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CCNM/DSTI/IND(98)37/FINAL



PARIS

Organisation de Coopération et de Développement Economiques
Organisation for Economic Co-operation and Development

OLIS : 22-May-1998
Dist. : 22-May-1998

Or. Eng.

CENTRE FOR CO-OPERATION WITH NON-MEMBERS
DIRECTORATE FOR SCIENCE, TECHNOLOGY AND INDUSTRY
INDUSTRY COMMITTEE

CCNM/DSTI/IND(98)37/FINAL
Unclassified

**BUILDING CAPACITY IN THE ENVIRONMENTAL GOODS AND SERVICES
INDUSTRY IN THE BALTIC REGION**

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FOREWORD

The two reports in this document were prepared for a workshop on “Building Capacity in the Environmental Goods and Services Industry in the Baltic Region” held on 1-2 December 1997 in Riga, Latvia. The Agenda for Action included in this document was elaborated during the workshop.

The workshop was part of the programme of the OECD Advisory Group on Industry and Environment in Central and Eastern Europe (AGIE) under the aegis of the Centre for Co-operation with the Economies in Transition (which was succeeded in 1998 by the OECD Centre for Co-operation with Non-Members). Organised by the OECD with assistance from the Regional Environmental Center for Central and Eastern Europe (REC), this workshop was a follow-up to previous more general analysis developed for the Central and Eastern European Countries.

In the OECD, the work on the environment industry was organised by Graham Vickery and Maria Iarrera (both from Directorate for Science, Technology and Industry). In the REC, the work was co-ordinated by Winston Bowman and Gerald Fancoj. The opinions expressed are those of the individual authors and do not necessarily reflect the views of their organisation or of the OECD. The report is published under the responsibility of the Secretary-General of the OECD.

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TABLE OF CONTENTS

AGENDA FOR ACTION.....	4
Introduction.....	4
Overview of factors affecting growth of the environmental goods and services industry in the Baltic region	4
Overview of the environmental goods and services industry	8
Agenda for action.....	9
ENVIRONMENTAL BUSINESS SECTORS IN THE BALTIC REGION: CURRENT STATUS AND BARRIERS TO FUTURE GROWTH	13
Introduction.....	13
Economic overview	15
Domestic environmental sectors	19
Barriers to development.....	26
Appropriate stakeholder activities	26
Conclusions.....	28
DEMAND FOR ENVIRONMENTAL TECHNOLOGIES IN ESTONIA, LATVIA AND LITHUANIA. OVERVIEW OF PROJECT OPPORTUNITIES	31
Introduction.....	31
Environmental priorities and project opportunities	37
Information channels for business opportunities	41
Demand for environmental technologies	43
Major end-users of environmental technologies	50
Advantages and disadvantages of local suppliers	52
Profile of the environmental business sector	53
Conclusions.....	55

AGENDA FOR ACTION

Introduction

In 1996, the OECD in collaboration with the Regional Environmental Center for Central and Eastern Europe (REC) organised a workshop in Szentendre (Hungary) on Building Capacity in the Environmental Goods and Services Industry in the Central and Eastern European Countries. This industry is seen as being particularly important for its contribution to economic development by integrating cleaner technologies and environmental practices in production, and for creation of jobs.

The principal aims of the Szentendre workshop was to analyse barriers to development of the environment industry to identify practical solutions to be able to recommend an Agenda for Action. It was found that common barriers to development of the environmental goods and services industry mainly relate to:

- *weak development of the environmental market* due to lack of comprehensive environmental regulation or weak enforcement; lack of information on environmental policies and regulations;
- *weak development of the environmental goods and services supplying firms* due to difficult access to credit and finance; lack of general and specific managerial skills; and lack of general market information.

On the basis of these findings, the Szentendre workshop developed an Agenda for Action, which recommends a wide range of practical steps which the different stake-holders should consider to foster development of the environment industry (see CCNM/DSTI/IND(98)36/FINAL). These were mainly to: facilitate the development of more stable demand for environmental goods and services; improve financing mechanisms; to provide better information on environmental regulations and markets and on access to credit; and support continuous management training.

It was recommended that this kind of workshop should be repeated for a smaller and more homogenous group of countries to develop a focused Agenda for Action. The Baltic region was chosen to be analysed first.

Overview of factors affecting growth of the environmental goods and services industry in the Baltic region

General economic framework for enterprise development

Analysis on the environmental goods and services industry in Central and Eastern Europe shows that its development usually depends on the state of advancement of economic reforms and industrial

restructuring, and on the development of environmental regulations, and the subsequent level of national environmental expenditure.

Economic reforms and industrial restructuring

In the case of the Baltic countries, macro-economic stability was reached rapidly, while the pace of industrial restructuring lagged somewhat behind. During the period between 1991 and 1995, the transition process to market economies was based in the three Baltic States on a comprehensive programme of liberalisation and macro-economic stabilisation. Priority was given to monetary and overall structural adjustment, without paying a great deal of attention to the different steps needed to restructure the industrial sector.

Reforms for the industrial sector required a shift from a centralised system to a network of capitalist enterprises, which as a first step called for privatisation of state-owned enterprises. Each of the Baltic States followed different paths of reform.

In *Estonia*, first prices were liberalised for all products except some municipal services and housing. Second, international trade was completely liberalised. Third, industrial production in branches such as furniture, clothing and transport was re-oriented towards solvent clients, by increasing trade with western countries. These sectors are now flourishing, while the more capital intensive industries, being less flexible to change, collapsed (e.g. pulp and paper, chemical, engineering and metal industries).

Privatisation took place either through foreign investment or by allowing management buy-outs. Estonia now needs to solve a governance problem in enterprises which are mainly managed by private individuals and owned either by the state, or controlled by rapidly developing financial institutions.

Latvia, having been strongly tied to the industrial system of the ex-USSR, faced greater difficulties in economic and industrial reforms. Price liberalisation created liquidity problems in most enterprises, while industrial re-organisation was delayed by difficulties in re-directing production towards Western countries. Although already in 1991 the government issued a Privatisation law, the process has not yet taken off comprehensively since the process of distributing vouchers has been complex and people have preferred to use the distributed vouchers for individuals purposes (e.g. buying houses), rather than industrial units.

Only a small number of industrial units are privatised, while most of them have been transformed into state enterprises. These are restructured through leasing licences: private individuals -- most often managers -- can agree to long-term lease contracts with the state, and eventually obtain ownership. 78 per cent of the privatisation has been carried out with this lease method, which still left most enterprises in the state's hands at the end of 1996.

Lithuania was the first to adopt a mass privatisation programme, which gave impressive results in numbers of privatised enterprises, but resulted in a concentrated industrial structure. A small number of holdings with a small amount of capital control a large network of enterprises, often comprising a commercial bank, one or more insurance companies, distribution networks and trade organisations (they control 52 per cent of the invested vouchers). The concentrated nature of the production structure poses serious problems for competition and gives concerns regarding barriers to market entry.

From this analysis, the Baltic states are still facing barriers to the development of a viable private sector. Estonia and Latvia are mainly affected by late and uneven privatisation and reorganisation of the

production structure, while Lithuania is more concerned with the concentrated nature of the production structure, which is controlled by a small number of holdings companies. Consequently, the three Baltic States, if compared with other Central and Eastern European countries, have not experienced the same upsurge in the creation of new SMEs. For example in Hungary there are 140 enterprises per 1 000 persons, while in Estonia only 40.

The *St. Petersburg Region* has always had strong economic links with the Baltic States, for historical and geographical reasons. Privatisation in this region, as for the entire Russian Federation, has been almost completed, with three-quarters of the economy in the private sector. The chemical, forestry, light industry and wholesale sectors are already privatised, while construction, transport and telecommunication are still state owned. Nevertheless, compared with Moscow, this region has poorly developed banking and financial institutions. Development of the private sector suffers as a consequence.

Growth in the region is also affected by incomplete legislation, weak enforcement, customs and certification problems, which hinder foreign direct investment, and deficiencies in the taxation system. Equally important obstacles are burdensome bureaucracy, weak institutions supporting proper functioning of markets and insufficient infrastructure in certain aspects.

This general economic framework can hinder development of a strong environment industry in the Baltic region. The industry is usually made up of many SMEs, and these face barriers to entry as markets are concentrated. The uncompleted economic reforms and delayed process of industrial restructuring also increases uncertainty with respect to market development and access to finance, hindering development of the environment industry. Lack of harmonisation in the region in economic regulatory reforms and in environmental policies also delays growth.

Environmental regulations and markets in the Baltic Region

Since 1994, the three Baltic countries and the Russian Federation have each developed and adopted a National Environmental Strategy, implemented a detailed National Environment Action Plan, established a budget for Environmental Expenditure and set up Environmental Funds. Estonia, Latvia and Lithuania have ratified the 1992 Helsinki Conventions on the protection of the Baltic Sea, and have commitments to cleaning up Baltic Sea "hot spots". Nevertheless, implementation and enforcement of environmental policy measures still need to be improved.

The total environmental expenditure from both the government and the private sector for the Baltic States in 1996 was estimated to be around US\$ 160 million. Water pollution is a major problem and a major share of environmental investments are directed towards water and wastewater treatment. In 1996, for example, in Estonia 67 per cent and in Latvia 83 per cent of environmental expenditures were allocated to projects for reducing water pollution (mainly sewage treatment plants), while the remainder was allocated to air protection and waste management projects.

The interest which the Baltic countries share in becoming members of the European Union (EU) will certainly make them commit even more resources to environmental protection. To obtain membership, these countries are required to "approximate" EU environmental legislation, which will imply a sustained higher level of investment. Average estimates of compliance costs for "approximation" to EU environmental legislation have been put at 80 - 120 ECU per capita total annual costs. This figure covers capital and operation costs for municipal wastewater and air pollution and operation costs for waste management.

Although this amount is only two-thirds of the average per capita environmental expenditure for European Union countries, it corresponds to a much larger share of GDP for the Baltic States. These costs and their impacts will depend on the timing of investment and the kind of policy instrument put in place to fulfil EU approximation requirements.

The demand for environmental goods and services is largely driven by the priorities established by environmental legislation. At present, demand for technologies and services related to wastewater treatment, waste management and energy efficiency (to reduce air pollution) is predominant for the whole region.

The demand is mainly expressed by government for municipal services, and industrial sectors such as power and energy, chemicals, and pulp and paper, which are recognised as being more polluting. It is expected that for the next few years, end-of-pipe equipment will have a predominant position in the market, compared with clean technologies, pollution prevention and waste minimisation programmes. However, in the long run, the choice between end-of-pipe or integrated technology will be mainly based on the trade-off between economic costs and benefits of each.

Future development of demand for environmental goods and services will also depend on the enforcement of environmental regulation, and the pace at which environmental concerns will be effectively integrated in the economy. Especially in the Baltic States, shortages of administrative personnel in Ministries hinder the appropriate development and enforcement of environmental regulations.

To facilitate growth in demand for environmental goods and services governments need to develop an integrated approach involving most Ministries (e.g. Trade, Industry, Environment, Agriculture etc.) based not only on environmental priorities but also on economic efficiency and available resources. In the light of these considerations, Governments of the Baltic Sea Region (Denmark, Estonia, Finland, Germany, Iceland, Latvia, Lithuania, Norway, Poland, the Russian Federation and Sweden) and the European Commission have developed an Agenda 21 for the Region to facilitate integration of environmental concerns into economic activities. This Agenda established precise objectives and implementation plans for most economic sectors (e.g. agriculture, energy, fisheries, forestry, industry, tourism and transport, financial institutes etc.) which is scheduled to be presented and endorsed by Governments in June 1998.

Objectives and implementation plans specifically for industry principally focus on creating the capacity to manage and solve environmental problems. Special attention is paid to the establishment of economic incentives which improve environmental management in industry; to development and implementation of eco-efficiency tools (e.g. Environmental Management Systems); to improvements in R&D co-operation and technology transfer, and to increased consumer awareness.

Building capacity for cleaner production and implementation of environmental management systems in enterprises will be boosted in most Central and Eastern European countries by a policy statement, planned for endorsement by Governments and other stakeholders at the "Environment for Europe" Ministerial Conference in June 1998. This statement asks governments to commit to strongly support and facilitate the implementation of environmental management by providing financial and technical aid to enterprises in Central and Eastern European countries and in the New Independent States (see for more details the Task force for implementation of Environmental Action Programme).

All these initiatives will foster demand for environmental goods and services and development of environment industry provided that business has sufficient resources to finance implementation of environmental management systems and invest in environmental projects.

Overview of the environmental goods and services industry

In the Baltic region, the environmental goods and services industry consists of 150-200 SMEs, which were for the majority established after 1990 (around 70 per cent of the total). They are mainly privately owned, active in the services sector and relatively small -- on average they employ 10 or fewer full-time persons. Their principal domains of activity are water and wastewater treatment, waste management and energy efficiency.

Domestic suppliers are more competitive than foreign companies as they provide goods and services which are adapted to specific local needs, easier to operate and cheaper, even though customers do not discriminate against foreign companies. Technologies or services are evaluated for product quality and reliability, warranty conditions, availability of after-sale services, more than country of origin.

As in the case of most Central and Eastern European countries, development of the environmental goods and services industry is primarily hindered by difficult access to credit and finance, small environmental markets, difficult access to general information (e.g. environmental regulation, financing opportunities, new environmental technology), and weak enforcement of environmental regulation.

Difficult *access to credit* is a common problem among SMEs. Banks and financial institutions normally prefer loans to larger companies as they are in the position to provide some collateral and need bigger loans which are usually cheaper to manage for banks. Financial Institutions find it more convenient to deal with big firms as investment risk control is more efficient for fewer and bigger companies than for a large number of small companies.

Scarce availability of micro credit negatively affects development of both demand and supply of environmental goods and services. Enterprises interested in investing in environmental projects are stopped by lack of finance, while enterprises which provide environmental goods and services have difficulties in finding resources to support the development of their business.

Resources to finance environmental projects could come from Environmental Protection Funds, which have been recently established in all Baltic States and the Russian Federation. They aim to collect revenues from fines and charges and use these funds for environmental projects both on the demand and the supply side. This should help enterprises to implement environmental management systems and other environmental projects and environmental goods and services enterprises to find resources for their development.

Firms in the Baltic region are confronted particularly by *small domestic markets*. After the collapse of the USSR, the Baltic countries lost the network of relations which guaranteed placement of their production. After 1990, most enterprises started to re-orient their production toward other markets especially in Western countries. Nevertheless, this has not always been successful, as foreign companies have gained access to Baltic markets increasing competition and, as there are some barriers to access to EU environmental markets (e.g. different environmental standards). For example, Estonian enterprises are facing strong foreign competition, as Scandinavian firms (e.g. from Finland) find easy access to their markets. At end 1997, Governments of the Baltic states were discussing an agreement to liberalise access

to each others markets in the region. If this agreement comes into effect, enterprises will benefit from renewed economic relations with old partners to enlarge markets and trade opportunities.

