanitation | 1.380 | 11.1998 - 10.2000 | Technical co-operation |
| 11 | Short term assistance – approximation of environmental waste legislation in Estonia to EU regulations | Approximation of laws | 0.005 | 10.1998 - 09.1999 | Technical co-operation |
| 12 | Valga water supply project | Water and sanitation | 1.080 | 01.1999 - 12.2002 | Equipment |
| 13 | Development of the Estonian forest conservation area network | Forestry policy and administrative management | 1.330 | 02.1999 - 01.2001 | Technical co-operation |
| 14 | Seminar in Estonia on long term planning and co-operation between citizens and authorities (traffic-environment, bicyclism) | Environmental policy and administrative management | 0.040 | 06.1999 - 10.1999 | training |
| **Completed** | | | | | |
| 1 | Registration of landfills and waste disposal in Estonia | Waste management, disposal | 0.34 | 02.1993 - 02.1994 | Sector aid |
| 2 | Conservation programme for Estonian wetlands | Biodiversity | 0.10 | 04.1993 - 07.1996 | Technical co-operation |
| 3 | Development of strategy for protection of groundwater in Estonia | Environmental education, training | 0.25 | 01.1992 - 08.1995 | Technical co-operation |
| 4 | Elimination of oil pollution (Tapa military airfield) | General environmental protection | 1.07 | 12.1993 - 09.1997 | Technical co-operation |
| 5 | Feasibility study for a hazardous waste management system in Estonia | Waste management, disposal | 0.53 | 12.1992 - 10.1994 | Technical co-operation |
| 6 | Planning of waste handling in Estonia and assistance to establish a basis for production of waste handling equipment | Waste management, disposal | 0.32 | 06.1992 - 12.1995 | Technical co-operation |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 7 | Transfer of technology and know-how concerning restoration of lakes in Estonia (Harku) | Water resources protection | 0.10 | 03.1992 - 02.1995 | Sector aid |
| 8 | Ground and surface water protection in Estonia, agricultural pollution in Estonia | Agricultural research | 0.22 | 03.1993 - 02.1995 | Economic and technical assessment, study |
| 9 | Preparation and implementation of the National Oil Spill Contingency Plan for Estonia | Water and sanitation | 0.37 | 09.1993 - 12.1996 | Economic and technical assessment, study |
| 10 | Transfer of technology for investigation of receiving waters to Estonia (phase II) | Water and sanitation | 0.39 | 12.1993 - 02.1996 | Technical co-operation |
| 11 | Improvement of the energy saving and billing systems in the housing sector | Housing policy and administrative management | 1.04 | 08.1993 - 12.1996 | Sector aid |
| 12 | Feasibility study for oily water reception facilities for the Port of Tallinn | Water and sanitation | 0.09 | 08.1995 - 12.1996 | Economic and technical assessment, study |
| 13 | Co-operation and technical assistance in the field of nuclear energy, preparedness and response | Environmental policy and administrative management | 0.08 | 11.1996 - 03.1997 | Environmental policy and administrative management |
| 14 | Chemical waste management pre-feasibility study | Waste management, disposal | 0.11 | 10.1991 - 02.1993 | Technical co-operation |
| 15 | National Oil Spill Contingency Pplan | General environmental protection | 0.12 | 03.1992 - 10.1992 | Economic and technical assistance, study |
| 16 | Training of forestry management | Environmental education, training | 0.13 | 01.1994 - 03.1994 | Training |
| 17 | Transfer of technology for investigations of receiving waters to Estonia (phase I) | Water and sanitation | 0.16 | 01.1992 - 04.1993 | Technical co-operation |
| 18 | Co-operation between Estonia and Denmark on education and transfer of technology | Water resources protection | 0.03 | 03.1992 - 10.1992 | Technical co-operation |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 19 | Co-operation between Estonia and Denmark on education and transfer of technology in the field of groundwater and inland waters | Water resources protection | 0.15 | 12.1992 - 04.1993 | Technical co-operation |
| 20 | The possibilities of the use of wind power in the Baltic States (Hiiumaa Island) | Wind power | 0.52 | 11.1993 - 08.1997 | Economic and technical assessment, study |
| 21 | Development of the Estonian fishing industry | Fishery development | 0.10 | 07.1994 - 02.1997 | Investment project |
| 22 | Environmentally sound technologies (Hiiumaa) | Biosphere protection | 0.25 | 01.1992 - 02.1996 | Equipment |
| 23 | Transfer of technology for marine monitoring procedures and institutional strengthening to Estonia | Environmental policy and administrative management | 0.11 | 07.1996 - 12.1996 | Equipment |
| 24 | Narva River water intake project and feasibility study of water supply in Sillamäe | Water resources policy and administrative management | 1.74 | 02.1996 - 11.1997 | Technical co-operation |
| 25 | Co-operation between Estonia and Denmark on transfer of technology and know-how concerning prevention and remedy water pollution | Water and sanitation | 0.99 | 11.1991 - 04.1996 | Equipment |
| 26 | Water supply system in Kuressaare (Small Municipalities Environmental Project) | Water resources policy and administrative management | 0.93 | 01.1995 - 12.1996 | Technical co-operation |
| 27 | Educational course for the filter plant workers in Viisnurk factory | Water and sanitation | 0.18 | 04.1996 - 07.1996 | training |
| 28 | Sustainable management strategy for Estonian forested wetlands | Forestry policy and administrative management | 0.29 | 04.1997 - 01.1999 | Technical co-operation |
| 29 | Sillamäe water supply action plan for rehabilitation of water supply system, monitoring programme for groundwater resources | Water and sanitation | 0.34 | 06.1997 - 02.1998 | Technical co-operation |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 30 | Water services improvement programme to meet EU accession requirements (Small Municipalities Environmental Project) | Water resources policy and administrative management | 0.20 | 11.1997 - 07.1998 | Technical co-operation |
| 31 | Construction of transmission pipeline for Aruküla municipality | Water and sanitation | 0.19 | 04.1998 - 05.1999 | Investment project |
| 32 | SMIP (Small Municipalities Investment Programme) – programme development | Water and sanitation | 0.19 | 09.1998 - 05.1999 | Technical co-operation |
| 33 | Feasibility studies on water supply and wastewater treatment for 17 small municipalities in Estonia (SMIP) | Water and sanitation | 0.25 | 09.1998 - 03.1999 | Technical co-operation |
| 34 | Municipality atlas for Kuressaare | General environmental protection | 0.12 | 05.1998 - 05.1999 | Technical co-operation |
| **Cancelled** | | | | | |
| 1 | Action plan for waste management improvements in the municipality of Tallinn (establishment of a new waste disposal site) | Waste management, disposal | 0.34 | 04.1995 - 04.1996 | Sector aid |
| 2 | Demonstration of a wind – diesel – battery system on Prangli island | Wind power | | 11.1996 | Investment project |
| 3 | Solid waste management improvement in Järva County | Waste management, disposal | 0.83 | 09.1996 - 10.1999 | Technical co-operation |

