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STAFF APPRAISAL REPORT

REPUBLIC OF LATVIA

MUNICIPAL SOLID WASTE MANAGEMENT PROJECT

February 2, 1998

Environment and Rural Development Sector
Latvia Country Unit
Europe and Central Asia

CURRENCY EQUIVALENTS

(as of December 1997)

Currency Unit	=	Lat
Lat 1	=	US $ 1.85
US $1	=	0.54 Lat

WEIGHTS AND MEASURES

Metric System

ha	=	hectare
kg	=	kilogram
ton	=	metric ton
MW	=	megawatts
kWh	=	kilowatt hour

LATVIAN FISCAL YEAR

January 1 - December 31

ABBREVIATIONS AND ACRONYMS

BDP	-	Business Development Plan
CH_4	-	Methane
EA	-	Environmental Assessment
EBRD	-	European Bank for Reconstruction and Development
ERR	-	Economic Rate of Return
EU (Tacis)	-	European Union Technical Assistance Program for the FSU
FAO	-	Food and Agriculture Organization of the United Nations
FRR	-	Financial Rate of Return
FSU	-	Former Soviet Union
GDP	-	Gross Domestic Product
GEF	-	Global Environment Facility
GHG	-	Greenhouse Gases
GLC	-	Getlini-2 Ltd.
GLE	-	Getlini-Eco Ltd.
GOL	-	Government of Latvia
ICB	-	International Competitive Bidding
IS	-	International Shopping
LFG	-	Landfill Gas
MOEPRD	-	Ministry of Environmental Protection and Regional Development
MSDP	-	Municipal Services Development Project
NCB	-	National Competitive Bidding
NGO	-	Non-governmental Organization
NPV	-	Net Present Value
NRT	-	Natural Resource Tax
NS	-	National Shopping
PHRD	-	Japanese Policy and Human Resources Development Fund
PPA	-	Power Purchase Agreement
PPF	-	Project Preparation Facility
PPU	-	Project Procurement Unit
PSC	-	Project Steering Committee
RCC	-	Riga City Council
SAL	-	Structural Adjusment Loan
SIDA	-	Swedish International Development Agency
SOE	-	Statement of Expenditure
SPC	-	Stopinu Pagast Council
UNFCCC	-	United Nations Framework Convention on Climate Change
VAT	-	Value Added Tax

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REPUBLIC OF LATVIA
MUNICIPAL SOLID WASTE MANAGEMENT PROJECT

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REPUBLIC OF LATVIA

MUNICIPAL SOLID WASTE MANAGEMENT PROJECT

Loan and Project Summary

Borrower:	Republic of Latvia
Guarantor:	Not Applicable
Implementing Agency:	Ministry of Finance
Beneficiary:	Government of Latvia, Riga City Council, and Getlini-Eco Ltd.
Poverty:	A poverty category is not applicable in this project
Amount:	US $7.95 million
Terms:	Payable in 17 years, including 4 years grace, at the standard IBRD interest rate for variable LIBOR-based US Dollar single-currency loans.
Commitment Fee:	At the rate of 0.75% on undisbursed loan balances, beginning 60 days after signing, less any waiver.
Onlending Terms:	It has been agreed with the Ministry of Finance that the Bank loan would be onlent under a subsidiary loan agreement to the Riga City Council, which in turn would pass these funds on to Getlini-Eco Ltd. under a separate onlending agreement. Terms would be similar to those obtained by Government of Latvia, except for a markup of about 0.7% to Government overheads / risks.

Financing Plan:

	Local	Foreign	Total
	----------	US $ million	----------
IBRD (loan)	3.32	4.63	7.95
GEF (grant)	2.98	2.14	5.12
SIDA (grant)	0.34	1.16	1.50
Riga City Council	2.54	3.46	6.00
Getlini-Eco Ltd.	2.00	2.64	4.64
Total Financing Required	11.18	14.03	25.21

Project Objectives:

The proposed Project would demonstrate self-sustaining modern waste management of municipal solid waste. This would be accomplished through maximum collection of generated methane, thereby reducing greenhouse gas emissions and creating a revenue stream to cover capital and operational costs of the improved landfill. Other objectives include: (a) simplifying the separation of recyclable material; (b) reducing environmental disturbances for neighbors of the disposal site; (c) demonstrating how outdated and obsolete disposal sites can be remediated and converted into sanitary landfills to enable continued operation; and (d) arresting the ongoing contamination of groundwater. The Project would also demonstrate the feasibility of developing the indigenous Latvian landfill gas as an energy resource. This technique would mitigate an otherwise constant emission of methane into the atmosphere, and at the same time, decrease the dependence on imported fossil fuel for electricity generation and/or heating purposes.