Information on market size and opportunities; and poor *marketing and management skills* are other barriers to development of environmental goods and services enterprises. Entrepreneurs lack information on size and structure of markets for environmental goods and services, which are not easy to estimate as environmental regulations are changing and enforcement delayed. Firms also recognise insufficient marketing and management skills as being major obstacles to expanding their market presence.

Multilateral and bilateral aid programmes can help to build capacity in both marketing and managerial skills. Financial aid programmes and projects which involve technology transfer can deliver technical and managerial knowledge to enterprises as an integral part of such programmes. This could be particularly simple and beneficial for the Baltic region as a whole as it comprises a balanced mix of differently advanced economies which share the same environmental problems. By promoting joint-ventures and exchange of information and knowledge, all the countries in the Baltic region will benefit from balanced development of both environmental markets and the environmental goods and services industry.

Agenda for action

The main practical steps proposed to foster development of the environment industry are: more transparent and integrated environmental policy; improved enforcement of environmental regulation; development of more stable demand for environmental goods and services; improvement of financing mechanisms; better information on environmental regulations, markets and access to credit; trade liberalisation; continuous management training; better co-ordination among donor agencies and aid. These suggestions are organised below into a focused Agenda for Action.

AGENDA FOR ACTION

Actions	Actors
Improve application and enforcement of environmental regulation	
– Integrate environmental protection in other policies (e.g. include specific Cleaner Production programmes in policies for business and industry)	Ministries of Economics; Finance, Environment, Business and Industry, National and Federal Agencies, Environmental Protection Funds
– Improve environmental regulation enforcement	
– Establish co-operative agreements between governments and industry (e.g. to facilitate implementation of Environmental Management and Auditing Systems)	
Develop more stable demand for environmental goods and services	
– Facilitate integration of the Baltic region through mutual trade liberalisation to enlarge markets	Governments, Business Associations, Industry, National and International Financial Institutions
– Up-grade products and production processes to EU standards	
– Make information on environmental projects widely available to the supply side	

Improve financing mechanisms

- Strengthen the role of environmental protection funds (e.g. following the example of the Polish Environmental Fund) Ministries of Finance, Environment, Foreign Affairs; International and National Financial Institutes, Environmental Protection Funds, Aid Agencies
- Establish environmental equity funds
- Improve financial system understanding of environmental problems and specific issues related to environmental projects
- Encourage financing of environmental projects on favourable terms where there are long-term pay-offs
- Break-up finance into smaller packages
- Subcontract small and medium sized enterprise funding to local financial intermediaries
- Establish and improve partnerships between environmental goods and services enterprises and environmental funds
- Improve co-ordination among donor agencies and aid programmes

Boost development of small and medium enterprises

- Complete privatisation programmes and the industrial restructuring process Governments, National and International Financial Institutions
- Implement stable macro-economic policy
- Improve SMEs capabilities e.g. their export capacity

Improve information on environmental regulations, markets and access to credit

- Establish specialised business associations Business Associations, Environmental Funds
- Publicise financial and aid programmes and projects
- Create a one stop shop for business advisory services
- Create an environmental goods and services enterprises directory

Support for continuous management training

- Establish management training courses Governments, Aid Agencies, Business Associations, Universities
 - Transfer management know-how back to back with technology transfer and financial assistance
-

ENVIRONMENTAL BUSINESS SECTORS IN THE BALTIC REGION: CURRENT STATUS AND BARRIERS TO FUTURE GROWTH

by Kenneth J. Macek

Introduction

The development of a vibrant domestic environmental industry to efficiently provide cost effective solutions to local and transboundary environmental problems in former Soviet bloc countries is of interest to both local governments and international stakeholders. The author has described a paradigm for the development process responsible for the emergence of domestic environmental business sectors in transitional economies (OECD, 1997). This paradigm (Figure 1) recognises distinct sequential steps to the development of both environmental markets (demand) and a domestic environmental industry (supply). The author also discussed the barriers to development of an environmental industry in the more advanced economies in transition of Central Europe.

The initial steps in the development process focus on the creation and distribution of adequate levels of national environmental investment (NEI) in order to create domestic markets (local demand) for the environmental goods and services required to efficiently address local environmental problems. Government activities required to create NEI focus on:

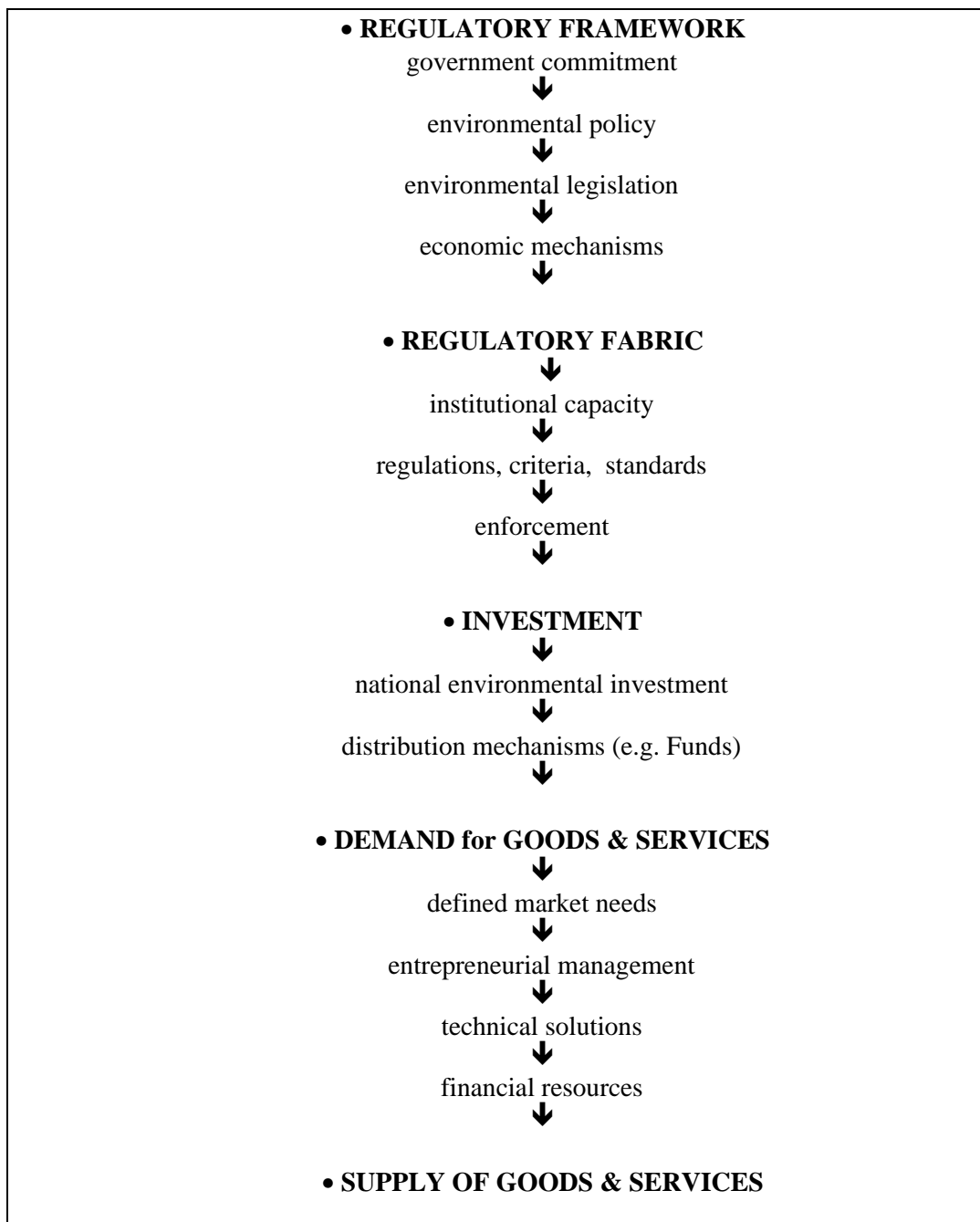
- establishing national environmental policies and strategy;
- enacting appropriate environmental legislation;
- developing effective environmental economic mechanisms;
- building local institutional capacity (e.g. regulatory, enforcement, funding);
- implementing and enforcing environmental regulations, standards, criteria, and action plans.

During these initial steps, international stakeholders in transition countries typically support policy and strategy development, and the institutional and capacity building necessary to foster the creation and distribution of adequate levels of national environmental investment (NEI). Some donors provide direct environmental investment in the form of grants and loans to address critical environmental problems (e.g. transboundary pollution). Together these efforts of national governments and international stakeholders are responsible for the early development of local environmental markets.

The success of both national and international efforts to create domestic NEI is directly related to the governments' ability to advance economic reforms. On a macro-economic level, two key prerequisites to the development of adequate and efficient NEI are economic growth and industrial restructuring,

respectively. The former provides the financial “slack” necessary to allocate resources to environmental investments, and the latter creates entities to manage those investments so as to assure the maximum returns on investment.

Figure 1. Paradigm for the Development of Environmental Goods and Services Sectors in Economies in Transition



It is clear that the various economies in transition of Central and Eastern Europe differ greatly in the development of their environmental business sectors. At one end of the developmental spectrum, countries which successfully initiated economic restructuring have quite advanced domestic environmental industries, stimulated by significant levels of national environmental investment. At the other end of this developmental spectrum, other countries which are still struggling with economic reform (e.g. Belarus, F.Y.R. Macedonia) have environmental business sectors which exist only conceptually, as economic restructuring has been painfully slow and the levels of NEI are extremely low.

In order to characterise the development of the environmental business sectors in the Baltic region of the former Soviet bloc and to identify the appropriate supporting activities of stakeholders in each country, it is useful to assess at what stage of the environmental developmental process the various countries in the Baltic region are. In particular, the author will focus on the success of each country to implement economic restructuring (as measured by growth in output) and to privatise its economy.

The objectives of this report are to characterise for Estonia, Latvia, Lithuania and (to the extent possible) the north-west region of Russia (i.e. St. Petersburg) the :

- macro-economic conditions, particularly with respect to industrial restructuring, and economic growth;
- the domestic environmental markets with respect to environmental policies, legislation and institutional capacity, and the resulting levels of NEI;
- current barriers to further development of domestic environmental markets and industries in the region; and
- stakeholder activities appropriate to accelerating the development of these domestic environmental business sectors.

The author's goal is to provide a basis for in-depth discussions on an agenda for action by stakeholders to stimulate the development of appropriate and efficient domestic environmental business sectors in each of the countries of interest, and in the Baltic region generally.

Economic overview

As reform efforts in the Baltic region started 2-3 years later than reform efforts in Central European countries, it is not surprising that, in general, the countries of the region are currently in earlier stages of economic reform. For example, a recent PHARE report (1997), indicates the majority of small and medium-sized enterprises (SMEs) in the Baltic region were created during the last 2-3 years. And, as a recent World Bank report concludes, formation and growth of private enterprises, and especially of SMEs, must remain a key part of continued reform in the region (1997).

Also, as observed among the Visegrad countries, individual efforts at economic reform can yield very different results in a region. Among the countries in the Baltic region, Estonia appears to have had the greatest success, and Lithuania and Russia the greatest difficulty, in implementing economic reforms.

As in other Central and Eastern European countries (CEECs), after independence each of the countries in this Baltic region experienced an initial significant decline in economic production as their

traditional markets disappeared. The rate at which the countries were able to moderate and eventually reverse this decline and stimulate economic growth is a function of their ability to (a) restructure and stabilise their economy, (b) increase clarity, transparency and stability of laws and regulations, (c) establish an attractive investment climate for both domestic and foreign private investment, (d) encourage the development of small and medium size enterprises (SMEs) and (e) develop alternative markets.

Because of various problems encountered in implementing an effective privatisation process, the countries of the Baltic region each still face significant barriers to the development of a thriving private sector characterised by the SMEs typically found in successfully economies in transition. PHARE (1997) reported that the density of newly created enterprises in the Baltic countries is significantly less than in most other countries of Central and Eastern Europe.

Also, with their relatively small national economies, regional co-operation among the countries of the Baltic region is critical to economic growth. Recognising this fact, the three Baltic states implemented a trilateral free trade agreement, and agreed to establish a customs union by 1998. Each of the countries has also signed a free trade agreement with the EU. However, the concept of a Baltic economic and cultural region is mainly theoretical. There are different economies, different languages, and different cultural backgrounds.

Estonia

Estonia is the smallest of the Baltic states. However, unlike its Baltic neighbours, it is relatively energy independent, producing more than 60 per cent of its energy requirements from the world's largest exploited oil-shale deposits. These deposits have been both a bane and a blessing to the country. During the Soviet era, Estonia became a centre for energy and resource intensive industries such as chemical, pulp and paper, and electricity generation, exporting large amounts to Russia and Latvia. The result was that the Estonian economy was highly energy intensive. However during recent years, when the price of imported fuels began to mirror world prices, Estonia was able to shield its economy from the effects of significant increases in energy prices by relying on its own energy sources.

A relatively stable Estonian government has encountered little opposition to swift economic reforms. Partly because of this fact and the aforementioned energy independence, the smallest Baltic country has been the most successful in this region at dramatically restructuring its economy and creating a functioning market economy and an attractive business environment for both domestic and foreign investors.

A national agency, patterned after Germany's Treuhandanstalt handles privatisation of state property. Small scale privatisation was completed in 1995, creating a rapidly growing number of SMEs. The privatisation of large state-owned companies in Estonia, even ones deemed "crown jewels" or "strategic" in neighbouring countries (e.g. telecommunications, airlines), is also proceeding, albeit at a slower pace. Nevertheless, the private sector is now estimated to account for approximately 70 per cent of the GDP, with the services sector now the largest economic sector. According to government forecasts, 90 per cent of the economy will soon be in private hands.

However several privatisation issues, having potentially significant implications for the environmental industry, remain. One major issue is the privatisation of the oil shale and electricity production facilities. Uncertainties related to future ownership have delayed the resolution of environmental issues associated with these activities.

By completely liberalising international trade and favouring strategic foreign investors, Estonia attracted \$800 million of foreign direct investment since 1991. This amount is several times higher than its larger neighbours to the south and second only to Hungary among CEECs in investments per capita. The government has now turned its attention to completing the privatisation of the remaining large infrastructure entities (e.g. energy, railways) which should attract additional significant foreign investment.

The Estonian banking system is well developed, the currency is convertible, relatively strong and stable (partially due to a constitutionally decreed balanced budget), and its laws are largely in line with the EU. Today, Estonia's major trading partners are the Nordic countries, while Russia now accounts for less than 20 per cent of all trade.

The structure of the national economy has shifted away from heavy reliance on oil shale and other natural resource intensive production (e.g. chemicals, paper, textiles) towards services such as finance, commerce, trade, tourism, insurance and communications. In addition to reducing environmental pressures, the result of these reform efforts has been a relatively brief and shallow economic decline during the period from 1992-93, followed by steady economic growth (e.g. 4.0 per cent in 1996). GDP on a per capita basis is the highest of the countries in this region. Estonia has been able to accomplish this remarkable economic restructuring while gradually bringing the inflation which often plagues economies in transition down to manageable levels (i.e. ~ 15 per cent in 1996).