*Table 21: Co-operation Projects in the Field of Environment with Finland*

| Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|
| **Underway** | | | | |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 1 | Operational environmental monitoring system for the Gulf of Finland | Water resources protection | 0.06 | 04.1997 – 04.2000 | Technical co-operation |
| 2 | Development of environmental co-operation between the cities of Tallinn and Helsinki | General environmental protection | 0.13 | 08.1992 – 09.1999 | Technical co-operation |
| 3 | Composting of residual sludge in Kuressaare | Waste management, disposal | 0.08 | 01.1998 – 12.1999 | Equipment |
| 4 | Development of environmental management systems of AS Kunda Nordic Cement and Optiroc Eesti AS | Environmental policy and administrative management | 0.09 | 06.1998 – 11.1999 | Technical co-operation |
| 5 | Development of the maintenance system for small scale wastewater treatment plants in Saaremaa | Water and sanitation | 0.04 | 10.1998 – 09.1999 | Technical co-operation |
| 6 | Rehabilitation of Narva main sewage pumping station | Water and sanitation | 0.21 | 11.1998 - 09.1999 | Investment project |
| 7 | Management plan for the Vooremaa Reserve | General environmental protection | 0.03 | 12.1998 – 12.1999 | Technical co-operation |
| 8 | Complementary training programme for the years 1998 – 1999 between Finnish an Estonian ministries of Environment | General environmental protection | 0.12 | 06.1999 – 11.1999 | Investment project |
| 9 | Boiler conversion in Viiratsi power plant | General environmental protection | 0.34 | 06.1999 – 11.1999 | Investment project |
| 10 | Estonian cleaner production programme | Environmental education, training | 0.09 | 01.1999 – 12.1999 | Technical co-operation |
| 11 | Delivery of equipment for control of chemical substances | Water resources protection | 0.17 | 05.1999 – 12.1999 | equipment |
| 12 | Kuressaare Bay environmental project | General environmental protection | 0.03 | 07.1999 – 08.1999 | Investment project |
| **completed** | | | | | |
| 1 | Construction of a water treatment chemical plant in Tallinn | Water and sanitation | 0.536 | 02.1994 – 11.1995 | Investment project |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 2 | Construction of two small scale wastewater treatment plants (Sõmera, Kohila) | Water and sanitation | 0.077 | 01.1992 – 01.994 | Investment project |
| 3 | Delivery of air pollution control equipment to the Kunda Cement Plant | Biosphere protection | 0.200 | 02.1994 – 02.1995 | equipment |
| 4 | Production of a video film on environmental issues for Estonian environmental authorities | Environmental policy and administrative management | 0.002 | 06.1994 – 08.1995 | Sector aid |
| 5 | Co-operation between the province of Järve in Estonia and water and environmental district of central Finland in municipal waste | Waste management, disposal | 0.002 | 04.1994 – 02.1995 | Technical co-operation |
| 6 | Co-operation (twinning arrangements) between Tallinn Waterworks & Sewerage Municipal Enterprise and Helsinki Water & Sewage | Water and sanitation | 0.432 | 01.1994 – 12.1994 | Technical co-operation |
| 7 | On the job training programme for 11 Estonian trainees in regional environmental administration in Finland I | Environmental education, training | 0.010 | 04.1994 – 04.1994 | Training |
| 8 | On the job training programme for 11 Estonian trainees in regional environmental administration in Finland II | Environmental education, training | 0.030 | 04.1995 – 05.1995 | Training |
| 9 | A study on increasing the efficiency of energy use in the industry of Estonia | Efficiency and conservation | 0.086 | 09.1994 – 12.1994 | Technical co-operation |
| 10 | Assessment of air quality in Estonia | General environmental protection | 0.010 | 04.1993 – 10.1993 | Technical co-operation |
| 11 | Narva power plants refurbishment feasibility study | Environmental policy and administrative management | 0.064 | 02.1994 – 05.1995 | Technical co-operation |
| 12 | The study on the optimum development of the Estonian oil shale mining operations and retorting industry | Environmental research | 0.101 | 05.1995 – 04.1996 | Technical co-operation |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 13 | Renovation of wastewater treatment plants in Häädemeeste | Water and sanitation | 0.33 | 01.1996 – 12.1997 | Legal infrastructure |
| 14 | Pilot project on construction of pyroflow boiler in Kohtla-Järve | General environmental protection | 0.24 | 04.1994 – 09.1994 | Sector aid |
| 15 | Rehabilitation of sewage network for Social Care Centre in Sõmera, Saaremaa | Water and sanitation | 0.07 | 05.1996 – 12.1996 | Investment project |
| 16 | Construction of wastewater treatment plants for the Lahemaa National Park | Water and sanitation | 0.52 | 05.1995 – 02.1997 | Investment project |
| 17 | Training of forestry management | Environmental education, training | 0.03 | 01.1992 – 03.1992 | training |
| 18 | Biological monitoring around power plants in North-East Estonia | Environmental reseach | 0.01 | 05.1994 – 09.1994 | Economic and technical assessment, study |
| 19 | Reconstruction of sewage treatment plant in Türi | Water and sanitation | 0.02 | 01.1992 – 09.1992 | Technical cooperation |
| 20 | Construction of the sewage system and wastewater treatment plant of Lihula | Water and sanitation | 0.72 | 03.1995 – 03.1997 | Technical cooperation |
| 21 | Environment project for Tallinn Water (Helsinki – Tallinn twinning agreement) | Environmental education, training | 3.89 | 01.1994 – 01.1998 | Technical cooperation |
| 22 | Procurement of oil spill clean up equipment for Estonia | Water and sanitation | 0.62 | 09.1995 – 06.1996 | Sector aid |
| 23 | Refurbishment of Kamari hydro power station | Water and sanitation | 0.06 | 02.1996 – 01.1998 | Equipment |
| 24 | Delivery and installation of fluid pumping stations and collection basin curtain walls to the RAS Kiviter | Water and sanitation | 0.08 | 02.1996 – 07.1997 | Investment project |
| 25 | Land use strategy for Pärnu town | Environmental education, training | | 11.1995 – 12.1996 | Technical cooperation |
| 26 | Physical planning of Pärnu County | Environmental education, training | | 02.1995 – 02.1996 | Sector aid |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 27 | Twinning co-operation between Estonian ministry of Environment and Finnish Ministry of Environment | Environmental education, training | | 01.1996 – 12.1997 | Training |
| 28 | Drawing up the radiation map for Estonia | Environmental research | 0.15 | 04.1996 – 12.1996 | Economic and technical assessment, study |
| 29 | Sludge dewatering equipment for the Tallinn Wastewater Treatment Plant | Water and sanitation | 0.16 | 01.1991 – 01.1991 | Sector aid |
| 30 | Delivery of wastewater treatment equipment to Tallinn | Water and sanitation | 0.21 | 01.1991 – 01.1992 | Sector aid |
| 31 | Pilot renovation of the sewage system of Tallinn | Water and sanitation | 0.19 | 01.1992 – 01.1993 | Sector aid |
| 32 | Pilot project for production of water treatment chemicals in Tallinn | Environmental policy and administrative management | 0.38 | 01.1992 – 04.1992 | Sector aid |
| 33 | Training programme for Tallinn Wastewater Treatment Plant staff | Environmental education, training | 0.37 | 01.1992 – 02.1992 | Sector aid |
| 34 | Wastewater treatment study in Kohtla-Järve pilot plant | Water and sanitation | 0.08 | 01.1992 – 01.1992 | Sector aid |
| 35 | Delivery of wastewater treatment equipment to Estonia | Water and sanitation | 0.07 | 01.1992 – 01.1992 | Sector aid |
| 36 | Planning work for renovation of Türi Sewage Treatment Plant | Water and sanitation | 0.02 | 01.1992 – 01.1992 | Sector aid |
| 37 | Environmental education programme for the managers of Estonian power plants | Environmental education, training | 0.06 | 01.1991 – 01.1991 | training |
| 38 | Environmental education programme for Estonian trainers regional administration | Environmental education, training | 0.03 | 01.1991 – 01.1991 | Training |
| 39 | Training course on water and environmental management for engineers | Environmental education, training | 0.06 | 01.1992 – 04.1992 | Training |
| 40 | Training programme on project planning | Environmental education, training | 0.02 | 03.1992 – 05.1992 | Training |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 41 | Training programme for technical managers in Estonian sewage treatment plants | Environmental education, training | 0.05 | 04.1992 – 06.1992 | Training |
| 42 | Delivery of equipment for training programme | Environmental education, training | 0.01 | 01.1992 – 01.1992 | Sector aid |
| 43 | Printing of Estonian environmental biology textbook for schools | Environmental policy and administrative management | 0.02 | 04.1993 – 07.1993 | Sector aid |
| 44 | Establishment of the environmental datacenter | Environmental policy and administrative management | 0.02 | 01.1992 – 03.1992 | Sector aid |
| 45 | Delivery of measurement equipment to the Estonian Institute of Meteorology and Hydrology | Environmental policy and administrative management | 0.12 | 01.1992 – 01.1993 | Technical cooperation |
| 46 | Appraisal of the pilot desulphurization project | Biosphere protection | 0.01 | 07.1992 – 09.1992 | Economical and technical assessment, study |
| 47 | A pilot sewage treatment unit for a milk plant in Tartu | General environmental protection | 0.02 | 01.1991 – 01.1992 | Sector aid |