Project Description:

The Project involves the remediation and continued operation of the Getlini waste disposal site, comprising three integrated investment components and one technical assistance component. The Project would include: (a) the remediation of the existing disposal site; (b) technical and operational improvements to meet so-called sanitary landfill standards; (c) the establishment of a sorting line for separation of recyclable materials and arranging separate areas for storing of separated material as well as hazardous waste, which would be transported to another site; (d) the establishment of a modern waste management technology based on energy cells for enhanced degradation of easily biodegradable waste; (e) the collection of landfill gas containing about 50 percent methane, CH_4; (f) the generation of electricity at the site by use of gas engines with direct delivery to the grid; and (g) technical and managerial assistance through twinning arrangements. These arrangements would enable disposal site staff to (a) efficiently operate the waste processing system and (b) achieve maximum revenues from the generated and separated by-products and (c) facilitate the future development of the company.

Project Benefits:

This Project would result in a number of environmental benefits. These benefits are: (a) remediation of the existing Getlini site, thereby postponing the establishment of a new site located at least at four times longer hauling distance; (b) collection of landfill gas from both already disposed waste and future waste generation, thereby reducing the emission of methane; (c) recirculation of leachate, thereby reducing treatment costs; and (d) demonstration of a technology that makes it possible to utilize other by-products from the decomposition of the waste, thereby prolonging the lifetime of the site and increasing the revenue stream. The Project would also cover its own costs, result in the cost-effective utilization of an indigenous energy resource, and result in foreign exchange savings when importing electricity or fossil fuel for heating purposes.

Environmental Aspects:

The environmental assessment results indicate that the Project would result in considerable environmental improvements by reducing: (a) groundwater pollution, (b) surface water pollution, (c) dust and air pollution caused by fires, (d) noise from site activities, and (e) odors from uncovered waste

material. The project would also substantially improve the working conditions for individuals involved in the separation and recycling of waste material.

Project preparation included a comprehensive environmental assessment consistent with the applicable procedures of the Government of Latvia and the provisions of World Bank Operational Directive 4.01, Environmental Assessment for a Category A project. Following this assessment, the project design was changed from opening of a new landfill site some 40 kilometers outside Riga to the rehabilitation and modernization of the existing site. Consequently, the environmental rating of the Project was changed from A to B. The Environmental Data Sheet is presented in **Annex 6.1.**

Project Risks:

The technology introduced by the Project is considered to be manageable without requiring highly specialized expertise. Owing to its comparatively recent development, practical applications are still limited, mostly to Western and Eastern Europe. The investment would also change the character of the existing operation in terms of commercial management. Managerial capacity therefore has to be considered a project risk.

Other technical risks relate to the actual amount of waste, its composition and the resulting gas generation, and timely and acceptable payment for the electricity delivered.

These risks will be mitigated through managerial and technical assistance provided under the project, through local regulations requiring that all the municipal waste generated by Riga City be delivered to Getlini, and by the signing of a power purchase agreement based on the current legislation for a period of at least 10 years. It is furthermore assumed that Riga's decline in population will be offset by increasing amounts of waste per capita. This will result in a constant, or even increasing, fraction of decomposable waste.

During the final stage of project preparation, opposition to the project has been voiced by a small group which opposes any changes in the management of the Getlini site. This opposition has attempted to stir up fears among the public based on allegations of acceptance of hazardous waste at the site, reduction of the current labor force, increased disposal fees, and involuntary resettlement.

The design of the project has taken all these issues into account: hazardous waste will not be accepted at the site, but in case of accidental delivery provision has been made for a facility for temporary storage; no reduction of the labor force is planned; there will be no increase in disposal fees as a result of the project; and no resettlement will take place as the project will be implemented within the borders of the existing site and does not require any additional land. The Ministry of Environmental Protection and Regional Development is taking the leading role in conducting a dialogue with this group and in conveying accurate information to the public at large.

A comparatively small risk remains that the Project will not succeed in arresting the ongoing groundwater contamination. However, the groundwater flows and the geohydrological conditions have been examined extensively. Because the Project will change the character of the existing landfill operation, this risk is regarded as marginal.

1. BACKGROUND

A. Country Context

1.1 Latvia, a small country of 2.6 million people in an area of 64,600 square kilometers, restored its independence in August 21, 1991. The country has a 500-kilometer coastline on the Baltic Sea, along which lie the ice-free seaports of Ventspils, Liepaja and Riga. Much of Latvia is a flat coastal plain. Nearly 43 percent of its surface area is covered with forest, interspersed with small rivers and lakes. Almost half the country is arable. The country has few natural resources and imports *all of its natural gas and oil products and half of its electricity needs.*

1.2 Following independence, Latvia launched a comprehensive reform program to transform its economy into a market based system. Priced and foreign trade were liberalized and the country pursued an independent monetary policy and a prudent fiscal policy. As a result, the average inflation dropped from nearly 1000 percent in 1992 to 7.5 percent in 1997. Progress in structural reforms have also been significant. Privatization of small businesses, agricultural land, and banking institutions has been almost completed and privatization of apartments and large enterprises have shown remarkable progress after a slow start at the beginning. The pension system has been reformed and serious steps have been taken to reform health and education sectors. The fall in real GDP which began with the independence came to a halt in late 1995. Since then the GDP grow by 2.8 percent in 1996 and is estimated to have grown by 4.5 percent in 1997.