Latvia

Compared to its northern neighbour, the political situation in Latvia has been relatively unstable since it declared its independence in December 1991. This, and the impact of the country's dependence on energy and raw material imports has made the economic reform process fragile and difficult, and Latvia's economic progress has been relatively slow and bumpy, although it appears to have accelerated recently.

Latvia's prosperity was historically linked to trade, agricultural production and light industry. Structural reform proceeded most rapidly in agriculture and in privatisation of small enterprises. Latvia's growing private sector accounts for an estimated 55 per cent of the country's GDP. However, the government still maintains a major role through 16 strategic sectorial planning programmes. Also, Latvia lagged behind its neighbours in privatisation of its diversified industrial enterprises, which are often outdated, oversized and inefficient, and generally in poor financial condition. Today there is still a shortage of investors.

During the first three years of independence, Latvia's output declined by 50 per cent. The country's economic turnaround appeared to start in 1994, but was undermined by a banking and budget crisis in 1995. After these crises, commercial credit was restricted to high-interest, short-term trade financing, holding back growth of the private sector, particularly of SMEs. Thus the economy was unable to exhibit even modest GDP growth until 1996, when output grew by almost 3 per cent.

During the transition, agriculture declined and there was a clear shift from manufacturing to services with finance and trade emerging as dominant sectors in the economy. For example, income from the transit trade has tripled during the last three years, and the Latvian government estimates that it could double again by the turn of the century. The government has invested more than US\$ 100 million in infrastructure at the port of Ventspils, and in 1996, more than 60 per cent of goods shipped via the Baltic sea and destined for the former Soviet Union entered through Latvian ports.

Last year represented a dramatic turnaround for the Latvian economy, as it received one of the highest financial ratings of the former Soviet bloc countries. As a result interest rates have fallen to near western levels. However, due to low levels of public and private investment, GDP is forecast to rise slowly for the next several years. The benefit of this slower growth and weak demand is that Latvia currently had one of the lowest inflation rates among the Baltic countries, second only to the Czech Republic among the economies in transition.

A potential problem in Latvia is the emerging regional disparity. With more than one third of the country's population, the city of Riga has captured nearly all foreign and domestic investment. With the decline in agricultural competitiveness, the countryside faces extreme poverty. Other cities, which were centres for dinosaur factories, also face significant economic hardship. Recognising this, the government has begun to turn its attention to regional development.

Lithuania

Lithuania was the first country in the former Soviet Union to declare its independence in 1990. Despite its earlier start, Lithuania has enjoyed less economic success (as measured by GDP per capita) than its Baltic neighbours to the north, perhaps because outdated, inefficient industries represented Lithuania's largest economic sector although this percentage declined during 1992-94.

The degree of industrial "restructuring" achieved in Lithuania is nominally larger than that in other Baltic states. However, the process failed to generate significant revenue for the state or improve the restructured firms access to capital and technology. It is estimated that real private sector output currently generates only 55-60 per cent of GDP.

Until recently (1996), the government had not been very successful at attracting foreign investment, and levels of direct foreign investment have been modest relative to other countries in the region and to Lithuania's potential. However, the energy, telecommunications and transportation sectors have yet to be privatised. The government proposed the public international tender of many large enterprises in these sectors during 1997-98, and one can expect significant foreign interest.

During the first three years after independence, Lithuania experienced a very serious decline in output. This decline halted after the introduction of a new currency in 1993. Since then there has been moderate economic growth in GDP. Led by recovery in light industry and rapid growth in trade and finance, the economy expanded by approximately 3.6 per cent in 1996, despite a major banking crisis (1995) which resulted in a significant increase in foreign debt and a temporary slowing of economic growth.

Northwest Russia

This region of Russia is comparable in population to the three Baltic states (combined) and shares many of the same geographic, topographic and economic characteristics. The realities of this region, as in other regions of the Russian Federation, differs greatly from the perception one might have of the Russian experience based upon observations in Moscow.

Approximately three-quarters of the Russian economy is now in the private sector. The shortcomings caused by the inevitable political compromises and irregularities involved in the privatisation process are regrettable, but minor in comparison to the magnitude of the achievement itself.

In the Baltic region, privatisation of wholesale enterprises, as well as the chemical, forestry and light industry sectors is virtually complete. However, substantial portions of the construction, communication and transport sectors remain in state hands. Output has declined every year since market reforms were initiated.

Although foreign investment appears substantial in absolute terms, it is relatively low, both for a country the size of Russia, and specifically for the north-west region. For example, the north-west region, including St. Petersburg, fetched only \$186 million in foreign direct investment in 1995, less than one-tenth the amount fetched by the central region, including Moscow. However, the legal system is being reformed to establish property rights and to make bankruptcy foreclosure possible. The government has proposed a radical overhaul of the faulty 1992 tax code to provide strong incentives for business investment.

The banking community in the region also suffers from lack of capital. The assets of all banks in St. Petersburg, for example, represent just one-tenth of those in Moscow. As a region, the banking sector ranks only seventh in assets in the country.

Since the beginning of market reforms the Russian economy suffered double digit declines in production. It is difficult to estimate how much production was understated (to avoid taxes) during this period. Recently (1995-96), the rate of decline in GDP decreased dramatically. However, the country's industrial collapse had not yet been reversed, as the percentage of loss-making companies continued to increase, especially in the manufacturing sectors. Only the natural resources sector, which accounted for almost half of Russia's exports, was profitable.

Domestic environmental sectors

In 1995, Estonia, Latvia and Lithuania signed a trilateral agreement on environmental protection focusing on transboundary issues, marine protection and sea monitoring. Each is also a signatory to the Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki Convention). As a result many of the environmental priorities of these countries relate to wastewater treatment aimed at reducing the flow of pollutants to the Baltic sea.

However, as each of the governments in this Baltic region have been wrestling with severe economic dislocations associated with economic reform, environmental priorities, especially those requiring domestic investment, have been relegated to the background. As a result, the environmental business sectors in these countries are in the very early stages of development, and foreign environmental investment plays a disproportionately large role in these environmental markets. Quantitatively the domestic environmental goods and services markets in the Baltic states will, *a priori*, be quite small by western standards, and determined by the ability of each country to create and distribute NEI. In each country, the environmental markets will vary qualitatively according to the nature of the environmental solutions required to address national environmental priorities.

Several common themes exist however among the countries of the region. Highly urbanised populations create significant water, wastewater and waste management problems. Thus, products and services to treat water and wastewater typically consume the major share of early NEI. The next largest component of emerging domestic environmental markets is usually concerned with solid waste management (both municipal and industrial). Energy consumption patterns are excessive and must be altered while their effects (excessive air pollution) must be addressed. Finally, each of the Baltic states

has inherited a legacy of soil and groundwater contamination from the Soviet military. To the extent this contamination threatens human health, it must also be addressed.

In general, the environmental industries in the region can be characterised as embryonic and service oriented (assessments, audits). Environmental expertise often still exists in government or quasi government organisations as opposed to the private sector. Foreign competitors are largely from the large donor nations (e.g. from Finland in Estonia, from Denmark in Lithuania) and are following the donor investments.

Information on the size of environmental business sectors in the region is scarce. Perhaps one of the most reliable indicators regarding these sectors is data on the activities of extra-budgetary environmental funds (i.e. national, regional, municipal). Such funds represent self-sustaining financing entities which supplement investments by enterprises and from general budgets at all government levels.

Estonia

As in many other CEECs, environmental issues played a substantial role in the political changes that led to Estonia's independence. The public traditionally was very aware of environmental issues, and Estonia was remarkably successful in developing environmental legislation and introducing the concept of sustainable development. Recently, however, environmental issues have taken a back seat as economic dislocations have garnered the attention of the government and the population.

The legislative environmental framework of Estonia is derived from western European legislation, and presently consists mainly of framework laws which require subsidiary legislation to effect significant change in the behaviour of polluters. The framework laws provide for a permit process, incorporating environmental impact assessment, to regulate the operation of industrial and commercial activities.

Estonia has recently (1997) adopted a National Environmental Strategy (NES), stating clearly its environmental policy goals and timetables. It is currently in the process of developing a National Environmental Action Plan (NEAP) which prioritises environmental problems according to criteria such as human health risk, identifies cost effective solutions and the resources to implement them. This NEAP is expected to be completed and adopted in 1998.

However, the institutional capacity, at both the national and regional levels, to develop and implement the strategy and enforce the necessary follow-up legislation is inadequate. The Ministry of Environment, which is *inter alia* responsible for managing all aspects of environmental issues, has a staff of approximately 110 professionals. Regional Environmental Departments, which are responsible for issuing licenses and permits, imposing and collecting emission charges, and managing local environmental impact assessments, are funded through local budgets. Local budgets are currently subject to great financial pressure and the Regional Environmental Departments suffer as a result.

The government has been emphasising the development of the required institutional capacity, and in recent years the Ministry of Environment has strengthened its position within the government. However, the government currently has little leverage to enforce environmental laws because the technology and resources to meet environmental standards is not available in many Estonian enterprises. Furthermore, the capacity of local authorities to monitor compliance is almost non-existent. The major apparent driving force for environmental investment by enterprises is the desire to be competitive with EU member countries.

Because Estonia has relatively high per capita energy consumption and is heavily reliant on the combustion of oil-shale and other fossil fuels, it has relatively high emissions of air pollutants. Although emission levels of major air pollutants decreased during the period 1991-94, they are expected to increase as the economic recovery gains momentum. Also, the increased use of personal automobiles is contributing to a rise in air pollution. A positive slant to this situation is the fact that an overwhelming proportion of air pollution in Estonia is produced by just three enterprises (two power plants and a cement plant). The government has identified these facilities as environmental priorities, and expects future investments in large pollution control systems for these sites. In fact, the investments have begun in the Kunda Nordic cement plant.

Ample groundwater is one of the country's most important natural resources and is the drinking water source for most of Estonia's towns and settlements (except for Tallinn and Narva). For the majority of drinking water, quality standards are in compliance with EU requirements. Nevertheless, significant investment in water supply development and wastewater treatment in Tallinn and other municipalities are anticipated. The responsibility for such investments lies with local governments which do not have the financial resources to undertake the required investments. Consequently, a sound funding system is required by which earmarked financing and co-financing can meet the local needs. In the interim, these investments likely will require foreign grants and loans (e.g. World Bank, EBRD, Nordic Investment Bank) to proceed.

Discharge of industrial wastewater dropped dramatically between 1991-94, along with industrial production. However, this trend should mirror economic growth and the need for a variety of solutions to industrial wastewater pollution should also increase.

The disposal of solid waste, particularly industrial waste is a severe problem. Industrial wastes, largely associated with the oil-shale industries, constitute more than 90 per cent of the solid wastes generated in Estonia. The bulk of these wastes are disposed in landfills, mainly in the north-east section of the country. Almost all domestic solid waste is dumped at uncontrolled landfills without separation. The responsibility for landfills now lies with the municipalities which usually do not have the technical and financial resources to manage such responsibilities. A new treatment and incineration facility for Tallinn, which generates over a third of all domestic solid waste in Estonia has been proposed by the government.

Under Estonian privatisation provisions, the state indemnifies the purchaser for any third party damages or clean-up costs arising from environmental pollution prior to the date of acquisition. However, there are no provisions for the funds to cover the costs of required government clean-up activities. Also, the environmental consulting business is still in its formative stages and cannot yet routinely carry out timely environmental liability audits.

Estonia's international environmental policy has so far focused on water protection. Most foreign assistance has come from the Scandinavian countries and been related to protection of the Baltic Sea.

Investment financing mainly comes from Finland, complemented by loans from IFIs (e.g. World Bank, EBRD, NIB, NEFCO). The exact amounts are difficult to quantify, but cumulative donor assistance through early 1995 was estimated at \$40 million (with almost half coming from Finland).

It is estimated that there are approximately 150 domestic suppliers of environmental goods and services; mostly entrepreneurs and small businesses. The current market is largely services oriented, providing waste treatment design, environmental auditing, waste disposal and environmental protection. The domestic product sector is in the very early stages of development.

The major barrier to growth of the domestic environmental business sectors is the level of NEI. Environmental investment from domestic sources was reported to be in excess of \$50 million in 1994, with the bulk of these investments (almost 70 per cent) reported by enterprises. If accurate, this level of NEI represents 1.8 per cent of GDP, a level rarely seen in even the richest western economies. Also, the reported contribution to NEI from the private sector rivals that seen in only the most advanced of the economies in transition (i.e. Poland). Experience in other economies in transition indicates, however, that, for a variety of reasons, both logistical and political, such reported levels of NEI, and especially the reported contribution from enterprises, are often grossly overstated.

A more reliable indication of the actual level of NEI may be the environmental investments funnelled through the extra-budgetary Environmental Fund, which includes the 19 district and two municipal (Tallinn, Narva) environmental funds. The main sources of financing for these funds are pollution charges, fines, interest from loans, and allocations from national and local budgets. It is worth noting, that as of 1996, user fees (e.g. water, mineral resource extraction) are not directed to the Environmental Funds in Estonia but rather to the national and regional budgets.

Of the approximately \$3 million disbursed by these environmental funds during 1995, the largest portion (almost 35 per cent) was for relatively large, water related projects. Revenues and disbursements of the Fund increased to approximately \$5.7 million in 1996. Experience indicates that the investments by national and regional funds usually constitute 30-40 per cent of the total NEI in economies in transition. If the situation in Estonia is typical of other economies in transition, even an optimistic scenario suggests the total domestic NEI in Estonia in 1996 was probably on the order of US\$ 15-20 million. Investment from donor assistance undoubtedly increased the 1995 NEI, but it is not possible to quantify the annual investment resulting from donor assistance. There is no information available regarding the trend in NEI since 1995.

Latvia

The present quality of the Latvian environment is generally high in comparison to the majority of European countries, and only a few environmental problems are manifested in the country as a whole (e.g. eutrophication, degradation of water ecosystems). As a result of this fact, and the recent socio-economic conditions (economic decline, financial constraints, social hardship), the relative importance of environmental issues during the early transitional period was low compared to social issues. In addition, the downward economic spiral that followed the beginning of market reforms significantly reduced the already modest environmental pressures.

Thus, it was not until 1995 that the Ministry of Environmental Protection and Regional Development (VARAM) proposed a National Environmental Policy Plan (NEPP) for Latvia, describing environmental priorities and goals. In 1997, the Ministry developed and implemented a National Environmental Action Program (NEAP), which translates the general policy goals of the NEPP into specific actions closely linked to the Public Investment Program (in which the environment is a priority) and the annual budget. However, the total cost of the NEAP and the availability of the required financial resources have not been analysed to date.

Existing environmental problems are confined to large towns, industrial regions, and abandoned Soviet military bases. Relative to western countries, air emissions from stationary sources are relatively low. Poor air quality is observed mainly in urban areas as a result of an increasing volume of traffic and from central heating. Water quality in Latvia is also relatively good. Eutrophication in the Gulf of Riga is a problem, but recent infrastructure investments have significantly reduced the nutrient load. Groundwater

quality is also generally good, with localised contamination associated with waste disposal sites. The volume of wastes generated by households is currently at a level of 50 per cent of the average in western Europe. Thus it is not surprising that the top environmental priorities identified in the NEPP relate to transboundary pollution issues rather than domestic environmental issues.