| 48 | A study on possibilities for biological treatment of run-off water from oil shale ash fields | Water resources assessment, study | 0.01 | 04.1992 – 04.1993 | Economic and technical assessment, study |
| 49 | Feasibility study on the sludge treatment project for Kehtna pig farms | General environmental protection | 0.02 | 01.1992 – 01.1993 | Economic and technical assessment, study |
| 50 | Measurements of the flue gas emissions of oil shale power plants | Water and sanitation | 0.06 | 02.1992 – 02.1993 | Technical cooperation |
| 51 | The reconstruction of full-scale pilot desulphurisation unit for reducing sulphur and dust emission of the Balti. Power Plant | Water and sanitation | 1.54 | 01.1994 – 01. 1996 | Sector aid |
| 52 | The reconstruction, finalisation and equipping of the Tallinn Wastewater Treatment Plant for mechanical an biological treatment | Water and sanitation | 1.54 | 01.1994 – 01. 1996 | Sector aid |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 53 | Delivery of wastewater treatment equipment to Tallinn Wastewater Treatment Plant | Water and sanitation | 2.72 | 09.1995 – 10.1995 | Sector aid |
| 54 | Renovation of the Iru Power Plant for natural gas utilisation | General environmental protection | 0.13 | 05.1994 – 04.1995 | Sector aid |
| 55 | Feasibility study for wastewater treatment in the town of Kohtla-Järve | Water and sanitation | 0.08 | 06.1992 – 12.1992 | Technical co-operation |
| 56 | Water quality classification on basis of macroalgae as biological indicator for the cities of Tallinn and Helsinki | Environmental research | 0.01 | 03.1994 – 03.1995 | Sector aid |
| 57 | Pilot project on energy conservation in the Õismäe housing sector in Tallinn | Efficiency and conservation | 0.08 | 03.1995 – 10.1995 | Investment project |
| 58 | Pilot project on the biological remedy of territories of former Soviet military bases | General environmental protection | 0.05 | 08.1994 – 05.1995 | Technical co-operation |
| 59 | Feasibility study on establishment of a new landfill in Tallinn (Maardu) | Waste management, disposal | 0.15 | 05.1994 – 08.1995 | Economic and technical assessment, study |
| 60 | Project on closing down the Kotinuka landfill and establishing in return the Uikala landfill (Kohtla-Järve) | Waste management, disposal | 0.08 | 06.1995 – 05.1996 | Technical co-operation |
| 61 | Refurbishment of wastewater treatment in Kihelkonna (Saaremaa) | Water and sanitation | 0.09 | 01.1995 – 12.1995 | Technical co-operation |
| 62 | Delivery of oil combating equipment to Estonia I | Water and sanitation | 0.19 | 09.1995 – 10.1995 | Investment project |
| 63 | Delivery of oil combating equipment to Estonia II | Water resources protection | 0.18 | 06.1995 – 09.1996 | Training |
| 64 | Reconstruction of the wastewater treatment system for Rapla town | Water and sanitation | 1.15 | 09.1996 – 12.1997 | Equipment |
| 65 | Reconstruction of the Pärnu Wastewater Treatment Plant and sewerage network, | Water and sanitation | 4.48 | 01.1995 – 09.1997 | Investment project |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 66 | Delivery of coastal water oil combating equipment to Estonia | Water resources protection | 0.25 | 09.1996 – 03.1997 | Investment project |
| 67 | Delivery of deep sea oil combating equipment to Estonia | Water resources protection | 1.37 | 09.1996 – 01.1997 | Investment project |
| 68 | Sanitation and construction of sewerage works in Viljandi City | Water and sanitation | 0.18 | 09.1996 – 12.1998 | Investment project |
| 69 | Construction of the wastewater treatment plant at Tapa | Water and sanitation | 1.95 | 06.1996 – 12.1996 | Technical co-operation |
| 70 | Construction and reconstruction of the sewerage system for Rakvere | Water and sanitation | 0.34 | 11.1996 – 12.1998 | Investment project |
| 71 | Establishment of an administrative unit for the Haapsalu-Matsalu environment project | Environmental policy and administrative management | 0.01 | 04.1996 – 08.1996 | Technical co-operation |
| 72 | Construction works for the Tallinn Wastewater Treatment Plant | Water and sanitation | 0.11 | 01.1995 – 06.1998 | Technical co-operation |
| 73 | Reconstruction of the sewerage system for Tallinn | Water and sanitation | 0.18 | 03.1996 – 12.1996 | Technical co-operation |
| 74 | Protection programme for the waterbeds of the Pärnu River catchment area | Water resources policy and administrative management | 0.11 | 05.1997 – 01.1998 | Technical co-operation |
| 75 | Construction and reconstruction of the water supply and sewerage systems in Mustvee | Water and sanitation | 0.89 | 05.1997 – 06.1998 | Investment project |
| 76 | Construction of a BIOROTOR sewage treatment plant in Maidla Village in Ida-Viru County | Water and sanitation | 0.02 | 03.1996 – 06.1996 | Equipment |
| 77 | Renovation of Tallinn Sewage Treatment Plant and delivery of Archimedes sewer pumps | Water and sanitation | 0.03 | 04.1996 – 06.1997 | Equipment |
| 78 | Renovation of the Tallinn Sewage Treatment Plant and construction of sedimentation tanks | Water and sanitation | 0.11 | 04.1996 – 06.1997 | Equipment |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 79 | Co-operation project between Häme Environmental Centre and Võrtsjärv Limnological Station on water protection | Water resources protection | 0.07 | 01.1997 – 12.1998 | Technical co-operation |
| 80 | Modernisation of the district heating network in Viljandi | General environmental protection | 0.91 | 06.1996 – 11.1996 | Investment project |
| 81 | Pollution modelling on the territory of the former Soviet military base on Pakri peninsula | Water resources protection | 0.09 | 12.1996 – 12.1997 | Technical co-operation |
| 82 | Training of the Estonian specialists for the implementation of Estonian clean production programme | Water and sanitation | 0.10 | 07.1997 – 02.1998 | Technical co-operation |
| 83 | TV film on Kunda environmental problems | Environmental education | 0.038 | 01..1996 – 09.1997 | Training |
| 84 | Repairing of the Tartu Sewerage System | Water and sanitation | 0.486 | 07.1997 – 12.1998 | Investment project |
| 85 | Mapping of important bird habitats in Estonia and publication of the results | Biodiversity | 0.014 | 05.1997 – 12.1997 | Technical co-operation |
| 86 | Delivery of a compactor for Tallinn | Waste management, disposal | 0.302 | 09.1997 – 10.1997 | Investment project |
| 87 | Construction of the wastewater collection and sewerage systems for Häädemeeste | Water and sanitation | 0.133 | 12.1997 – 12.1998 | Investment project |
| 88 | Developing nuclear and other radioactive waste safety in Estonia | Waste management, disposal | 0.002 | 04.1997 – 12.1997 | Training |
| 89 | Forestry development programme with project co-ordination for supporting private forestry and its institutional strengthening in Estonia | Forestry development | 1.234 | 07.1995 – 05.1998 | Technical co-operation |
| 90 | Controlling Estonian industrial releases | Biosphere protection | 0.027 | 03.1997 – 03.1998 | Technical co-operation |
| 91 | Course on bioindicators for Estonian environment officials | Environmental education, training | 0.022 | 04.1997 – 10.1997 | Training |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 92 | Network of waste deposit centres in Estonia within the framework “Keep Baltic tidy” | Waste management, disposal | 0.035 | 01.1994 – 03.1998 | Technical co-operation |
| 93 | Development of the public health service waste management in Tallinn | Waste management, disposal | 0.016 | 09.1996 – 12.1997 | Technical co-operation |
| 94 | Water protection project for Rae peat production site | Water resources protection | 0.010 | 01.1997 – 06.1997 | Technical co-operation |
| 95 | Construction of the Keila Sewage Pumping Station | Water and sanitation | 0.130 | 03.1998 – 06.1999 | Equipment |
| 96 | Use of filtered waste from the Kunda Cement plant for soil improvement | Waste management, disposal | 0.270 | 01.1998 – 08.1998 | Equipment |
| 97 | Design of Uikala landfill | Waste management, disposal | 0.03 | 04.1998 – 03.1999 | Technical co-operation |
| 98 | Study on closing of the Estonian landfills for industrial and energy production waste | Waste management, disposal | 0.11 | 12.1997 – 12.1998 | Technical co-operation |
| 99 | Construction of a bilge water treatment plant in Rohuküla | Waste management, disposal | 0.13 | 06.1998 – 11.1998 | Investment project |
| 100 | Kuressaare Bay environmental project | General environmental protection | 0.09 | 09.1998 – 01.1999 | Investment project |
| 101 | Development of the calculating system for the traffic emissions in Estonia | Environmental policy and administrative management | 0.01 | 11.1998 – 05.1999 | Technical co-operation |
| 102 | Refurbishment of the Tartu Wastewater Treatment Plant | Water and sanitation | 0.09 | 06.1998 – 01.1999 | Investment project |
| 103 | Environmental co-operation between Finland and Estonia | Environmental policy and administrative management | 0.03 | 03.1999 – 05.1999 | Technical co-operation |
| **cancelled** | | | | | |
| 1 | Delivery of equipment for water and sewage works in Estonia | Water and sanitation | | 10.1993 – 11.1993 | Equipment |
| 2 | Preparation of co-operation programme between Estonia and Uusimaa in Finland | Environmental policy and administrative management | 0.02 | | Technical co-operation |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 3 | Finalisation of the wastewater treatment unit for the Salutaguse Yeast Plant | Water and sanitation | 0.02 | | Investment project |

*Table 22: Co-operation Projects in the Field of Environment with Germany*

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| **Underway** | | | | | |
| 1 | Baltic Environmental Forum II | Environmental policy and administrative management | 0.48 | 09.1998 – 08.2000 | training |
| **Completed** | | | | | |
| 1 | Five day seminar for the staff of environmental ministers of the Baltic States in Bonn, Germany (10 people from Estonia) | Environmental education, training | | 10.1993 – 10.1993 | Training |
| 2 | Rehabilitation of Kärdla and Käina Wastewater Treatment Plants in Hiiumaa | Water and sanitation | 0.94 | 06.1996 – 06.1997 | Investment project |
| 3 | Oil shale industry and mining in Estonia | Environmental education, training | 0.05 | 09.1994 – 08.1995 | Technical co-operation |
| 4 | Environmentally sound redevelopment of the oil shale region | Environmental policy and administrative management | 0.00 | 08.1995 – 10.1996 | Economic and technical assessment, study |
| 5 | Mining investigation in Tammiku, Kohtla-Järve | General environmental protection | 0.10 | 08.1995 – 10.1996 | Technical co-operation |
| 6 | Baltic Environmental Forum I | Environmental policy and administrative management | 0.56 | 08.1995 – 08.1998 | Training |
| 7 | Training programme for workers in the field of environment protection | Environmental education, training | 0.05 | 09.1992 – 11.1992 | Training |

*Table 23: Co-operation Projects in the Field of Environment with the Netherlands*

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| **Request** | | | | | |
| 1 | The implementation of IPPC (Integrated Pollution Prevention and Control) directive 96/61/EC in Silmet | EU integration | 0.19 | 09.1999 – 12.2000 | Technical co-operation |

*Table 24: Co-operation Projects in the Field of Environment with Norway*

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| **Underway** | | | | | |
| 1 | Twinning agreement between AS Keila Vesi and Oslo Water & Sewage Works under the auspices of Keila Supply & Wastewater | Water resources policy and administrative management | 0.19 | 03.1998 – 12.2000 | Technical co-operation |
| **Completed** | | | | | |
| 1 | Environmental auditing | Environmental education, training | 0.08 | 08.1996 – 12.1996 | Training |
| 2 | Twinning agreement between Estonian Water Company and Oslo Water & Sewage Works | Water resources policy and administrative management | 1.62 | 03.1995 – 03.1999 | Technical co-operation |

*Table 25: Co-operation Projects in the Field of Environment with Sweden*

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| **Request** | | | | | |
| 1 | Building the capacity for regeneration of forests in private ownership | Forestry policy and administrative management | 0.02 | 09.1999 – 03.2000 | Technical co-operation |
| **Underway** | | | | | |
| 1 | Construction of the wastewater treatment, sewerage, and water supply networks for Haapsalu with twinning component included | Water and sanitation | 1.17 | 05.1995 – 12.1999 | Investment project |
| 2 | Environmental monitoring on the Lake Peipsi | Water resources protection | 0.52 | 01.1997 – 10.1999 | Technical co-operation |
| 3 | Assistance to the Estonian land board aerial photography for 1998 and 1999 | Environment research | 0.40 | 04.1998 – 08.1999 | Technical co-operation |
| 4 | Woodland key habitat inventory | Forestry policy and administrative management | 0.06 | 01.1999 – 12.1999 | Technical co-operation |
| 5 | Development of sustainable hardwood management | Forestry policy and administrative management | 0.07 | 01.1999 – 06.2000 | Technical co-operation |
| 6 | Support to the integrated coastal zone management for Kihnu Strait | Environmental policy and administrative management | 0.05 | 02.1998 03.2000 | Training |
| 7 | Haapsalu and Matsalu Bays environment project with an environment management component for agricultural run-off elements | Environmental education, training | 0.39 | 04.1998 – 12.2000 | Technical co-operation |
| 8 | Support to physical planning | Environmental education, training | 0.24 | 11.1998 – 05.2000 | Training |
| 9 | Air quality management project | General environmental protection | 0.17 | 01.1999 – 12.2000 | Technical co-operation |
| **Completed** | | | | | |
| 1 | Project for identifying radiation risks in Sillamäe | Waste management, disposal | 0.03 | 08.1995 – 09.1996 | Economic and technical assessment, study |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 2 | Study on radon in Estonia | Environmental research | 0.05 | 05.1993 – 11.1993 | Economic and technical assessment, study |
| 3 | Integrated coastal monitoring programme | Water resources protection | 0.18 | 02.1995 – 12.1995 | Economic and technical assessment, study |
| 4 | Project on satellite mapping for an Estonian base map development project | Environmental policy and administrative management | 0.76 | 09.1993 – 07.1994 | Technical co-operation |
| 5 | Geological survey within a project on geological information system (phase I) | Environmental policy and administrative management | 0.04 | 07.1993 – 09.1994 | Technical co-operation |
| 6 | Air quality management, control and measurement network in Tallinn (phase II) | General environmental protection | 0.70 | 10.1994 – 12.1996 | Technical co-operation |
| 7 | Ortophotomapping at the scales of 1:2000 for cadestral and planning purposes and the transfer of technology (phase I) | Environmental policy and administrative management | 0.50 | 05.1994 – 12.1995 | Technical co-operation |
| 8 | Assessment and monitoring of coastal fish resources | Fishery research | 0.08 | 04.1994 – 10.1994 | Technical co-operation |
| 9 | Training programme for Estonian specialists on physical planning | Environmental education, training | 0.02 | 06.1995 – 10.1996 | Training |
| 10 | Baltic States fishery management system | Fishing policy and administrative management | 0.09 | 06.1994 – 03.1995 | Technical co-operation |
| 11 | Chemical mapping of soils of North-East Estonia | Environmental policy and administrative management | 0.04 | 02.1994 – 06.1994 | Technical co-operation |
| 12 | Geological survey within the framework of geochemical research of soil pollution in Estonia | Environmental research | 0.07 | 10.1994 – 12.1997 | Technical co-operation |
| 13 | Joint information for the computer storage of bedrock data in Estonia | Environmental policy and administrative management | 0.10 | 06.1993 – 07.1994 | Technical co-operation |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 14 | Geological survey of Estonia as geo-information (computer based storage of bedrock data in Estonia) (phase II) | Environmental policy and administrative management | 0.06 | 10.1994 – 12.1996 | Technical co-operation |
| 15 | Environmental library systems | Environmental policy and administrative management | 0.01 | 05.1994 – 11.1997 | Sector aid |
| 16 | Operational oil drift forecast for the Baltic Sea | Water and sanitation | 0.05 | 11.1995 – 12.1996 | Technical co-operation |
| 17 | Assistance to the implementation of the land reform | Environmental policy and administrative management | 0.57 | 12.1996 – 01.1998 | Technical co-operation |
| 18 | Aerial photography and mapping | Environmental policy and administrative management | 0.18 | 01.1996 – 11.1996 | Sector aid |
| 19 | Radiation protection and waste management | Waste management, disposal | 0.00 | 11.1995 – 12.1997 | Legal infrastructure |
| 20 | Construction of a sewage treatment unit for a hotel in Saaremaa | Water and sanitation | 0.08 | 05.1992 – 06.1993 | Sector aid |
| 21 | Pre-feasibility studies of environmental situation at the west coast of Estonia, in Tartu area and at Lake Peipsi | Water resources protection | 0.41 | 01.1992 – 07.1992 | Economic and technical assessment, study |
| 22 | Support for wastewater treatment in Viljandi | Water and sanitation | 0.04 | 01.1992 – 05.1992 | Economic and technical assessment, study |
| 23 | Feasibility study of a sewage plant in Valga | Water and sanitation | 0.04 | 02.1992 – 05.1992 | Economic and technical assessment, study |
| 24 | Atlas of mortality | Environmental research | 0.04 | 07.1992 – 07.1993 | Sector aid |
| 25 | Training course in meteorology | Environmental education, training | 0.03 | 03.1992 – 04.1992 | Training |
| 26 | Training course on water management | Environmental education, training | 0.01 | 02.1992 – 04.1992 | Training |
| 27 | Delivery of equipment for sewage treatment plants | Water and sanitation | 0.02 | 04.1993 – 07.1993 | Investment project |
| 28 | Feasibility study for a sewage treatment plant in Kuressaare | Water and sanitation | 0.12 | 10.1990 – 10.1991 | Economic and technical assessment, study |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 29 | Feasibility study of a sewage treatment plant in Haapsalu | Water and sanitation | 0.03 | 01.1992 – 03.1992 | Economic and technical assessment, study |
| 30 | Hydrometeorological communication link | Environmental education, training | 0.12 | 12.1992 – 09.1993 | Training |
| 31 | Geological survey for the research of peat deposits | Environmental research | 0.01 | 10.1994 – 10.1995 | Technical cooperation |
| 32 | Geological survey for hydrological monitoring | Water resources protection | 0.16 | 02.1994 – 12.1998 | Technical cooperation |
| 33 | Elimination of SR (strontium) - 90 radiation and contamination risk from lighthouses | General environmental protection | 0.08 | 09.1993 – 09.1994 | Technical cooperation |
| 34 | Integrated hydrological modelling system | Environmental policy and administrative management | 0.06 | 09.1994 – 09.1995 | Technical cooperation |
| 35 | Training courses in land valuation and in cadastre systems | Environmental policy and administrative management | 0.08 | 11.1996 – 12.1996 | training |
| 36 | Technical assistance to the Estonian Land Board | Environmental policy and administrative management | 0.05 | 09.1996 – 02.1997 | Sector aid |
| 37 | Assessment of policy options for encouraging the utilisation of wood energy (I phase) | Forestry policy and administrative management | 0.03 | 08.1998 – 11.1998 | Technical cooperation |
| 38 | Agreement between Estonian Ministry of Environment and the Swedish Environmental Protection Agency on seminar work | Environmental education, training | 0.20 | 03.1998 – 07,1999 | Training |
| 39 | Feasibility study for a wastewater treatment project in Narva | Water and sanitation | 0.11 | 07.1997 – 07.1998 | Technical cooperation |
| 40 | Water framework directive | Water resources policy and administrative management | 0.15 | 04.1998 – 05.1999 | Technical cooperation |
| **Cancelled** | | | | | |
| 1 | Agricultural run-off management | General environmental protection | | | Economic and technical assessment, study |
| 2 | Cadastral project for Tapa | Environmental policy and administrative management | 0.25 | 02.1997 | Technical cooperation |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 3 | Experimental production of aerators in Viiratsi | Environmental policy and administrative management | 0.05 | | Investment project |
| 4 | Study on development of a sewage system for Kärdla | Water and sanitation | 0.07 | | Economic and technical assessment, study |