The government reported that in 1994, the level of NEI represented 0.8 per cent of GDP (NEPP), suggesting the level of NEI in Latvia in 1994 (from all domestic sources) was, at most, approximately US\$ 25 million. Again, such government proclamations must be carefully considered. The US Department of Commerce estimated that the level of domestic NEI in Latvia in 1995 was less than 0.1 per cent of GDP. However in 1996, the government established the Latvian Environmental Fund. A source within the Fund estimated that the 1997 revenues to the Fund would be approximately US\$ 10 million, and that disbursements would equal revenues. If the Latvian Fund is typical of the early operational stages of other CEE funds in its ability to leverage disbursements, then the actual levels of NEI in Latvia in 1997 may approach 2.5-3.5 times the disbursements of the Fund (i.e. US\$ 25-35 million).

Lithuania

The environmental situation in Lithuania is neither as benign as that in Latvia, nor has it benefited from the relative levels of environmental investments made possible by consistent economic growth observed in Estonia. The government developed its National Environmental Strategy in 1996. Clearly, the principal environmental priority is construction of wastewater treatment facilities (in order to prevent contamination, particularly by nitrogen, of shallow groundwater resources used for drinking water). As a result, environmental markets in Lithuania are essentially one dimensional. Most environmental services are currently supplied by academic institutions and government institutes. Private environmental consulting firms have only recently emerged in Lithuania.

The National Environmental Strategy also identifies air pollution control (particularly from the transport sector), waste management, and remediation around former Soviet military bases as national priorities, but there is little evidence that these are currently being addressed with substantial environmental investment.

The Ministry of Environmental Protection currently focuses on developing national environmental quality standards and norms for environmental policy implementation, implementation of EIA procedures into the regional development process, the development of appropriate and effective economic instruments to create the required levels of environmental investment, and the reorganisation of the Environmental Investment Fund.

The majority of public sector environmental investments were allocated through the State budget and have decreased annually in real terms since 1994. According to a recent study (Danish EPA, 1997), annual domestic NEI from various public sector sources was estimated to be approximately US\$ 25-30 million between 1994-96. Virtually all of this public sector NEI was directed toward wastewater treatment. The Lithuanian Environmental Investment Fund (LEIF) was established this year and expects to begin funding investments by small and medium sized public and private entities. Sources of revenues for the LEIF are anticipated to be US\$ 2.1 million in seed funds from PHARE, US\$ 5 million collected from pollution charges, and other donor funds. The principal financing mechanism will be 5-year, soft loans for up to 80 per cent of an investment (but not exceeding US\$ 375 000) with a 2-year grace period.

The role of the Municipal Environmental Funds in Lithuania is steadily increasing, with annual environmental investments growing from approximately US\$ 1.5 million in 1994 to more than US\$ 3.5

million in 1996. Most of the investments of the Municipal Environmental Funds are also directed toward wastewater treatment.

Government data indicates that enterprises in Lithuania spent approximately US\$ 70 million for environmental goods and services during 1994-95. There are, however, two problems with these data. First, they are usually grossly overstated in most economies in transition; and second it is impossible to distinguish between financial resources coming from enterprises' own budget and public budgets.

Of all the countries in the Baltic region, donor and IFI activities have perhaps played the most significant role in environmental investments in Lithuania. During the period 1994-96, more than US\$ 100 million of donor support (grants and loans) has been provided to the environmental sector in Lithuania, mainly from Denmark. At present, more than 80 per cent of this has been invested for the treatment of wastewater.

A good estimate for the total environmental goods and services markets in Lithuania in 1997 is probably on the order of US\$ 45-50 million. This includes: (a) less than US\$ 25-30 million for public sector investment, (b) a significant portion of foreign annual environmental investment (perhaps equivalent to domestic public sector investment recently), and (c) the environmental investment which comes from enterprises' own funds.

Russian Federation

The Russian Federation consists of 21 republics, 49 oblasts (e.g. Novgorodskaya, Leningradskaya), 6 krais, 10 okrugs, and 2 cities of federal importance (Moscow, St. Petersburg). In most cases, the Federation shares legislative and administrative authority to some degree with these regions and communities, which have different degrees of legislative and administrative authority.

From an environmental perspective, the federal Ministry of Environmental Protection and Natural Resources, [Minpriroda] issues environmental regulations which serve as guidance for the regions and communities of the Federation to exercise their own legal regulations, or to adopt laws or other statutory acts. Some of the regions and communities of the Federation are quite progressive in dealing with environmental issues (e.g. the Primorski krai) while others are much more *laissez faire* in this regard.

As a result, it is virtually impossible to consider the development of environmental business sectors on a national level. The author's paradigm for the development of local environmental goods and services sectors must be considered in light of complex national, regional and local legislative and regulatory developments.

A complex system of state, republic, krai, oblast and local environmental funds operates to address urgent environmental problems, to recover losses in the natural environment, and to obtain compensation for past damages. The principal source of revenues for these funds are payments for emissions, discharges of pollutants, and disposal of wastes.

In view of the complexity of the legislative, regulatory, and funding mechanisms in the regions of the Russian Federation, discussions of the development of "local" environmental markets and industries must be necessarily generic in nature.

Northwest Russia

Even in this small region of the Russian Federation bordering on the Baltic and the Baltic States, environmental jurisdiction is not simple, being shared among Minprirodi, its regional offices (e.g. Lenkomecologia), the Pskov oblast, Leningradska oblast, the Novogrodskaja oblast, and the local (e.g. St. Petersburg, Novgorod, Vyborg) authorities.

The environmental business sector in north-west Russia is relatively nascent due to lack of regulatory enforcement and of government or private investment in environmental expenditures. However, the economic fortunes of many of the enterprises in the region are improving and they should be in a position to respond to environmental regulatory pressures with the required environmental investments. In north-west Russia these enterprises include timber, pulp and paper, wood products and chemicals. In addition, many large municipalities are preparing major environmental investment programmes.

Water pollution is a major problem and environmental investments are directed toward water and wastewater treatment. Solid waste management, both municipal and industrial (including groundwater protection) represents another area of concern. There is a trend in Russia toward the privatisation of municipal waste management. For example, the city of St. Petersburg is currently preparing an international tender for the privatisation of its municipal waste management. Currently, air pollution control is not generally considered to be a high environmental priority. This may reflect the obsolete nature of domestic air pollution control equipment rather than any real assessment of air pollution.

Pollution charges and fines are currently the only incentives for industrial enterprises to make environmental investments. However, the level of these charges and fines has been so eroded by inflation, as to no longer be effective deterrents to irrational behaviour by polluters. Unfortunately, these pollution charges and fines, which are the source of revenues for regional (oblast) and municipal environmental funds, barely cover operating costs for the Funds and do not provide sufficient resources for infrastructure investments. Russian authorities should reassess the structure of environmental charges and fines.

In the past, resources for environmental investments were centrally allocated from the state budget, with some smaller portion allocated from [state] enterprise budgets. Now regional and local governments in conjunction with industrial enterprises are responsible for addressing local environmental problems. The regional and local governments need to develop new mechanisms to finance necessary environmental investments. After 1991, enterprise budgets became the principal source (80 per cent) of environmental investments. As the activity of Russian industrial enterprises declined, so did their environmental investments. In fact, as environmental investments were viewed as discretionary spending, their decline was disproportionately larger than the general industrial decline observed in Russia since 1991.

In 1991, the Russian parliament enacted the framework environmental protection law which established the current legal basis for the present three tiered system of environmental funds consisting of (a) the Federal Environmental Fund, (b) the more than 80 regional environmental funds (e.g. the St. Petersburg City Environmental Fund, the Leningrad Regional Fund), and (c) the district and municipal environmental funds. As a point of reference, investments by all environmental funds in the Russian Federation were only US\$ 70 million in 1993 and US\$ 120 million in 1994. Considering the size of the Russian Federation, these figures represent a relatively paltry, and totally inadequate level of environmental investment. It is reasonable to assume that the level of NEI by environmental funds in the north-west region of the Federation is probably less than one tenth of the total investment by all funds.

Barriers to development

In economies in transition, barriers to the development of efficient environmental business sectors can be classified into two types. The first type are generic barriers related to the successful development of SMEs across all business sectors. These include lack of rational, unequivocal tax codes; a legal and judiciary framework to enforce contracts and bankruptcy procedures; clarification of property rights, both real and intellectual; and an attractive investment and business climate. The second type are barriers specific to the environmental business sector. In economies in transition, lack of comprehensive environmental policies and regulation, institutional capacity, and weak enforcement are typically sector specific barriers operating to impede the development of domestic environmental markets during their early development stages.

The environmental business sector in each country faces similar barriers to their further development. Many of the current barriers to development are related to insufficient levels of NEI.

The development of dedicated environmental funds (both national and regional) to fund NEI, has certainly helped in financing environmental projects, although the total environmental investment to be managed and dispersed by these funds is inadequate to address environmental problems. The environmental Protection Funds principally rely for their funds on environmental charges and fines, therefore it is imperative that charges and fines operate at economically viable levels and that they are collected.

Another barrier, which must be overcome in order to create the required NEI, is the lack of capacity among those parties (e.g. enterprises, municipalities) responsible for meeting environmental requirements to “package” these investments in a way that credit and investment sources can evaluate the creditworthiness of borrowers and the returns from investments, respectively. This capacity is particularly essential to enterprises proposing investments in new (e.g. clean) technologies, and to municipalities proposing substantial capital investments in environmental infrastructure or privatisation of municipal services.

Finally, the Baltic states appear to face a unique barrier to the development of efficient domestic environmental business sectors. This barrier is a function of the relatively small size of the economies in each state, and thus of the size of their potential environmental markets. It is likely that the development of the most efficient local environmental sectors could be hampered by the lack of market niches of sufficient size in any one country to attract the development of a full range of alternative, low cost environmental solutions.

Each of the above-mentioned barriers relates to the development of the demand side of the environmental business sectors in the Baltic States. Eventually, barriers typically related to the development of the supply side of environmental business sectors will emerge. Stakeholders will then have to address their efforts towards overcoming those barriers. The author has previously described the types of barriers to growth that typically emerge in the later stages of the development of environmental business sectors in economies in transition (OECD, 1997).

Appropriate stakeholder activities

Given the above assessment of the barriers to the future development of the environmental sectors in the Baltic States of the former Soviet Union, it is reasonable to explore the types of donor assistance that respond to those barriers.

On a macro-economic scale, perhaps the most effective stakeholder activities are those supporting the privatisation process. These activities could include improving transparency of the privatisation process, reducing barriers to foreign participation (e.g. local registration, work permits, etc.), and implementing land reform allowing foreign ownership. Evidence from more advanced economies in transition clearly shows that transferring the responsibility for environmental investment to the private sector has a dramatic effect on both the level and efficiency of NEI.

Other macro-economic efforts benefiting from stakeholder support include efforts to rationalise the tax regime; liberalise capital markets; accelerate the reduction in import tariffs and streamline customs procedures; strengthen the legal judicial framework to improve enforcement of contracts; establish a sound basis for protection of intellectual property rights; and improve the availability of credit, on favourable terms, to SMEs.

On a sector specific scale, government activity, and donor related support, has been concerned with establishing environmental priorities and policies, developing institutional capacities, and implementing and enforcing environmental legislation. The presumed result of these activities will be a significant increase in the levels of NEI in each country, thereby creating increased demand for local environmental goods and services as countries begin to implement action plans to address their environmental priorities.

Assuming that economic restructuring (i.e. privatisation) succeeds and that economic reforms lead to economic growth, experience in other CEE countries suggests that two specific aspects of institutional capacity are particularly essential to creating the required NEI and accelerating the development of domestic environmental sectors.

The first relates to institutional capacity to develop and implement regulations, containing appropriate environmental criteria and standards. This activity is essential to provide information to polluters concerning their environmental responsibilities and to define standards of acceptable environmental performance. This activity also responds to the countries' efforts to harmonise their environmental frameworks in anticipation of future entry into the European Union. National environment ministries must develop adequate institutional capacity in order to respond to the initially high level of activity, at the national level, necessary to develop appropriate environmental regulations, criteria and standards.

The second relates to the capacity required to enforce environmental regulations, monitor compliance, and collect and funnel environmental charges and penalties into NEI. Such institutional capacity, which must be developed and maintained at all levels of environmental enforcement (i.e. national, regional, local), is often the last and least developed, particularly at the local level where responsibility for enforcement usually rests. Its importance to creating NEI is evident from the success of the Polish model for creating environmental investment, where enforcement and collection rates are among the highest in all of Europe.

Finally, it appears that environmental sector development might be more efficient, and provide a broader range of cost effective environmental solutions, if the Baltic markets were truly regional in nature. A possible approach is for each state to harmonise its environmental criteria and standards with countries of the region, so that environmental solutions developed in one would be directly applicable in neighbouring countries. EU harmonisation efforts in each country will contribute to standardisation of environmental regulations. Stakeholders should focus efforts on similar activities intended to regionalise the Baltic environmental markets.

Conclusions

The development of a vibrant domestic environmental industry to efficiently provide cost effective solutions to local and transboundary environmental problems in former Soviet bloc countries is of interest to both local governments and international stakeholders. The success of both national and international efforts to create domestic environmental investment to drive demand for environmental goods and services is directly related to the governments' ability to advance economic reforms. On a macro-economic level, two key prerequisites to the development of adequate and efficient national environmental investment are economic growth and industrial restructuring, respectively. The former provides the financial "slack" necessary to allocate resources to environmental investments; and the latter creates entities to manage those investments so as to assure the maximum returns on that investment.

A relatively stable Estonian government has encountered little opposition to swift economic reforms. Partly because of this fact and its energy independence, the smallest Baltic country has been the most successful in this region at dramatically restructuring its economy and creating a functioning market economy and an attractive business environment for both domestic and foreign investors.

The structure of the national economy has shifted away from reliance on oil shale and other natural resource intensive production (e.g. chemicals, paper, textiles) towards services such as finance, commerce, trade, tourism, insurance and communications. In addition to reducing environmental pressures, the result of these reform efforts has been a relatively brief and shallow economic decline during the period from 1992-93, followed by steady economic growth (e.g. 4.0 per cent in 1996). GDP on a per capita basis is the highest of the countries in this region.

Latvia's growing private sector accounts for an estimated 55 per cent of the country's GDP. However, the government still maintains a major role through 16 strategic sectorial planning programmes. During the first three years of independence, Latvia's output declined by 50 per cent. The country's economic turnaround appeared to start in 1994, but was undermined by a banking and budget crisis in 1995. After this banking crisis, commercial credit was largely restricted to high-interest, short-term trade financing, holding back growth of the private sector, particularly of SMEs. Thus the economy was unable to exhibit even modest GDP growth until 1996.