*Table 26: Co-operation Projects in the Field of Environment with Switzerland*

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| **Completed** | | | | | |
| 1 | Finalisation and equipping of a wastewater treatment plant for Tartu together with constructing small sewerage and water supply networks | Water and sanitation | 19.34 | 12.1994 – 09.1997 | Investment project |
| 2 | Technical assistance to mapping | Environmental policy and administrative management | 1.45 | 11.1996 – 12.1997 | Technical co-operation |
| 3 | Finalisation of the construction of a wastewater treatment plant for Otepää | Water and sanitation | 1.76 | 12.1994 – 11.1997 | Investment project |

*Table 27: Co-operation Projects in the Field of Environment with the United Kingdom*

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| **Completed** | | | | | |
| 1 | CLICOM (Climate Computing) systems | Environmental policy and administrative management | 0.02 | 05.1996 – 06.1997 | Technical co-operation |
| 2 | Workshop on wetland management | Environmental education, training | 0.02 | 09.1995 – 09.1995 | Training |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 3 | Training for national park officials in UK | Environmental education, training | | 04.1996 – 04.1996 | Training |

*Table 28: Co-operation Projects in the Field of Environment with the USA*

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| **Completed** | | | | | |
| 1 | Environmental assessment of oil shale mining and combustion in Estonia | Environmental policy and administrative management | 0.08 | 04.1994 – 02.1995 | Economic and technical assessment, study |
| 2 | Technical assistance in the field of environmental monitoring and management | Environmental policy and administrative management | 0.26 | 10.1993 – 09.1996 | Technical co-operation |