1996 represented a dramatic turnaround for the Latvian economy when output grew by almost 3 per cent. In 1996, Latvia received one of the highest financial ratings of the former Soviet bloc countries. As a result interest rates have fallen to near western levels. Continued growth at approximately the same pace is foreseen for 1997. However, due to low levels of public and private investment, GDP is forecast to continue to rise slowly for the next several years.

Lithuania has enjoyed less economic success (as measured by GDP per capita) than its Baltic neighbours to the north, perhaps because outdated, inefficient industries represented Lithuania's largest economic sector although this percentage declined during 1992-94. Until recently (1996), the government had not been very successful at attracting foreign investment, and levels of direct foreign investment have been modest relative to other countries in the region and to Lithuania's potential.

During the first three years after independence, Lithuania experienced a very serious decline in output. Since 1994 there has been moderate economic growth in GDP. Led by recovery in light industry and rapid growth in trade and finance, the economy expanded by approximately 3.6 per cent in 1996.

Since the beginning of market reforms the Russian economy suffered annual double digit declines in production. Recently (1995-96), the rate of decline in GDP decreased dramatically. Indeed there was modest economic growth in 1997.

As each of the governments in this Baltic region have been wrestling with severe economic dislocations associated with economic reform, environmental priorities, especially those requiring domestic investment, have been relegated to the background. As a result, the environmental business sectors in these countries are in the very early stages of development. In general, the environmental industries in the region can be characterised as embryonic and service oriented (assessments, audits). Environmental expertise often still exists in government or quasi government organisations as opposed to the private sector. Information on the size of environmental business sectors in the region is scarce.

In Estonia, it is estimated that there are approximately 150 domestic suppliers of environmental goods and services; mostly entrepreneurs and small businesses. The current market is largely services oriented, providing waste treatment design, environmental auditing, waste disposal and environmental protection. The domestic product sector is in the very early stages of development. The total domestic NEI in Estonia in 1995 was probably on the order of US\$ 10-12 million. Investment from donor assistance undoubtedly significantly increased the 1995 NEI, but it is not possible to quantify the annual investment resulting from donor assistance.

The present quality of the Latvian environment is generally high in comparison to the majority of European countries, and only a few environmental problems are manifested in the country as a whole (e.g. eutrophication, degradation of water ecosystems). In addition, the downward economic spiral that followed the beginning of market reforms, significantly reduced the already modest environmental pressures.

A source within the Latvian Environmental Fund estimated that the 1997 revenues would be approximately US\$ 10 million, and that disbursements would equal revenues. If the Latvian Fund is typical of the early operational stages of other CEE funds in its ability to leverage disbursements, then the actual levels of NEI in Latvia in 1997 may approach 2.5-3.5 times the disbursements of the Fund (i.e. US\$ 25-35 million).

The environmental situation in Lithuania is neither as benign as that in Latvia, nor has it benefited from the relative levels of environmental investments made possible by consistent economic growth observed in Estonia. The principal environmental priority in Lithuania is construction of wastewater treatment facilities (in order to prevent contamination, particularly by nitrogen, of shallow groundwater resources used for drinking water). As a result, environmental markets in Lithuania are essentially one dimensional. Most environmental services are currently supplied by academic institutions and government institutes. Private environmental consulting firms have only recently emerged in Lithuania.

It is likely that the real level of total NEI in Lithuania approximates a figure consisting of (a) something less than the US\$ 25-30 million of reported public sector investment, plus (b) the rather significant portion of foreign annual environmental investment (perhaps equivalent to domestic public sector investment recently), and (c) the environmental investment which comes from enterprises' own funds (which in the authors estimation is significantly less than either of the previous two components). Thus, a reasonable estimate of the total environmental goods and services markets in Lithuania in 1997 is probably on the order of US\$ 45-50 million, with foreign environmental investment representing a significant component of the total estimated market.

As a result, it is virtually impossible to consider the development of environmental business sectors on a national level. The author's paradigm for the development of local environmental goods and services sectors must be considered in light of complex national, regional and local legislative and regulatory developments. The environmental business sector in north-west Russia is relatively nascent due to lack of regulatory enforcement and of government or private investment in environmental expenditures.

As a point of reference, investments by all environmental funds in the Russian Federation were only US\$ 70 million in 1993 and US\$ 120 million in 1994. It is reasonable to assume that the level of NEI by environmental funds in the north-west region of the Federation is probably less than one tenth of the total investment by all funds. If the environmental funds are typical of the early operational stages of other CEE funds in their ability to leverage disbursements, then the actual levels of NEI in north-west Russia in 1997 may approach 2.5-3.5 times the disbursements of the Funds in the region (i.e. US\$ 25-35 million).

In economies in transition, barriers to the development of efficient environmental business sectors can be classified into two types. The first type are generic barriers related to the successful development of SMEs across all business sectors. The second type are barriers specific to the environmental business sector. The former include lack of rational, unequivocal tax codes; a legal and judiciary framework to enforce contracts and bankruptcy procedures; clarification of property rights, both real and intellectual; and an attractive investment and business climate. The latter typically include lack of comprehensive environmental policies and regulation, institutional capacity, and weak enforcement.

Baltic states appear to face a unique barrier to the development of efficient domestic environmental goods and services sectors. This barrier is a function of the relatively small size of the economies in each state, and thus of the size of the potential environmental markets represented by each state. It is likely that the development of the most efficient local environmental sectors could be hampered by the lack of market niches of sufficient size in any one country to attract the development of a full range of alternative, low cost environmental solutions.

On a macro-economic scale, perhaps the most effective stakeholder activities are those supporting the privatisation process. These activities could include improving transparency of the process, reducing barriers to foreign participation (e.g. local registration, work permits, etc.), and implementing land reform allowing foreign ownership.

Assuming that economic restructuring (i.e. privatisation) succeeds and that economic reforms lead to economic growth, experience in other CEE countries suggests that two specific aspects of institutional capacity are particularly essential to creating the required NEI and accelerating the development of domestic environmental sectors. The first relates to institutional capacity to develop and implement regulations, containing appropriate environmental criteria and standards. The second relates to the capacity required to enforce environmental regulations, monitor compliance, and collect and funnel environmental charges and penalties into NEI.

Finally, it appears that environmental sector development might be more efficient, providing a broader range of cost effective environmental solutions, if the Baltic markets were truly regional in nature. A consideration for stakeholders is to support activities to harmonise environmental criteria and standards within countries of the region, so that environmental solutions developed in one would be directly applicable in neighbouring countries.

**DEMAND FOR ENVIRONMENTAL TECHNOLOGIES IN ESTONIA, LATVIA AND
LITHUANIA.
OVERVIEW OF PROJECT OPPORTUNITIES**

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Introduction

In an effort to facilitate environmental investments and to support the environmental business sector in Central and Eastern Europe, the Regional Environmental Center for Central and Eastern Europe (REC) conducted a detailed survey on the environmental technology market in Estonia, Latvia and Lithuania. The findings presented in this report are largely based on formal interviews of a cross-section of senior level actors in the environmental technology market, including representatives from industries, municipalities and environmental businesses. Additional interviews were held with selected government agencies and related institutions which provided an insight into the demand of environmental technologies.

Up to 100 professionals were interviewed in each country. In-country researchers selected a representative cross-section of interviewees based on size, area of expertise and geographical location. In addition to the interviews, the report was supplemented by information from personal contacts, researchers' experience, informal telephone interviews, news reports, trade journals and industry literature. The survey was conducted between October 1997 and April 1998. Results of this survey are presented in the following sections. Estonia, Latvia and Lithuania have many things in common besides their legacy of Soviet rule. Among other things, they share the Baltic Sea, lush green forests and incredible biodiversity. They also generate their respective revenues from similar industries such as agriculture, fishing, mining and manufacturing. All three countries are facing similar obstacles as they continue to democratise and rebuild their national identities. Estonia, Latvia and Lithuania have come a long way since 1989. Each country has managed to reform the political and legislative infrastructures and have held democratic elections.

EU accession is a major priority in the Baltic States. Estonia has been invited to join the EU in the first wave during the early part of the next decade and Latvia and Lithuania are working hard towards their goal of accession in the next 10 years. Thus, the harmonisation of domestic structures and legislation with those of the European Union is considered a high priority. All three countries would like to join the OECD in the coming years as well.

Environmental expenditures

Environmental expenditures in the Baltic States have changed very little in the past few years. There was a surge of spending in the early 1990s that has since slowed. In Estonia, environmental

expenditures continue to rise while Latvian and Lithuanian figures are slipping. This does not suggest a decrease in the importance of the environment, but it illustrates the difficulties encountered in obtaining current and accurate data on the environment. As a percentage of GDP, environmental expenditures are decreasing. In Latvia and Lithuania they have fallen below 1 per cent. GDP continues to rise each year while the share that is allocated for the environment declines. This is a result of other pressing issues faced by the government such as inflation, unemployment and welfare reform.

Table 1. **Total Environmental Expenditures in 1996**

Country	Expenditures (US\$ million)	Share of GDP (per cent)
Estonia	77.7	1.7
Latvia	27.6	0.5
Lithuania	31.1	0.4
Total	136.4	-

Source: Author.

As can be seen in Table 1, environmental expenditures in the Baltic States totalled over US\$ 130 million. Estonia accounts for over half of this figure, spending US\$ 77.7 million in 1996. This can be attributed to a number of factors, including the relatively good economic situation in Estonia, the financial support received from Finland which allows the country to direct funds towards the environment and the high priority given to the goal of EU accession and the environmental reform that is necessary before acceptance.

It is expected that in the next few years, the environmental technology market will grow at a rate of 4 to 8 per cent annually.

Searching and obtaining resources to finance environmental projects poses continuing difficulties. This is one of the most pressing problems of environmental protection for all Central and Eastern European Countries. The Baltic States generally draw financial support from:

- state, regional and municipal budgets;
- extra-budgetary funds (state environmental protection funds, other ear-marked funds);
- environmental investments of commercial enterprises, both state and privately owned;
- commercial credit, both domestic and foreign;
- foreign environmental investments;
- foreign assistance programmes.

The structure of financial resources for environmental projects is changing. In recent years, the share of funds coming from enterprise has risen while the share provided by state, regional and municipal budgets has fallen. This trend is expected to continue in years to come.

The majority of state financing in all three countries is allocated to the construction and maintenance of wastewater treatment facilities and public water supply projects. The remainder is spent on waste management and air protection. Industry and municipalities usually cover the costs of projects related to waste and air.

Market for environmental technologies

The market for environmental technologies and services in the Baltic States, while very young, is growing rapidly. However, it is difficult to estimate the size of the market because accurate data is still not available. In all three countries, consumption of environmental technologies is not recorded by the national statistical offices and there are no up-to-date studies of the market available.

Based on a review of secondary sources, the market for environmental technologies in Estonia can be estimated at US\$ 45-55 million per year with an annual growth rate of approximately 6 per cent. More than half of the market is based on domestic production, the remainder on imports. The Latvian pollution control equipment market is estimated at US\$ 18-22 million with an annual growth rate of 4 per cent. Finally, Lithuania's market for environmental technologies is estimated at US\$ 25-28 million with an annual growth rate of 4 per cent. These figures must be considered with care.

State environmental funds

All three surveyed countries have established national environmental protection funds in order to provide financial assistance and support to various environmental protection activities, including public infrastructure projects and local projects (such as the construction of wastewater treatment plants and drinking water systems). It has to be noted that currently the Latvian and Lithuanian State Environmental Funds are not operating very successfully regarding environmental expenditures and they have a limited impact to support environmental investments in their countries. In an effort to overcome the state funds' limitations, both countries have established Environmental Investment Funds which provide loans for environmental investments.

Generally speaking, the revenue for the State Environmental Funds comes from outside the national budget, so that that environmental protection is not competing with other social programmes for limited state resources.

The state fund in Estonia is called the Estonian Fund for Nature Protection and Rational Use for Natural Resources. It was established in 1983 to collect revenues from fines and non-compliance fees for polluting natural water bodies. Under the Ministry of Environment, the fund collects financial resources and provides support for environmental protection.

In Latvia, the Environmental Protection Fund was established in 1996 under the Ministry of Environmental Protection and Regional Development to support environmental projects. The Environmental Protection Fund is the manager of the state special budget for environmental protection and it receives 40 per cent of the revenue from nature taxes. In addition, the Latvian Environmental Investment Fund was established in November 1997 to pool certain earmarked domestic resources with foreign funding to support private and public environmental projects. Another source of funding, the Municipal Development Fund, was created as a sub-project of the International Bank for Reconstruction and Development to mobilise financial resources for local governments where state funding is not sufficient.

The Lithuanian State Fund for Nature was created in 1993 to collect revenue from fines for the violation of environmental protection laws. In 1998, the Lithuanian Environmental Investment Fund is expected to become operational. It will provide soft loans and limited grant financing to the public and private sector for environmental projects.

Only in Estonia do state funds currently account for a significant amount of the country's spending on the environment. These resources are generally used for the financing of national and regional public infrastructure projects, municipal projects (such as the construction of new wastewater treatment plants) whose costs exceed their budget capability and projects in other priority areas.

State environmental funds' main activities are to provide financial support for investments, usually through loans with preferential conditions. Alternative forms of support include grants, subsidies to bank credits, equity involvement, etc. The form of funding available for any given project depends on the project itself, the investor and the financing institution.

Table 2 presents the breakdown of expenditures from state environmental funds for 1996. As illustrated in Table 2, the majority of expenditures was allocated to water-related projects. This emphasises the current priorities of the Baltic States and its high investment costs. As previously mentioned, the funds spent on wastewater treatment and water quality and supply are generally spent by municipalities. On the other hand, air pollution control projects (caused by stationary industrial sources) are usually covered by the investors' own funds.

Table 2. Breakdown of 1996 Expenditures of State Environmental Funds

Country	1996 Expenditures (US\$ million)	Year of establishment	Expenditures by Sector**
Estonia	6.6	1983	Water-related projects (42 per cent), Waste (14 per cent), Air Protection (4 per cent)
Latvia*	3.7	1996	Water protection (64 per cent), Waste (25 per cent), Air protection (11 per cent)
Lithuania	1.1	1993	Water-related projects (90 per cent), Waste Management & Air Protection (10 per cent)

*Data for Latvia is for 1997.

**Note: Total per centage may not sum to 100 per cent.

Source: State Environmental Protection Funds of the surveyed countries, 1998.

State environmental funds generate their revenue mainly from economic instruments for environmental protection, such as user fees, disposal charges and non-compliance fines. Estonia collects most of their fines from violations of water and air protection regulations. Fines in each sector continue to grow each year. In Latvia, natural resource taxes generate the most revenue, followed by fees collected from penalties and licences. In Lithuania, 1.3 per cent of the state environmental budget is made up of the revenue from taxes, fines and fee collection. This manner of generating income for environmental protection is expected to grow in the future.

Legislation and enforcement

Estonia, Latvia and Lithuania have enacted comprehensive environmental legislation. Much of the legislation is undergoing changes related to improving existing guidelines, filling in gaps and adapting laws to the European Union regulations. Regarding the latter task, over 200 pieces of EU legislation have to be adopted. According to 1997 estimates, the cost for the 10 associated countries to comply with EU's environmental *aquis* will be in the range of 100 and 130 billion US\$.