*Table 29: Co-operation Projects in the Field of Environment with the EU*

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| **Request** | | | | | |
| 1 | PHARE 1998 – Water accession project on technical assistance to the Ministry of Environment | EU integration | 0.4 | 09.1999 – 12.2000 | Technical co-operation |
| 2 | PHARE 1998 – Air accession project on procurement of ambient air quality monitoring equipment | Biosphere protection | 1.00 | 03.2000 – 12.2000 | Investment project |
| 3 | PHARE 1998 air accession project for providing technical assistance to the Ministry of Environment | EU integration | 0.41 | 09.1999 – 12.2000 | Technical co-operation |
| 4 | Water supply project for Rakvere, Paide and Rapla | Water and sanitation | 6.00 | 10.1999 – 02.2001 | Investment project |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 5 | Remedy project for the Sillamäe radioactive tailing pond | Waste management, disposal | 5.00 | 11.1999 – 01.2004 | Investment project |
| 6 | Small and medium scale enterprise promotion II: Tartu sewage collector | Water and sanitation | 5.70 | 01.2000 – 06.2001 | Investment project |
| 7 | EU Accession project on water and wastewater for Estonian small municipalities (consisting water accession programmes for 17 small towns) | Water and sanitation | 9.68 | 11.1999 – 12.2002 | Investment project |
| **Firm commitment** | | | | | |
| 1 | PHARE 1997 REDOS 2 – supply and rehabilitation of the distribution network for Jõhvi-Ahtme | Water and sanitation | 1.54 | 08.1999 – 12.2000 | Investment project |
| 2 | PHARE 1998 water accession project for Kuressaare, Pärnu and Valga sewage treatment plants | Water and sanitation | 3.85 | 09.1999 – 06.2001 | Investment project |
| **Underway** | | | | | |
| 1 | Wastewater treatment and aquifer protection on Vormsi island | Water and sanitation | 0.38 | 01.1997 – 12.1999 | Investment project |
| 2 | Environmental infrastructure of water protection area in Pandivere | Water and sanitation | 2.41 | 10.1997 – 12.2000 | Investment project |
| 3 | PHARE 1997 – Accession Programme Support Unit | Environmental policy and administrative management | 0.62 | 04.1998 – 12.2000 | Technical co-operation |
| 4 | PHARE 1997 – REDOS II, implementation of a water resource management plan for the Ida-Virumaa region in Estonia | Water and sanitation | 0.87 | 03.1998 – 11.2000 | Technical co-operation |
| 4 | PHARE 1997 – REDOS II, implementation of a water resource management plan for the Ida-Virumaa region in Estonia | Water and sanitation | 0.87 | 03.1998 – 11.2000 | Technical co-operation |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 5 | Development of action programmes for implementation of the requirements of EU environmental legislation in Estonia | Approximation of laws | 0.16 | 10.1998 – 08.1999 | Technical co-operation |
| 6 | Development of approximation programmes for EU legislation concerning genetically modified organisms | Approximation of laws | 0.16 | 04.1998 – 07.1999 | Technical co-operation |
| 7 | Development of approximation programmes for EU legislation concerning good laboratory practice and animal experiments | Approximation of laws | 0.13 | 08.1998 – 07.1999 | Technical co-operation |
| **Completed** | | | | | |
| 1 | Programme for pollution monitoring and environmental legislation together with an implementation of a masterplan for pollution, monitoring and enforcement | Environmental policy and administrative management | 2.07 | 10.1997 – 10.1998 | Technical co-operation |
| 2 | PHARE CBC (Cross Border Co-operation) 1994 – hazardous waste management system | Waste management, disposal | 2.40 | 08.1996 – 12.1996 | Technical co-operation |
| 3 | National Environmental Action Programme | Environmental policy and administrative management | 0.40 | 04.1997 – 06.1998 | Technical co-operation |
| 4 | Baltic ECO's 1993 – 1994 educational and training programme – professional project management and leadership in environmental matter | Environmental education, training | 0.25 | 12.1994 – 12.1994 | Training |
| 5 | Training of Estonia officials in environmental matters (life programme) | Environmental education, training | 0.25 | 01.1993 – 10.1996 | Training |
| 6 | PHARE 1992 – technical assistance to the Ministry of Environment | Environmental policy and administrative management | 0.33 | 10.1993 – 12.1994 | Technical co-operation |
| 7 | Institutional support in environmental strategy to the Ministry of Environment | Environmental policy and administrative management | 0.35 | 02.1995 – 08.1995 | Technical co-operation |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 8 | PHARE 1995 - water resource management by reduction of pollution in oil shale mining areas: (Estonia) | Water and sanitation | 0.18 | 11.1995 – 11.1996 | Technical co-operation |
| 9 | Rehabilitation of water supply and sewage in Tallinn | Water and sanitation | 1.91 | 08.1995 – 01.1997 | Technical co-operation |
| 10 | Infrastructure in Matsalu Nature Reserve | Environmental policy and administrative management | 0.25 | 01.1995 – 11.1996 | Technical co-operation |
| 11 | Masterplan for pollution monitoring and enforcement | Environmental policy and administrative management | 0.42 | 05.1996 – 12.1998 | Technical co-operation |
| 12 | Project management support in civil engineering | Environmental policy and administrative management | 0.71 | 04.1995 – 12.1997 | Technical co-operation |
| 13 | Implementation of the Convention on biological Diversity and the Act on Sustainable Development in Estonia | Environmental policy and administrative management | 0.36 | 01.1996 – 10.1998 | Technical co-operation |
| 14 | Impact on eutrophication on trophic relationships in different coastal areas of the south-east Baltic Sea | Water resources protection | 0.05 | 02.1994 – 02.1997 | Economic and technical assessment, study |
| 15 | PHARE 1993 – final design for oil shale mining | Site preservation | 0.06 | 06.1994 – 02.1995 | Technical co-operation |
| 16 | Leakage detection and control in Estonia and Latvia | Water and sanitation | 0.55 | 01.1995 – 05.1996 | Technical co-operation |
| 17 | Analytical quality assurance – HELCOM PLC – 3 (pollution load compilation programme) | Environmental policy and administrative management | 0.27 | 12.1994 – 12.1995 | Technical co-operation |
| 18 | Development of an integrated coastal zone management plan for the Matsalu Bay catchment area | Environmental policy and administrative management | 0.04 | 11.1994 – 04.1996 | Technical co-operation |
| 19 | Development of an integrated coastal zone management plan for Käina Bay | Environmental policy and administrative management | 0.03 | 11.1994 – 04.1996 | Technical co-operation |
| 20 | Environment project for Keila City Water | Water and sanitation | 0.76 | 08.1998 – 03.1999 | Investment project |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 21 | Establishment of a GIS (Geographical Information System) based biodiversity monitoring system in Estonia | Environmental policy and administrative management | 0.32 | 01.1998 – 12.1998 | Technical co-operation |
| 22 | Rehabilitation of water supply and sewerage in Tallinn | Water and sanitation | 0.58 | 01.1998 – 09.1998 | Equipment |
| 23 | PHARE COP 1995 APSU (Accession Programme Support Unit) – provision of equipment for Matsalu Nature Reserve | Environmental policy and administrative management | 0.08 | 01.1998 – 01.1999 | Equipment |
| 24 | Small Municipalities Environmental Project (SMEP) – technical assistance | Water and sanitation | 0.29 | 06.1996 – 06.1999 | Technical co-operation |
| 25 | Small Municipalities Environmental Project (SMEP) – equipment implementation of SMEP | Water and sanitation | 1.86 | 08.1997 – 12.1998 | Investment project |
| 26 | Development of legal transposition programmes for the approximation of EU environmental legislation requirements into Estonian law | Approximation of laws | 0.17 | 03.1998 – 04.1999 | Technical co-operation |
| 27 | Assessment of environmental enforcement structures and practices in Estonia and Poland | Approximation of laws | 0.24 | 08.1998 – 04.1999 | Technical co-operation |
| **Cancelled** | | | | | |
| 1 | Implementation of the Estonian Environmental Approximation Strategy and Action Plan (priority sector – drinking water) | EU integration | 16.38 | 06.1998 – 06.2002 | Technical co-operation |

*Table 30: Co-operation Projects in the Field of Environment with UNDP*

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| **Underway** | | | | | |
| 1 | CAPACITY 21 in Estonia | Environmental policy and administrative management | 0.19 | 08.1997 – 03.2000 | Technical co-operation |
| **Completed** | | | | | |
| 1 | Project on regional sustainable development in the Ida-Virumaa County | Environmental policy and administrative management | 0.05 | 12.1993 – 07.1994 | Economic and technical assessment, study |
| 2 | Assistance to the introduction of environmental auditing in Estonia | Environmental policy and administrative management | 0.05 | 10.1996 – 07.1997 | Technical co-operation |

### 6.3.2 Co-operation Process in the Field of Energy

*Table 31: Co-operation Projects in the Field of Energy with Sweden*

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| **Completed** | | | | | |
| 1 | Demonstration of energy saving potential | Efficiency and conservation | 0.20 | 12.1991 – 12.1993 | Economic and technical assessment, study |
| 2 | Policy advisor to the Energy sector in the Ministry of Economic Affairs | Energy policy and administrative management | 0.05 | 03.1992 – 06.1992 | Technical co-operation |
| 3 | Project formulation – energy | Efficiency and conservation | 0.01 | 11.1990 – 11.1991 | Technical co-operation |
| 4 | Energy expert advisory services | Energy policy and administrative management | 0.14 | 08.1992 – 06.1993 | Technical co-operation |
| 5 | Economy and management for power engineers | Energy education, training | 0.02 | 01.1993 – 05.1993 | Training |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 6 | Extension of support to energy adviser in the Ministry of Economic Affairs | Energy policy and administrative management | 0.17 | 06.1995 – 02.1997 | Technical co-operation |
| 7 | Energy saving measures in 12 apartment houses in Tartu (Estonia) | Efficiency and conservation | 0.10 | 09.1993 – 01.1994 | Economic and technical assessment, study |
| 8 | Boiler conversion to wood fuel in Jõgeva, | Efficiency and conservation | 0.07 | 09.1993 – 12.1993 | Technical co-operation |
| 9 | Energy saving advise | Efficiency and conservation | 0.02 | 05.1992 – 12.1992 | Technical co-operation |
| 10 | Boiler conversion | Efficiency and conservation | 0.09 | 06.1993 – 12.1993 | Economic and technical assessment, study |
| 11 | Energy adviser at the Ministry of Economic Affairs I | Energy policy and administrative management | 0.18 | 06.1994 – 08.1995 | Technical co-operation |
| 12 | Extension of contract for consultancy services performed by power utilities Fjärvärmebyrän and Stockholm Energi in Tartu | Energy policy and administrative management | 0.26 | 06.1994 – 12.1997 | Technical co-operation |
| 13 | Course in electric drives | Energy education, training | 0.02 | 03.1994 – 12.1994 | Training |
| 14 | Energy adviser at the Ministry of Economic Affairs II | Energy policy and administrative management | 0.19 | 03.1994 – 12.1994 | Technical co-operation |
| 15 | Extension of support to energy advisor at the Energy sector in the Ministry of Economic Affairs | Energy education, training | 0.06 | 03.1997 – 12.1997 | Technical co-operation |