Since the early 80s, Estonia's environmental legislation included various acts regarding water, waste and air pollution. The National Environmental Strategy was adopted in 1997 and the National Environmental Action Plan will be completed in 1998.

Latvia introduced a new framework law in 1991 (Environmental Protection Act). This legislation was followed by the National Environmental Policy Plan, the Environmental Health Plan and the Environmental Action Plan, which were adopted between 1994 and 1995.

In Lithuania, the Environmental Protection Act was adopted in 1992, and together with the National Environmental Strategy, which was adopted in 1996, it constitutes the main environmental framework.

All countries have ratified the 1992 Helsinki Convention on the protection of the Baltic Sea.

Nevertheless, enforcement and implementation of these regulations still need to be improved. Although certain levels of enforcement exist in each country, it is by no means comprehensive and consistent. Enforcement policies generally revolve around monetary penalties but also include environmental standards, restrictions and permitting systems. These enforcement policies are often implemented at the local level, without co-ordination at the national level. Therefore, requirements and levels of enforcement vary greatly within any given country. Another contributing factor to problems with enforcement is the rate at which small to medium sized enterprises are growing, leading to difficulties in the tracking and collection of fines.

The system for assessing environmental fees and fines is very complex and the degree of responsibility among authorities varies. In general:

- Environmental fees are payable for the emission of regulated substances into the air and water; fees are also due for water extraction and waste disposal. Fees are due regardless of the level of compliance with relevant permits.
- Environmental fines are applied when a polluter exceeds the emission limits set in the relevant operating permit.

The effectiveness of monetary penalties to increase compliance is limited. The polluter-pays principle applies, but levels for charges are not high enough to act as a serious deterrent. Furthermore, the collection rate is far from 100 per cent.

Policy co-ordination, modification of legislation, increased enforcement of regulations, education and institutional strengthening, major investments in water and air protection are all likely to be part of the future of environmental actions.

Environmental administration

During the transition period, the environmental administration in all three countries has experienced significant changes, most notably, the decentralisation of many environmental activities from national to local and regional bodies. Generally speaking, Estonia, Latvia and Lithuania have established three levels of environmental administration:

- national level ministries (e.g. Ministry of Environment, other environment related ministries);
- regional level (county, provincial) environmental departments of regional authorities, inspection bodies, etc.;
- municipal level departments created by local authorities.

Ministries of Environment generally manage and implement national environmental policy, co-ordinate national environmental projects and maintain international co-operation. Environmental monitoring and enforcement is normally carried out by regional inspecting authorities. Most environmental permit issuance, collection of charges and imposition of penalties is done by regional authorities as well. Physical planning and construction permits and utility contracts are administered at the municipal level. Municipalities are increasingly responsible for waste management and wastewater treatment including operation, calculation and collection.

Governments collect environmental information, such as records of compliance and discharge monitoring for processing, storage and distribution, but they often do not provide timely access to the public. National statistical offices are mainly responsible for processing and disseminating environmental information. Annual environmental reports are published by each Ministry of Environment.

Estonia has well developed legislation accounting for many areas of the environment that need protection. The National Environmental Strategy (NES), adopted in March 1997, is the primary policy document on the environment. It has set out short-term and long-term goals for the state of the environment to be achieved by 2000 and 2010 respectively. The National Environmental Action Plan for Estonia is currently under development.

Latvia established a State project agency called “Vides projekti” (Environmental Projects) in July 1997, to provide services such as project preparation and prioritisation, feasibility studies and bidding documents. The resources for this agency come from the Latvian Environmental Protection Fund, the Latvian Environmental Investment Fund and the Municipal Development Fund. Latvia also maintains a National Environmental Action Plan.

Lithuania has 56 Municipal Nature protection Funds that collect revenue from pollution charges. Seventy per cent of this revenue is directed to the Municipalities while the other 30 per cent goes to the State budget. The Ministry of Environmental Protection handles most of the environment related issues and projects in Lithuania.

Environmental priorities and project opportunities

In the Baltic Region, serious environmental damage has occurred. The development of heavy industry in certain areas is one of the key causes of environmental degradation. Although there has been a significant decline in manufacturing activities, and a simultaneous reduction in environmental pollution, the health of the environment needs to be improved.

While air pollution and poor quality drinking water are the most frequently cited problems, the management of wastewater and solid waste, pollution from transport and the energy sector and site remediation and cleanup of contaminated land remain major challenges. Environmental pollution is particularly heavy in industrialised areas where large polluting companies operate (e.g. textile, food processing, mining and factories). Additional environmental damage, especially the contamination of soil, has been caused by former military bases and camps.

Environmental policies in all three countries place high emphasis on modifying the industrial sector to reduce pollution at its source. These policies generally stress preventive measures instead of the end-of-pipe approach. Introduction of environmentally friendly manufacturing techniques throughout all production processes is emphasised.

Table 3. **Breakdown of Environmental Expenditures by Media, 1996**

Country	Environmenta l Expenditures (US\$ million)	Share of Environmental Expenditures*		
		Air Protection	Water and Wastewater	Waste
Estonia	77.7	25%	67%	8%
Latvia	27.6	8%	83%	6%
Lithuania	31.1	6%	88%	4%

*Note: Total per centage may not sum to 100 per cent.

Source: 1997 Statistical Yearbooks of the surveyed countries.

In all three countries, water protection remains top priority, followed by air protection and waste management. Table 3 represents the breakdown of environmental expenditures by media. As it illustrates, the bulk of environmental spending is on water protection, wastewater treatment and the improvement of drinking water quality. Air quality receives the second largest amount of spending, closely followed by waste management, including hazardous waste. The large share of investment for water related projects is attributed to two main factors:

- Protection of water resources and supply of quality drinking water is the major priority in Estonia, Latvia and Lithuania. New water protection regulations force municipalities to invest in water and wastewater treatment and the sector has become the main recipient of municipal money invested in the environment. This trend is expected to continue in the near future.
- Air pollution from large stationary sources is still considered one of the most important causes of environmental damage and money is continuously allocated for air protection projects in the energy and power generation sector.

Respondents mentioned frequently the point that the lack of funds for environmental projects, incomplete or changing legislation and inconsistent enforcement and lack of awareness on environmental issues hinder the implementation of environmental investments.

In general, however, significant project opportunities are expected in wastewater treatment, air quality protection, waste management and site remediation.

Air and energy

The energy and power generation sector and mobile transport are the major sources of pollution in the Baltic countries, specially with respect to sulphur dioxides, nitrogen oxide, solid particles and carbon oxides emissions. All three countries are signatories to international agreements on the reduction of long-range transboundary air pollution and the emission of greenhouse gases and substances damaging the ozone layer.

Priority areas in the energy sector include the conversion of fuel to gas, the conservation of energy and the introduction of alternative energies. Modernisation of older heat generation facilities is underway in each of the three countries. Domestic heating contributes to air pollution and is recognised as an area for adaptation in the future. Construction of installations for the reduction of dust and gaseous emissions (especially sulphur dioxides, nitrogen monoxides, carbon oxides and dust particles) is also a priority area. In the long term, in particular, energy saving measures will be an important opportunity area.

Domestic heating is another source of air pollution in cities, mainly caused by individual fireplaces which are not fitted with any air pollution control equipment. Construction of district heating systems in urban areas is probably one of the ways to address these problems.

Furthermore, the transport sector plays an increasing role in contributing to significant air pollution in urban areas. Leaded fuel consumption is still relatively high, but goals for significant reduction have been established for the near future.

Finally, pollution from stationary sources such as industrial factories (e.g. manufacturing companies, cement industry, etc.) is indicated as a major source of air pollution and needs improvement due to the necessity of reducing air emission of volatile organic substances, hydrocarbons, heavy metals and other air pollutants.

Water and wastewater

By far the largest investments in recent years and years to come are in the water and wastewater sectors. The biggest problem is the lack of comprehensive and adequate treatment facilities and a leaking and insufficient existing supply and collection network. Poor quality drinking water is an issue of top priority in the Baltic States. Discharge of untreated industrial and municipal wastewater has contaminated surface and ground water in many areas. More than half of all generated sewage is discharged untreated. A number of cities do not have wastewater treatment facilities or treat only a fraction of their sewage.

The main project opportunities in the water management sector are related to the construction of and modernisation of existing water supply and wastewater treatment systems, sewerage and pumping houses. Contamination of groundwater resources, in particular by oil-based substances, organic solvents and heavy metals, is also a serious problem.

Estonian discharges into watercourses reach the Baltic Sea and Estonia maintains a bilateral treaty with Finland to remove 90 per cent of organic and phosphorous substances from wastewater. This treaty had an original deadline of 1996 which has been extended to 1998.

In Latvia, in order to ensure implementation of remediation measures, the Ministry of Environmental Protection and Regional Development established the 800+ Programme for water management. It aims to reduce health risks, improve water quality and prevent degradation of water ecosystems.

In Lithuania, the eutrophication of lakes, and especially the Curonian Lagoon, is of national concern. The majority of domestic wastewater is discharged into rivers after insufficient mechanical and/or biological treatment. In 1996 for example, 40 per cent of wastewater was treated to national standards, 44 per cent was insufficiently treated and 16 per cent was discharged untreated.

Not all inhabitants of the surveyed countries have access to quality drinking water or treated water. In some remote areas, residents obtain their water from wells that are likely contaminated. Shortages of quality drinking water often occur in urban centres, where consumption continues to grow.

Waste management

Waste management is frequently cited as a growing problem in the Baltic States. As household waste continues to grow, the need for effective collection, sorting, transporting and disposal of waste is necessary. Illegal dumping of waste occurs frequently. The rate of recycling and processed waste utilisation are low.

One of the most pressing issues is to improve the handling of existing landfill sites, most of which are abandoned or mismanaged. In Lithuania for example, over 800 landfills exist, most of which are not located in good geographic or geological areas.

Hazardous waste poses a difficult problem since virtually no legislation or regulations existed in the past for its disposal and few facilities are equipped to dispose of it properly. Therefore, the hazardous waste that currently exists is sitting awaiting disposal while it leaks into the ground, contaminating the soil and groundwater. Hospital waste is incinerated in small facilities. All three countries are in the process of enacting laws on hazardous waste management.

Until now, projects related to waste management have focused on landfill construction. This is expected to continue in the future but other projects are expected to grow in importance including waste minimisation and the recycling of waste. Construction of modern hazardous waste facilities is also expected in the near future. In Estonia, waste-related projects have focused on the closing of abandoned landfills and the construction and operation of new landfills. One of the goals of the Estonian government is to increase recycling by 30-40 per cent in the next four years. In Latvia, the government intends to introduce the "Law on Solid Waste Management" and a Hazardous Waste Management Strategy in 1998. In Lithuania, the Law on Waste Management is currently in Parliament being reviewed, and regulations for hazardous waste management are being prepared.

Other areas

A significant number of projects relating to site remediation are underway in all three surveyed countries as each outlined a need to clean up former Soviet military sites. Soil monitoring and revitalisation of heavy industrial areas is growing in importance.

Comprehensive environmental programmes have been developed for the most contaminated areas and for special national treasures such as the Curonian Lagoon in Lithuania.

Noise and vibration affecting the general public does not seem to be a major area of interest. Some small scale environmental surveys and health related studies have been conducted but funding tends to go to more pressing issues such as water supply management. Noise-related problems are generally outlined at the local level and some measures have been taken to reduce the transport noise near highways and airports.

Occupational health and safety (OHS) is not a priority either, but it does not go unnoticed. Various environmental impact assessments have been conducted, but like noise and vibration issues, these are not pressing. The introduction of regulations matching those of the EU will increase the importance of OHS as employers will be held accountable for the health of their employees.

Finally, environmental management systems such as EMAS and ISO 14000 are slowly being recognised in the Baltic States. This field is expected to grow in the future as awareness increases.

Future developments

Water related issues, particularly water supply, quality and wastewater treatment will remain a high priority for many years to come as assessment, construction, and management of facilities is needed requiring major investments.

Air pollution will continue to be a priority, although there is a shift expected from large industrial plants to a focus on small to medium sized companies and the pollution they emit. Air pollution from mobile sources, predominantly traffic, will continue to grow in importance and be a major focus of environmental impact assessments.

Currently, end-of-pipe technologies are used but there will be a gradual shift to include preventive measures and clean technologies. Increasing environmental fees and enforcement and growing costs of waste disposal are expected to aid in compliance by residents and enterprises. Price liberalisation is also expected to stimulate significantly the demand for energy-efficient measures.

The construction of modern landfills, and overhauling of existing ones is expected to remain a long-term priority in all three countries. Hazardous waste collection and disposal will also remain important as legislation comes into place in the near future.

Information channels for business opportunities

A very important factor in the success of entering the market in the Baltic States is the access to information on project opportunities. This can be difficult as there is no central body that collects and disseminates information on upcoming projects. Therefore, establishing personal contacts, attending environmental fairs and exhibitions and reading environmental and professional publications is the most effective way of gaining access to the market.

Government organisations and professional associations are regarded somehow as an important source of information. Ministries of Environment make general data on the environment available, but usually not information on project opportunities. The majority of businesses expressed disappointment with the inefficiency and changing structure of the ministries. However, additional useful sources of information include catalogues of products from technology providers, assistance for various environmental agencies and reports from local environmental administrations and regional inspectorates.

Major publications

Based on the survey, the main environmental and business publications read by environmental professionals are listed in Table 4.

Table 4. **Major Environmental or Business Publications and Readership (per cent)**

Estonia	“Environmental Technology” (<i>Keskkonnatehnika</i>)	50%
	<i>Ärielu</i>	45%
	<i>Sõnumileht</i>	27%
Latvia	“Daily Business” (<i>Dienas Bizness</i>)	64%
	“Business & Baltics” (<i>Bizness & Baltija</i>)	30%
	“Day” (<i>Diena</i>)	27%
Lithuania	“Morning of Lithuania” (<i>Lietuvos rytas</i>)	60%
	“Republic” (<i>Respublika</i>)	55%
	Publications from the Ministry of Environmental Protection	30%

Source: Author

Information about available environmental technologies

In general, purchasing environmental technologies was not seen as a significant problem by respondents, because of the wide range of products (domestic or imported) on the market. There were some bottlenecks noticed in obtaining very specific environmental technologies and information on the best available technologies. However, in the opinion of the respondents, the environmental technology market in Estonia, Latvia and Lithuania is still growing.

The major ways of gathering information prior to buying environmental technologies and services include personal and professional relationships which are especially important where business with a supplier has already occurred. Another significant source cited was participation or attendance at fairs and exhibitions, obtaining brochures and catalogues of products and directories of various businesses. Fairs and exhibitions were listed as the greatest source of information for Estonian and Lithuanian respondents. Latvian respondents tended to prefer acquiring advertisements and product

catalogues. Information provided in journals and newspapers was cited as another important source for information.

A few respondents mentioned the idea of project demonstration in specific environmental technologies in high demand areas where best available technologies can be presented to a wide range of potential customers.