*Table 32: Co-operation Projects in the Field of Energy with Denmark*

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| **Completed** | | | | | |
| 1 | Establishment of a demonstration area for energy savings | Efficiency and conservation | 0.25 | 12.1992 – 12.1993 | Technical co-operation |
| 2 | Energy savings in two selected buildings in Pärnu | Efficiency and conservation | 0.04 | 01.1992 – 12.1992 | Technical co-operation |
| 3 | Change-over of heating plant from fuel oil to chipped wood and peat | Efficiency and conservation | 1.31 | 01.1993 – 12.1993 | Technical co-operation |
| 4 | Financial aid and institutional study in Estonian energy sector | Energy research | 0.01 | 07.1993 – 12.1993 | Economic and technical assessment, study |
| 5 | Stationing of a Danish advisor at the Energy sector of Ministry of Economic Affairs | Energy policy and administrative management | 0.11 | 07.1993 – 12.1993 | Technical co-operation |
| 6 | Modernisation of metering and regulating stations | Energy policy and administrative management | 0.06 | 01.1996 – 12.1997 | Technical co-operation |
| 7 | Project Management Unit with European Bank for Reconstruction and Development assistance I | Energy generation and supply | 0.15 | 01.1994 – 03.1996 | Technical co-operation |
| 8 | Reconstruction of Pärnu energy sector with European Investment Bank assistance I | Energy generation and supply | 0.02 | 01.1994 – 12.1996 | Technical co-operation |
| 9 | Värska metering station | Energy generation and supply | 0.00 | 01.1994 – 03.1997 | Technical co-operation |
| 10 | Thermography | Energy generation and supply | 0.08 | 01.1994 – 03.1997 | Technical co-operation |
| 11 | Energy statistics for Estonia | Energy generation and supply | 0.03 | 01.1994 – 12.1996 | Technical co-operation |
| 12 | Reconstruction of Pärnu energy sector with European Investment Bank assistance II | Energy generation and supply | 0.08 | 01..1994 – 12.1996 | Technical co-operation |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 13 | Small boiler conversion with International Bank for Reconstruction and Development assistance I | Energy generation and supply | 0.09 | 01.1994 – 12.1996 | Technical co-operation |
| 14 | District Heating Master Plan for Eastern Estonia | Energy generation and supply | 0.33 | 01.1994 – 03.1997 | Technical co-operation |
| 15 | Reconstruction of Pärnu energy sector with European Investment Bank assistance III | Energy generation and supply | 0.09 | 01.1994 – 03.1997 | Technical co-operation |
| 16 | Small boiler conversion with International Bank for Reconstruction and Development assistance II | Energy generation and supply | 0.03 | 01.1994 – 12.1996 | Technical co-operation |
| 17 | Small boiler conversion | Energy generation and supply | 0.27 | 01.1995 – 12.1997 | Technical co-operation |
| 18 | Project Management Unit with European Bank for Reconstruction and Development assistance II | Energy generation and supply | 0.08 | 01.1995 – 03. 1997 | Technical co-operation |
| 19 | Technical assistance and equipment for energy conservation in public buildings | Energy generation and supply | 0.75 | 01.1995 – 06.1997 | Technical co-operation |
| 20 | Pärnu District Heating rehabilitation with European Investment Bank assistance | Energy generation and supply | 0.09 | 01.1996 – 12.1997 | Technical co-operation |
| 21 | Small boiler conversion with International Bank for Reconstruction and Development assistance III | Energy generation and supply | 0.17 | 01.1997 – 01. 1998 | Sector aid |
| 22 | Inspection of pipelines (phase II) | Energy generation and supply | 0.24 | 01.1996 – 07.1998 | Investment project |
| 23 | Gas leak inspection system | Energy generation and supply | 0.25 | 01.1997 – 06.1998 | Technical co-operation |
| 24 | Wind energy project (phase I) | Energy generation and supply | 0.07 | 09.12997 – 06.1998 | Economic and technical co-operation, study |
| 25 | District Heating rehabilitation in Kärdla | Energy generation and supply | 0.20 | 01.1996 – 06.1998 | Technical co-operation |
| 26 | District Heating rehabilitation in Viljandi | Energy generation and supply | 0.26 | 01.1997 – 06.1998 | Technical co-operation |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| **Request** | | | | | |
| 1 | Training programme for persons from the District Heating sector | Energy generation and supply | 0.27 | 07.1998 – 12.1999 | Training |
| 2 | Energy conservation | Efficiency and conservation | 0.27 | 07.1998 – 12.1999 | Technical co-operation |
| 3 | Energy strategy support study | Energy policy and administrative management | 0.27 | 07.1998 – 12.1999 | Legal infrastructure |
| 4 | Inspection of natural gas transmission pipelines (phase III) | Energy generation and supply | 0.20 | 07.1998 – 12.1999 | Sector aid |
| 5 | Project implementation assistance | Energy generation and supply | 0.17 | 07.1998 – 12.1999 | Technical co-operation |
| **Firm commitment** | | | | | |
| 1 | Business development in the Eastern Europe housing sector n | Housing | 0.16 | 04.1999 – 04.2000 | Technical co-operation |

*Table 33: Co-operation Projects in the Field of Energy with Finland*

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| **Completed** | | | | | |
| 1 | The training programme of Estonian energy technology experts | Energy education, training | 0.05 | 01.1994 – 12.1995 | Training |
| 2 | Energy Conservation Programme for Estonian industry | Efficiency and conservation | 0.23 | 01.1992 – 12.1996 | Technical co-operation |
| 3 | Power generation by autonomous wind diesel system in Prangli island | Electrical transmission, distribution | 0.25 | 01.1993 – 12.1995 | Investment project |
| 4 | Energy audits in industrial enterprises in Tallinn | Energy policy and administrative management | 0.02 | 01.1993 – 12.1994 | Economic and technical assessment, study |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 5 | Renovation of Iru power plant in Tallinn for natural gas utilisation | Gas fired power plants | 0.13 | 01.1992 – 12.1994 | Investment project |
| 6 | Energy efficient renovation of an apartment building in Tallinn and energy conservation training | Efficiency and conservation | 0.08 | 01.1994 – 12.1994 | Technical co-operation |
| 7 | Consultancy and training services for Estonian energy administration | Energy policy and administrative management | 0.01 | 01.1992 – 12.1994 | Training |
| 8 | Rehabilitation with technical assistance of the Iru Power Plant in Estonia related to the World Bank's loan | Electrical transmission, distribution | 0.30 | 01.1993 – 12.1997 | Technical co-operation |
| 9 | Combustion of Estonian oil shale in a circulating fluidised bed boiler | Efficiency and conservation | 0.26 | 01.1993 – 12.1994 | Technical co-operation |

*Table 34: Co-operation Projects in the Field of Energy with the EU*

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| **Underway** | | | | | |
| 1 | Establishment of regional energy centres | Energy policy and administrative management | 0.9 | 05.1995 – 09.1999 | Technical co-operation |
| 2 | Investment preparation facility | Energy generation and supply | 0.9 | 05.1998 – 12.1999 | Investment project |
| **Completed** | | | | | |
| 1 | Energy Programme Implementation Unit | Energy policy and administrative management | 0.4 | 02.1997 – 12.1998 | Technical co-operation |
| 2 | Energy advisor to the Energy sector of the Ministry of Economic Affairs | Energy policy and administrative management | 0.2 | 06.1993 – 03.1995 | Technical co-operation |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 3 | Energy database for Estonia | Energy policy and administrative management | 0.2 | 08.1995 – 10.1996 | Technical co-operation |
| 4 | Project Implementation Unit for the Energy sector of the Ministry of Economic Affairs | Energy policy and administrative management | 0.9 | 08.1994 – 08.1996 | Technical co-operation |
| 5 | A study to identify short term energy conservation and supply potential | Efficiency and conservation | 0.60 | 01.1992 – 12.1992 | Economic and technical assessment, study |
| 6 | Energy use study | Energy research | 0.04 | 05.1992 – 12.1992 | Economic and technical assessment, study |
| 7 | Restructuring of electricity sector | Electrical transmission/distribution | 0.30 | 09.1995 – 12.1996 | Technical co-operation |
| 8 | Energy Conservation Programme | Efficiency and conservation | 0.20 | 01.1996 – 12.1997 | Technical co-operation |
| 9 | Energy Strategy Plan for Estonia | Energy policy and administrative management | 0.45 | 04.1996 – 05.1997 | Technical co-operation |
| 10 | Metering plan for electricity | Energy policy and administrative management | 0.30 | 03.1997 – 10.1998 | Technical co-operation |
| 11 | Training of staff in energy | Energy policy and administrative management | 0.40 | 01.1996 – 12.1998 | Training |
| 12 | Institutional and organisational development | Energy policy and administrative management | 0.20 | 01.1996 – 12.1998 | Technical co-operation |
| 13 | Oil shale perspectives within energy production | Energy policy and administrative management | 0.50 | 01.1995 – 12.1996 | Technical co-operation |
| 14 | Standardisation of heat load and energy consumption calculations for buildings | Efficiency and conservation | 0.05 | 01.1996 – 12. 1998 | Technical co-operation |
| 15 | Standardisation of the energy sector | Energy policy and administrative management | 0.05 | 01.1996 – 12.1998 | Technical co-operation |
| 16 | Post implementation analysis | Energy generation and supply | 0.30 | 03.1997 – 09.1998 | Technical co-operation |

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| 17 | Assistance to EU accession | Energy generation and supply | 0.10 | 05.1997 – 07.1997 | Legal infrastructure |

*Table 35: Co-operation Projects in the Field of Energy with the United Kingdom*

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| **Completed** | | | | | |
| 1 | Recommendations on restructuring of Southern Electricity Network in Estonia | Electrical transmission, distribution | 0.04 | 01.1993 – 12.1994 | Technical co-operation |

*Table 36: Co-operation Projects in the Field of Energy with the USA*

| | Description | Objectives | Budget Million EURO | Duration | Evaluation |
|---|---|---|---|---|---|
| **Completed** | | | | | |
| 1 | Regional energy efficiency | Efficiency and co-operation | 0.7 | 01.1994 – 12.1995 | Technical co-operation |

### 6.3.3 German – Estonian Co-operation

#### *6.3.3.1 Scientific Co-operation Projects*

##### *6.3.3.1.1 Computer-Aided Energy Management and Process Control Functions for Stabilisation the Interconnected Power System of the Baltic States*

| | |
|---|---|
| Donor programme | INCO-COPERNICUS programme |
| EU partner | Germany |
| Sector | Power engineering |
| Type of financing | Grant |
| Type of assistance | Co-ordination and scientific know how |
| Project status | Completed |
| Target area | Estonian Power System |
| Total budget | EURO 200,000 |
| Estonian share | EURO 55,200 |
| Project duration | January 1994 – December 1996 |
| German partner | Fraunhofer Institute for Information Technology and Data Processing – Department of Process Control<br>Dr. Klinger<br>Tel.: (49 228) 305 2180, Fax: (49 228) 305 3524<br>P.O. Box 120 629, D – 53048 Bonn |
| Estonian partner | Estonian Energy Institute<br>Dr. Lembit Krumm, Head of the Department of Power Systems<br>Tel.: (372) 452 577, Fax: (3726) 460 206<br>Paldiski road 1, 10137 Tallinn<br>lembit@eeri.ee |
| Description | Generalisation, development and implementation of the complex theory and methods of the hierharchic control of Interconnected Power Systems (IPS) within the system of international research projects for the polyoptimal correction of the performance of electrical regimes in IPS to reach the interstate co-operation level with the regard to the corresponding technical and economical criteria. |
| Objectives | To improve the functioning quality of the interconnected power systems of the Baltic States. |

#### *6.3.3.1.2 Use of Wind Energy Resource in Estonian – Scientific Know-how transfer from the Bochum University (Germany) to Tartu University (Estonia) in the Field of Wind-climate and Wind Energy Resource Evaluation*

| | |
|---|---|
| Donor programme | Bilateral |
| EU partner | Germany |
| Sector | Wind energy |
| Type of financing | Grant |
| Type of assistance | Scientific co-operation |
| Project status | Completed |
| Target area | Wind energy resource in Estonia |
| Total budget | 25 000 EUR |
| Estonian share | |
| Project duration | July 1994 – September 1995 |
| German partner | University of Bochum, Institute of Geography, department of Climate Research<br>Dr. Jürgen Steinrücke<br>Universitätsstr. 150, D-44801 Bochum |
| Estonian partner | University of Tartu, Institute of Geography<br>Dr. Ülo Mandre<br>Tel.: (372 7) 375 826, Fax.: (372 7) 375 825<br>Vanemuise 46, 51014Tartu |
| Description | Bochum University assists Tartu University in scientific know-how for measuring wind speed according to the EU standards to serve for wind energy resource evaluation in Estonia |
| Objectives | Wind energy resource evaluation in Estonia |

### *6.3.3.2 Co-operation in the Field of Wind Energy*

#### *6.3.3.2.1 Project Proposal for Erecting a Wind Farm in Hiiumaa*

| | |
|---|---|
| Output power | 1.5 MW (3 x 500 kW) |
| Annual energy production | 3,750 MWh |
| Total budget | DEM 3,370,000 |
| Donor programme | ELDORADO |
| Donor contribution | DEM 1,780,000 |
| German partner | PreussenElektra AS |
| German partner contribution | DEM 240,000 |
| Estonian partner | Eesti Energia |
| Estonian partner contribution | DEM 240,000 |
| Date of the proposal | 1996 |
| Reason of unsuccess | Eesti Energia showed low interest |

*6.3.3.2.2 German firms, having shown interest in wind energy application in Estonia*

**ENERCON GmbH**
Dreekamp 5, D-26605 Aurich
Tel.: (49) 419 270
Fax: (49) 4192 7199

**Tacke Windenergy GmbH**
P.O. Box 1261, D – 48497 Salzbergen
Tel.: (49 597) 197 080
Fax: (49 597) 197 0866

**NORDEX GmbH**
Sehlingdorfer str. 26, 49328 Melle
Tel.: (49 5) 427 9424
Fax: (49 5) 427 9424

**SÜDWIND Energy Systems GmbH**
Prinzenstrasse 32-33, D-10969 Berlin, Germany
Tel.: (49 306) 169 260
Fax: (49 306) 169 2677

**Jacobs Energy GmbH**
Kleinbahnhof 19 – 23, D – 25746 Heide, Germany
Tel.: (49 481) 850 650
Fax: (49 481) 850 6510
e-mail: jacobs-energie@t-online.de

**Baltic Energy GmbH**
Mr. Jepsen
Spielplatz 5, D – 24969 Lindewitt – Linnau, Germany
Tel.: (49 461) 144 3212
Fax: (49 661) 144 3222

**WiMa WINDKRAFTMANAGEMENT GmbH**
Mr. Heck
Wilhelmstrasse 17 – 19, D – 24143 Kiel, Germany
Tel.: (49 431) 705 170
Fax: (49 431) 705 1722

**Lars Mach Ltd.R.**
Mr. Lars Mach
Ekendonk 16, D – 47809 Krefeld, Germany
Fax: (49 215) 154 1525

### *6.3.3.3 Industrial Co-operation*

#### *6.3.3.3.1 Firms with German Partnership Active in the Field of Environment Equipment in Estonia*

**Schöttli Keskkonnatehnika AS**
Christina Jörg
Mustamäe tee 50, 10621 Tallinn
Tel.: (3726) 706 874
Fax: (3726) 706 875
Profile: environmental equipment in the field of drinking water clean up

#### *6.3.3.3.2 Firms with German Partnership Active in the Field of Power Engineering in Estonia*

**RD Electronic AS**
Vladimir Nikitin
Linda 2, 20309 Narva
Tel.: (372 35) 922 72
Fax: (372 35) 330 54
Profile: Transformators, thermoregulators

**GEA PT Baltic**
Rein Kirsimäe
Männimäe tee 28, 71020 Viljandi
Tel.: (372 43) 370 00
Fax: (372 43) 370 00
Profile: various equipment for power engineering

**AEG Energietechnik GmbH**
Mait Ruut
Madara 27, 10612 Tallinn
Tel.: (3726) 403 487
Fax: (3726) 403 488
Profile: equipment for energy supply

**Bergemann – Ilmarine AS**
Hubert Tammik
Mustamäe tee 5A, 10616 Tallinn
Tel.: (3726) 259 570
Fax: (3726) 541 359
Profile: accessories for industrial boilers, details for burners

**Eesti Gaas AS**
Vaike Pallo
Liivalaia 9, 10118 Tallinn
Tel.: (3726) 303 004
Fax: (3726) 313 884
Profile: trade with natural gas