Major trade fairs

Environment-related fairs and exhibitions play a major role as a source of information for potential buyers of environmental technologies and services. Table 5 lists the most important events held regularly in each country. Although attendance at fairs and exhibitions reflects the small market in the Baltic countries, it is expected to increase as more shows take place in the region and consumers realise the benefits of participation. These trade fairs and exhibitions provide an excellent opportunity to showcase new technologies and learn more about what is available on the market.

Table 5. **Major Environment-Related Trade Events**

Country	Name of Fair	Approximate Date
Estonia	“Environment” (<i>Keskkond</i>)	biannual, November (1998)
	“Quality of life” (<i>Elukvaliteet</i>)	biannual, April
Latvia	<i>Ecobalt</i>	annual, May or June
	<i>Energetika</i>	annual, March
	<i>Industry Balt</i>	annual, November
Lithuania	<i>Baltecologia, Baltecontrola,</i> <i>Baltengeia, Baltetechnika</i>	annual, May
	<i>Agrobalt</i>	annual, May
	<i>Infobalt</i>	annual, October

Source: Author

Public procurement regulations and tendering

All surveyed countries have adopted public procurement regulations, which require a formal announcement of tenders for major projects involving public money. Official tender announcements must include information on project specification, selection criteria and official deadlines. However, it is important to mention that, quite often, deadlines are set too early after tender announcement, forcing bidders to abandon responses except when they have advance knowledge of the project. Table 6 lists public procurement bulletins in the Baltics.

Table 6. **Public Procurement Bulletins**

Country	Year Procurement Law Adopted	Official Tender Bulletin
Estonia	January 1, 1996 (amended January 1, 1997)	“Bulletin of State Suppliers” (<i>Riigihangete Teataja</i>)
Latvia	January 1, 1997	“Law on State and Municipal Tenders”
Lithuania	January 1, 1997	“State News” (<i>Valstybes Zinios</i>) “Lithuanian Morning” (<i>Lietuvos Rytas</i>)

Source: Author

Access to public information and the Right-to-Know

It is important for companies entering the market in the Baltic Region to understand that they will encounter difficulties in obtaining information for a number of reasons. As already mentioned, there is no central body collecting, sorting and distributing information related to the environment to the public and the concept of “public information” still needs major improvement. In general, the following key factors contribute to the poor flow of information:

- scarcity of quality information — often environmental data from the past was not tracked or was not available to the public;
- poor channels for distribution of information -- either non-existent or inefficient;
- less developed information resources and collection services;
- organisational structures of state institutions are changing frequently, making it difficult to maintain current contact information and an understanding of the responsibilities of the institutions;
- a history of the old-style chain of command system where no formal information is released without formal approval from a superior;
- a “liberal approach” to deadlines and commitments.

Demand for environmental technologies***Summary and Overview***

The demand for environmental technologies and services in Estonia, Latvia and Lithuania is primarily based on the current priorities of national policy and regulations. Table 7 outlines the general demand for environmental technologies in the Baltic States.

Table 7. Summary of Demand for Environmental Technologies

	Estonia	Latvia	Lithuania
Air	moderate	moderate	high
Water	moderate	moderate	moderate
Wastewater	high	moderate	high
Waste	moderate	high	high
Energy	high	high	high

Source: Author

Overall, the demand for technologies was moderate to relatively high. Technologies related to wastewater are high in demand for Estonia and Lithuania yet only moderate in Latvia. While waste and energy related technologies were deemed high in importance for Latvia and Lithuania, they are only of moderate-to-high importance for Estonia. The demand for air pollution reduction technologies was cited as high for Lithuania but only moderate for Latvia and Estonia.

Considering the priority assigned by all three countries to water supply in environmental policy, it is surprising that only moderate demand was identified for water supply technologies across the region. This can be explained by the fact that technologies in this sector are available more readily than those of other sectors and that many water related projects are already underway.

Similarly, a high number of air quality related projects account for the generally moderate levels of demand in the air sector by Estonia and Latvia. In other words, when interpreting the data, one must be aware that some important environmental issues have been dealt with already or are currently being addressed.

Table 8 presents an overview of the higher demand areas. Environmental technologies related to energy were given top priority by all three countries. Second in demand by all the respondents was industrial and municipal wastewater and hazardous waste management related technologies. It is expected that, within the next few years, focus will remain on end-of-pipe technologies with a gradual introduction of pollution prevention and waste minimisation technologies.

Table 8. Overview of High Demand Sectors

Estonia	Municipal wastewater Industrial wastewater Energy
Latvia	Municipal waste Hazardous waste Energy
Lithuania	Air pollution control Municipal wastewater Industrial wastewater Hazardous waste Energy

Source: Author

The following sections provide an overview of the demand for specific environmental technologies in each sector.

Air

The highest demand outlined by respondents was in emission abatement and cleaner production, followed by air pollution control and flue gas equipment. Fairly high demand was outlined by all three countries for instrumentation and process control/software as well. Air sampling and laboratory analysis is primarily required by industry for assessing gaseous emissions and the government sector and local authorities indicated a growing need for technologies for the monitoring and analysis. Demand for other technologies varied between countries.

Air pollution control technologies are mainly reflected by scrubbers, filters and equipment to reduce emissions of particulate, sulphur dioxide, carbon oxides etc. The market in the Baltic countries is mainly dominated by foreign companies. Technologies for cleaner production are becoming increasingly important due to the expected shift from end-of-pipe solutions to pollution prevention measures.

Table 9 presents the demand for air related technologies and where future growth is expected.

Table 9. **Environmental Technologies in Demand -- Air**

Country	Technologies in Demand
Estonia	Technologies in high demand: emission abatement/cleaner production Technologies where demand is expected to rise: instrumentation and process control/software; air sampling/laboratory analysis; air pollution control/flue gas purification equipment
Latvia	Technologies in high demand: air pollution control/flue gas purification equipment Technologies where demand is expected to rise: instrumentation and process control; air sampling/laboratory analysis
Lithuania	Technologies in high demand: emission abatement/cleaner production; instrumentation and process control/software; air sampling/laboratory analysis; air pollution control/flue gas purification

Note : The different technologies are listed in order of importance.

Source: Author

Water

All three surveyed countries indicated protection of water resources and the improvement of water quality in their national priorities, although they each gave it a moderate demand ranking compared to (drinking) water related technologies. The primary goals are to increase the number of people connected to the public water supply network and maintain or improve the existing quality of drinking water.

In all three countries, the highest demand is indicated for treatment processes in general. Lithuania also indicated a high demand for inspection and reconditioning of the existing supply network. Estonia pointed to water recycling and reuse as the next highest technology in demand. Almost all of the countries indicated monitoring/sampling/laboratory analysis and instrumentation/process control/software as areas expected to grow in the near future.

Some experts also mentioned the need for technologies regarding facility operation of drinking water collection stations and reservoirs and water treatment plants.

Table 10 displays the high demand water related technologies and technologies where demand is expected to rise.

Table 10. **Environmental Technologies in Demand -- Water**

Country	Technologies in Demand
Estonia	Technologies in high demand: treatment processes Technologies where demand is expected to rise: water recycling and reuse; instrumentation/process control/software; construction of supply networks
Latvia	Technologies in demand: treatment processes Technologies where demand is expected to rise: monitoring; sampling/laboratory analysis; inspection and reconditioning of existing supply networks
Lithuania	Technologies in high demand: treatment processes; inspection and reconditioning of existing supply and collection networks Technologies where demand is expected to rise: instrumentation/process control/software; monitoring/sampling/laboratory analysis

Note : The different technologies are listed in order of importance.

Source: Author

Wastewater

In all the countries, the protection of water resources received a high priority in national environmental policy. Primary objectives are to increase the percentage of the population served by sewage disposal facilities, increase the proportion of wastewater treated in biological processes and to increase the treatment of industrial wastewater. Although wastewater management is listed as a major priority for all the surveyed countries, the technologies they demand vary greatly in this sector. In general, Estonia and Lithuania indicated high demand and Latvia moderate demand for wastewater related technologies.

All the countries' respondents point to pollution prevention/waste minimisation (industrial wastewater) as the technology most in demand followed by physical, chemical and biological treatment processes. Estonia indicated also a high demand in advanced treatment processes for industrial wastewater. In the future, advanced treatment processes and the inspection and reconditioning of existing collection networks are expected to grow in demand in Estonia.

In Latvia, high demand was indicated also for sampling and laboratory analysis. Monitoring and spill control and containment, as well as sludge treatment and disposal, are the areas where demand is expected to rise in the future.

Overall the highest demand of wastewater technologies was identified in Lithuania. In addition to the high demand areas mentioned above, instrumentation/process control/software and the inspection and reconditioning of existing collection networks was mentioned as being in high demand by the respondents. Sludge treatment and disposal and monitoring/sampling/laboratory analysis are areas where demand is expected to increase in the future.

It should be noted that conventional treatment systems are generally available on local markets, largely based on domestic technologies. However, advanced wastewater technologies, in particular tertiary

treatment, specialised industrial wastewater treatment, etc. are often imported, and often ranked in high demand by industrial users.

It is interesting that all three countries listed a strong demand for pollution prevention/waste minimisation technologies while the general focus of measures currently used is end-of-pipe. This indicates an interest in preventive measures and an opportunity in the environmental technology market for growth.

Table 11 presents wastewater related technologies high in demand, and technologies where demand is expected to rise.

Table 11. **Environmental Technologies in Demand - -Wastewater**

Country	Technologies in Demand
Estonia	<p>Technologies in high demand: pollution prevention/waste minimisation (industrial wastewater); spill control and containment; physical, chemical, and biological treatment processes; advanced treatment processes (industrial wastewater)</p> <p>Technologies where demand is expected to rise: inspection and reconditioning of existing collection networks; instrumentation/process control/software</p>
Latvia	<p>Technologies in high demand: physical, chemical and biological treatment processes; sampling and laboratory analysis; pollution prevention/waste minimisation</p> <p>Technologies where demand is expected to rise: monitoring (municipal wastewater); spill control and containment; sludge treatment and disposal (municipal wastewater)</p>
Lithuania	<p>Technologies in high demand: pollution prevention/waste minimisation; instrumentation/process control/software (industrial wastewater); inspection and reconditioning of existing collection networks; physical, chemical, and biological treatment processes</p> <p>Technologies where demand is expected to rise: facility operation; sludge treatment and disposal; monitoring/sampling/laboratory analysis</p>

Note : The different technologies are listed in order of importance.

Source: Author

Waste Management

Overall, Latvia and Lithuania indicated high demand of waste-related technologies and Estonian demand was moderate.

In all the countries, high levels of demand were indicated for hazardous waste followed by industrial and municipal waste. Waste collection/transportation and storage was indicated by respondents in all three countries as one of the most needed technologies. This illustrates the fact that waste in general is not being managed efficiently or effectively in the Baltic States. The next most frequently cited technology in demand by all three surveyed countries was pollution prevention/waste minimisation. This can be explained by the rising costs for disposal faced by municipalities. Also the focus of governmental environmental policies is expected to reinforce measures of pollution prevention and waste minimisation.

Overall, the demand for technologies related to waste incineration is insignificant, but increasing demand was indicated for technologies used for landfill disposal, both for municipal and hazardous waste. Most landfills in the surveyed countries are reaching their capacity and new waste disposal sites have to be built in the future.

Site redemption technologies, and decontamination and clean-up equipment were in high demand in particular in Lithuania, although serious problems of contaminated land can be found throughout the Baltic countries. High clean-up cost and the lack of liability and responsibility are seen as barriers in investment in such technologies.

The technologies expected to rise in demand are recycling and resource recovery, according to respondents in all three countries. Various other technologies are expected to grow in demand such as site monitoring, site analysis and waste characterisation.

Radioactive waste management is not one of the highest priorities in the waste sector. It falls behind hazardous and municipal waste management. Therefore the technologies indicated as in demand do not include any that relate to radioactive waste.

Table 12 presents the waste-related technologies most in demand and technologies where demand is expected to rise.

Table 12. **Environmental Technologies in Demand -- Waste Management**

Country	Technologies in Demand
Estonia	Technologies in high demand: waste collection/transportation and storage; pollution prevention/waste minimisation Technologies where demand is expected to rise: sample analysis/waste characterisation (industrial and hazardous waste); recycling and resource recovery (industrial and hazardous waste)
Latvia	Technologies in high demand: waste collection/transportation and storage; pollution prevention/waste minimisation; landfill disposal (municipal waste) Technologies where demand is expected to rise: composting/biomass conversion (municipal waste); recycling/resource recovery (municipal and industrial waste)
Lithuania	Technologies in high demand: pollution prevention/waste minimisation; waste collection/transportation and storage; site remediation/cleanup of contaminated land (hazardous waste); landfill disposal (industrial and hazardous waste) Technologies where demand is expected to rise: recycling/resource recovery; site monitoring (hazardous waste)

Note : The different technologies are listed in order of importance.

Source: Author

Energy

Of all the environmental areas, demand was seen as being highest in the energy sector. All surveyed countries indicated a high demand in energy-related technologies which is driven partly by national environmental policies and partly by the inefficiencies of the current systems.

By far the most frequently mentioned technologies in demand were new and efficient energy and heat systems as well as retrofitting and rehabilitation of existing systems, in particular for the power generation sector. However, demand is also expected to rise in other branches of industry. Heat recovery and energy saving technologies were listed in high demand which reflects the growing costs of energy.

The technologies expected to increase in demand in the future are related to process management and control (e.g. boiler tuning, fuel efficiency optimisation) as well as instrumentation. Interestingly enough, the use of alternative sources of energy was not mentioned as an issue in demand, though national environmental policy indicated the use of alternative energy sources as a goal for the future in all the surveyed countries. This illustrates the need for the existing systems to be modernised and to become more efficient as the first priority.

Table 13 outlines the areas where energy-related technologies are in demand and where demand is expected to rise.

Table 13. **Environmental Technologies in Demand -- Energy**

Country	Technologies in Demand
Estonia	<p>Technologies in high demand: New/efficient energy and heat generation systems (energy and power generation); retrofitting/rehabilitation of existing systems (energy and power generation); process management and control (energy and power generation)</p> <p>Technologies where demand is expected to rise: heat recovery and energy savings (energy and power generation); process management and control (other industrial sector)</p>
Latvia	<p>Technologies in high demand: heat recovery and energy savings; new/efficient energy and heat generation systems (energy and power generation); retrofitting/rehabilitation of existing systems (energy and power generation); process management and energy savings (energy and power generation)</p> <p>Technologies where demand is expected to rise: same ranking but for other industrial sectors</p>
Lithuania	<p>Technologies in high demand: new/efficient energy and heat generation systems; retrofitting/rehabilitation of existing systems; heat recovery and energy savings</p> <p>Technologies where demand is expected to rise: instrumentation; process management and control</p>

Note: The different technologies are listed in order of importance.

Source: Author

Major end-users of environmental technologies

The reason behind including this section in the questionnaire and subsequently this report was to give an indication of who are the major buyers of environmental technology. However there was a tendency among the respondents not to point to the more lucrative sectors. Many respondents were either unaware or hesitant to reveal the major customers in their sector.

The major end-users as indicated by the responses are municipalities, the energy and power sector and industry. The energy and power generation sector and industry are the major end-users of air pollution prevention and energy-related technologies. In the water, wastewater and waste management sectors, by far the major end-users of technologies are municipalities. Surprisingly enough, transport is not the largest end-user of noise, vibration and OHS technologies, instead it is manufacturing plants and construction companies.

Worth noting is the trend that municipalities are the major end-users of environmental technologies. This is largely due to the decrease in production in the Baltics since the late 1980s. In addition, the responsibility for the management of water, wastewater and waste falls on the individual municipalities. Therefore as collection and disposal costs continue to rise, municipalities will be searching for more cost-effective solutions.

The rankings presented in Tables 14 - 17 give an indication of the major end-user groups in specific areas of environmental technology in each surveyed country.

Air

The major end-users of air quality-related technologies are the energy and power generation sector followed by industrial companies and transport. Most power plants are owned by the state through a majority share, while local heating stations have various forms of ownership. Many have become joint-stock companies while others are private or owned by municipalities. The significance of the energy and power generation sector as consumers is expected to increase in the future as more stringent regulations are enacted for air emissions.

Other significant end-users include industrial companies such as cement factories, mining industry, food processing and the textile industry. Notably, neither small stationary pollution sources such as those of small industrial companies or transport are considered major end-users of air pollution reduction technologies mainly because they are not overly affected by current legislation.

Table 14 identifies the major end-users of air related technologies in the surveyed countries.

Table 14. **Major End-Users of Environmental Technologies -- Air**

Country	Major End-user Groups
Estonia	Mining industry; transport; power plants
Latvia	Energy sector; power plants; industrial companies; municipalities
Lithuania	Power plants and heat generating stations; industrial companies; transport

Source: Author

Water and wastewater

Municipalities or operators of municipal systems are the largest end-users of technologies related to water and wastewater. By examining the current state of municipal facilities, it is safe to say that this trend will continue for many years to come. Municipalities have the enormous task of construction and management of water and wastewater systems in the Baltics, which involves immense financial investment. In Latvia for example, municipalities already purchase 45 per cent of the water and wastewater technologies. Latvian municipalities are in great need of wastewater related technologies since 90 per cent of their current discharge is insufficiently treated.

Other significant end-users include power stations and various industries such as chemical, food processing, pharmaceutical and pulp and paper. The wastewater facilities in industrial companies are generally in poor condition and require significant modernisation. Higher discharge levels are expected in the future as production begins to increase again.

Table 15 identifies the major end-users of water and wastewater related technologies in the surveyed countries.

Table 15. Major End-Users of Environmental Technologies --Water and Wastewater

Country	Major End-user Groups
Estonia	Municipalities; power stations; chemical industry; food processing industry; pulp and paper industry; agriculture
Latvia	Municipalities/municipal services; various types of manufacturing; pharmaceutical industry; textile industry
Lithuania	Municipal waste water service companies; hospitals; chemical industry; food industry; textile industry

Source: Author

Waste Management

Municipalities and municipal service providers (contracted companies) are the largest end-users of waste-related technologies such as waste collection, landfilling or incineration in the Baltic States. This is explained by the fact that municipalities are wholly responsible for the entire waste management process from collection to disposal and in the next few years, as new legislation is introduced regarding solid waste, the demand for waste-related technologies will increase.

Municipalities in Lithuania currently manage over 800 landfills. The vast majority of these sites are in poor condition, many have been abandoned and all of them require significant modernisation. Industry in the Baltic countries is slowly being forced to dispose of its waste effectively.

In Lithuania, much of the secondary raw material waste is wood, non-ferrous metals and glass. The current collection and disposal system is not well organised, therefore the waste is not being disposed of effectively. Other important end-users are the oil-shale and cement industries, followed by construction companies.

Table 16 outlines the major waste technology end-users.

Table 16. **Major End-Users of Environmental Technologies --Waste Management**

Country	Major End-user Groups
Estonia	Municipalities; oil-shale industry; cement manufacturing industry; construction companies
Latvia	Municipal waste management services; other industries (construction, textile, paper, food)
Lithuania	Municipalities; municipal service operators; landfill operators; largest waste producers

Source: Author

Energy

The energy and power generation sector is the largest end-user in all three countries. It is becoming increasingly important for this sector to decrease its emissions and increase its efficiency. Energy generation is rising each year in Estonia, Latvia and Lithuania. Therefore, industrial energy companies are expected to remain the greatest end-users of energy-related technologies.

Another significant end-user is municipalities in their control of heating systems for their local area. Reforms of domestic heating are expected within the next few years as municipalities turn to gas as their heating source.

While energy saving technologies are becoming increasingly important, industrial branches become more interested in heat recovery and energy-saving technologies in the future as their production increases and energy costs rise.

Table 17 lists the energy-related end users in order of importance.

Table 17. **Major End-Users of Environmental Technologies -- Energy**

Country	Major End-user Groups
Estonia	Power generation; manufacturing; heavy industry; pulp and paper industry
Latvia	Energy sector; municipal power generation; other industrial sectors
Lithuania	Power plants; heat generating stations; municipal services; other industrial companies

Source: Author

Advantages and disadvantages of local suppliers

Purchasing preferences

The country of origin (domestic vs. foreign) of a particular environmental technology clearly is not the key factor behind a purchasing decision made among buyers. Most experts only rely on the best technology or best practice criteria when making a purchasing decision. Preference was also given to buy technologies from in-country offices instead of ordering it through a foreign office.

Product quality and reliability, warranty conditions, availability of after-sales service, lowest possible costs outlay in achieving required standards, previous experience with suppliers and good references are determining factors in purchasing choices. Additional preferential credit or financing from the supplier significantly increased the chances of selling products.

Strength and barriers of local products

By far the highest proportion of respondents indicated the low price as the biggest strength of local technologies compared to foreign products (70-80 per cent). Other significant advantages include the point that local products are easy to customise and adapt for specific local needs (60-70 per cent), and are user friendly and easy to operate (30-50 per cent)

Surprisingly, lack of product information (50-60 per cent), little information about suppliers (40-50 per cent) were also mentioned as obstacles to purchasing local products. Another interesting point was that local products are considered best mainly to fulfil the minimal environmental requirements and that they quickly become dated due changing environmental regulations.

Profile of the environmental business sector

Since 1990, the market for environmental technologies and services has grown steadily in all the surveyed countries, leading to the dynamic development of local environmental businesses. However, compared to other CEE countries (e.g. Czech Republic, Hungary or Poland) the environmental business community in the Baltic countries is small. This is not surprising given the history of the countries, their small population and their environmental budgets. It is estimated that 150-200 SMEs are currently active in the environmental market and that number is still growing. The majority of companies are service oriented. Although a number of companies were established before 1990, the majority are quite young, with more than 70 per cent established after 1990. Most of the environmental businesses founded after 1990 are privately owned companies and are small. More than half of the survey respondents employ 10 or fewer full-time employees. Overall the number employed in the environmental business sector is not significant.

Lithuanian environmental businesses tend to be concentrated on providing services while Estonian companies focus more on sales and engineering, offering limited consulting services. Environmental consulting in Estonia was introduced recently, in 1992-1993, and tends to focus predominantly on environmental impact assessments and site monitoring. It is quite common for the annual sales of an Estonian environmental business to reflect only one or two major projects a year. Latvian environmental businesses tend to be more well-rounded and provide a variety of technologies and services but the market is still considered small.

Information needs

When asked to comment on the information needs in their field or simply in general, the respondents are eager to answer. Many types of information relating to the environment in the Baltic countries are simply not compiled, not accessible to the public or not accurate.

The greatest need for information indicated by most of the respondents was in the area of new environmental technologies. This was followed by a need for more information on in-country

environmental regulations. Since environmental legislation is continuously being enacted and revised to meet international agreements and EU regulations, companies and municipalities are finding it difficult to comply. This is exacerbated by the fact that the legislation is often not transparent enough to be understood.

Another significant area in need of information is related to domestic tenders for projects. Although each surveyed country maintains legislation and a publication related to tenders, the respondents felt that the opportunities to bid were often passed by because of inaccessibility or short notice.

The areas of information needs that are expected to grow in the future include: environmental quality standards for industries, eco-efficient and cleaner production practices and sources of project financing.

Serving the public with adequate, accurate information is an area that needs to be developed in the Baltic Region. This is expected to improve with time (see Table 18).

Table 18. **Information Needs of Environmental Businesses**

Country	Information Needs
Estonia	<p>Information in high demand: new environmental technologies; in-country environmental regulations; domestic tenders of projects</p> <p>Information in demand: sources of project financing; environmental quality standards for industries; eco-efficient and cleaner production practices</p>
Latvia	<p>Information in high demand: in-country environmental regulations; sources of project financing; new environmental technologies</p> <p>Information in demand: environmental quality standards for industries; domestic tenders for projects; eco-efficiency and cleaner production practices</p>
Lithuania	<p>Information in high demand: new environmental technologies; in-country environmental regulation; domestic tender for projects; sources of project financing</p> <p>Information in demand: environmental quality standards for industries; eco-efficient and cleaner production practices</p>

Note : Information needs are listed in order of importance.

Source: Author

Barriers to development

Environmental businesses were asked to identify the main obstacles to business development. Access to credit and finance was rated by the respondents as the biggest hindrance to further business development. This reflects the current severity of the financial market wherein commercial loans are difficult to obtain.

All surveyed countries are EU associate countries and Estonia will join the EU in its next wave of enlargement. Therefore, environmental legislation will eventually comply with EU standards. This means, in many cases, that the law will be tougher and the enforcement more strict which will have a

significant influence on the environmental market. For now, “weak” environmental legislation is not seen as a major barrier to the development of environmental businesses. Foreign competition within the environmental market was also viewed as only a minor barrier to business development.

Unfortunately for environmental businesses, they have little power to eliminate the obstacles that stand in the way of their development. However, the government could reduce most of the barriers by introducing instruments and incentives that favour environmental enterprises. Above all, the enforcement of environmental and tax regulations and improved access to financing are key factors in creating a market in which environmental businesses can thrive (see Table 19).

Table 19. **Barriers to Development**

Country	Main Barriers to Development
Estonia	access to credit and finance; general access to information
Latvia	access to credit and finance, tax regulation, general access to information
Lithuania	tax regulation; access to credit and finance

Source: Author

Conclusions

In each of the surveyed countries, significant environmental degradation has occurred in the past. The development of heavy industry is one of the main causes of this damage. Although there has been a decline in manufacturing activities and a corresponding reduction in environmental pollution in recent years, environmental degradation still persists.

While poor quality drinking water and air pollution are the environmental problems mentioned the most frequently, management of wastewater and solid waste and pollution from transport remain major challenges. Environmental pollution is particularly heavy in industrialised areas.

In the Baltic countries, the major environmental priorities outlined by the governments are water protection and air pollution prevention. National environmental policies focus on air emissions specifically from energy and power generation facilities and other large industrial sources as the main targets for environmental regulations. The goals within the water protection sector are to increase the number of residences served by sewage disposal facilities and potable water systems, protect groundwater resources and construct and manage adequate wastewater treatment facilities.

In the near future, air pollution control and water protection will continue to be a high priority, although there will likely be a shift in focus toward making small-to-medium-sized businesses limit their emissions and treat their discharge. Air pollution from transport is expected to grow as the number of vehicles on the road continues to rise. Although regulations are currently not applied to the transport industry, this is expected to change in the future. Water management, specifically wastewater treatment, will most likely remain a priority area in the future. The construction of modern wastewater treatment facilities is a priority in all three countries at this time. Finally, waste management, a very large problem, is expected to remain a major concern. The majority of landfills in the Baltic countries are not equipped to handle municipal waste let alone hazardous waste.

Total environmental spending by state governments has decreased in comparison with expenditure figures from the early 1990s. This does not, however, indicate a decrease in the importance

of the environment as a national priority, instead it illustrates the fact that the state governments in the Baltic region are facing issues of varying priority and that their limited budgets must be allocated very carefully in order to address these issues.

The distribution of expenditures to the environment corresponds with the national priorities of Estonia, Latvia and Lithuania. Environmental expenditures in Estonia have remained above 1 per cent of GDP for the past few years while Latvia and Lithuania's have fallen below that level. The expenditure for all three countries totals US\$ 136 million with Estonia's portion accounting for more than half of the figure. It is expected that, in actual numbers, environmental expenditure will grow at a rate of 4 to 8 per cent in the coming years. A change is anticipated in the sources of funds for environmental projects. Currently, most of the financing comes from the state budget (including state environmental protection funds), municipal budgets and investors' own funds. In the next few years, a greater amount of funding is expected to come from business contributions while state budgets are expected to decrease.

The bulk of environmental expenditures are directed towards water-related projects followed by air protection. Waste management activities are the third largest priority area. Most of the state financing tends to concentrate on the construction of wastewater treatment and sewage facilities and public water supply projects. The remainder is allocated to air protection and waste management. The costs of the latter categories are predominantly covered by industrial plants and municipalities.

As indicated by the survey, the major end-users are municipalities, the energy power generation sector and major industry. Aside from continuous financial constraints, the purchasing of environmental technologies does not pose any significant problems. There is a fairly wide range of products available on the market at varying costs.

The demand for environmental technologies tends to be driven by the current priorities in each country. Overall, demand for environmental technologies is moderate to relatively high. Most categories maintain moderate demand but a few were identified as being high in demand. Technologies related to water were moderate in all three countries. Estonia indicated high demand for wastewater technologies, Latvia indicated high demand for waste and energy technologies and Lithuania indicated high demand for all categories except water.

Technologies related to energy and municipal, industrial and hazardous waste management were rated high in demand across the board. The same is true for wastewater technologies. In the next few years, the focus of environmental remediation measures will be on end-of-pipe technologies although some growth is expected for pollution prevention and waste minimisation technologies.

In the surveyed countries, there are no effective formal channels for the distribution of information about environmental business opportunities. Instead, the respondents focus on participation and attendance at trade fairs and exhibitions, reading environmental publications and local newspapers and maintaining contacts with colleagues in similar sectors. Although Ministries of Environment are good sources for general information, they do not tend to provide information on project opportunities.

Each country has recently enacted legislation regarding public procurement and tendering procedures. It requires formal announcement of tenders for all planned acquisitions involving the use of public money. However, at this point, most experts are sceptical as to its usefulness in ensuring the availability of information on project opportunities.

In conclusion, the environmental technology market in the surveyed countries is very small and competitive, but business opportunities exist for local suppliers. In particular, waste management,

wastewater and energy-related technologies are the most promising business areas for the coming years. The majority of purchases are based on the best-technology criteria and reasonable prices. The country of origin is not seen as a critical factor. Suppliers can expect market success if their products are of high quality and reliability. Foreign co-operation can be beneficial because foreign businesses have generally better marketing expertise, access to financial resources and modern technologies, while local companies have better knowledge of local market conditions and rules. Finally, over the next few years the environmental market will be strongly driven by the EU accession process.