1.3 In 1995, the economy experienced serious difficulties as a result of a banking crises and the widening of the fiscal deficit to 3.3 percent of GDP. While the banking crises began with the failure of Latvia's largest commercial bank, due to its poor commercial practices, factors contributing to the rise in fiscal deficit included growing wage payments and rising tax arrears. The Government's response to the crises was impressive. The confidence in the banking system was restored through adopting a number of measures to strengthen the prudential regulations and the supervision of the banking system, including closure of banks not in compliance with laws and regulations. To reduce the fiscal deficit, the Government began to reduce expenditures. Despite these efforts the pressure on the budget continued, and to reduce this pressure on a sustainable basis, the Government began a medium term process to reform key expenditure programs and to strengthen the management of public resources. These measures which were also

supported by the Bank Structural Adjustment Loan allowed the Government to reduce the fiscal deficit to 1.3 percent of GDP in 1996 and to 1 percent in 1997. Fiscal deficit is expected to drop further in 1997.

1.4 Under the former Soviet regime, public administration and management in Latvia was highly centralized. Since independence, there has been substantial progress in the decentralization of authority to local governments. Until recently, there were three levels of local government: (a) rural districts and small towns (pagasts); (b) regions (rayons), which include rural districts and small towns on their borders; (c) and seven major cities, including Riga, which incorporate the functions of both pagasts and rayons. The GOL has decided simplifying the territorial administrative system to include only two levels of governments; the national government and the subnational government consisting of cities, towns, small municipalities, and rural pagsts. It has clarified expenditure responsibilities for the two levels of government. New laws provide for a stable and transparent system of revenue assignment. They formalize intergovernmental fiscal relations through allocations of tax revenues between the state and local governments, and allow for some revenue equalization among municipalities. The current legislative framework will adequately support the proposed project while allowing for longer term reforms and the development of the municipal sector.

1.5 Today, local governments are largely responsible for the provision of municipal services, including water, sewerage, and solid waste[1] collection and disposal. While service provision in most sectors is at a high level, investments are still required for rehabilitation of existing facilities, including improved environmental management in the solid waste sector. Despite progress in raising tariffs and moving toward cost recovery, local governments and associated service enterprises have insufficient funds to undertake such investments at present. Given fiscal constraints, the central government also lacks sufficient reserves to fund major investments from its state budget. The need for external financing to support public infrastructure services and municipal governments has been determined to be a priority in both GOL's Public Investment Program and the Bank's Country Assistance Strategy.

B. Sectoral Context

1.6 Latvia's Public Expenditure Review, prepared in 1994, highlighted the need to support priority investments in energy, transport and urban environmental services and to establish economic charges and financing mechanisms to fund such investments. Latvian authorities subsequently prepared a National Energy Strategy, which emphasizes use of indigenous energy resources and diversification of fuel choice and supply, as far as

[1] In this discussion, solid waste is a broad term covering municipal waste (largely household and public building), industrial and hospital waste, as well as hazardous waste.

possible. In 1995, the Ministry of Environmental Protection and Regional Development (MOEPRD) completed a National Environmental Policy Plan for Latvia, which was subsequently accepted by the Cabinet of Ministers. Improved waste management is cited in the Plan as one of the top five priorities for Latvia.

Environmental Priorities

1.7 Over the last four years, the major environmental priority for the country has been the protection of drinking water supplies, largely supplied from surface waters. Latvia has long suffered from a low level of wastewater treatment and an overload of existing sewage treatment plants, particularly in the larger cities. Hence, attention has been directed to securing funding for investments to rehabilitate and improve the country's water/wastewater treatment plants. These efforts have been supported by a number of bilateral donors, which have participated in the Baltic Sea Environment Programme, as well as international financial institutions. Hand-in-hand with efforts to prepare investment projects has been technical assistance for municipal utility development, both operationally and financially, recognizing the decentralization of responsibility for urban infrastructure to municipalities. Fortunately, the major cities are now covered by ongoing or upcoming projects that address these problems: *Riga* (an EBRD commitment); *Daugavpils* (World Bank-financed Municipal Services Development Project); *Liepaja* (a Bank-financed Liepaja Environment Project); and *Ventspils* (self-financing from special hard currency payments for port use). The country therefore is now beginning to focus on other needs and problems.

1.8 Several themes emerged from the recent National Environmental Policy Plan:

(i) continued encouragement and support to local authorities to mobilize resources for environmental services and improvements, particularly developing a self-financing capability within utilities;

(ii) the need to develop environmental policy and policy instruments, considering the eventual harmonization with EU directives;

(iii) concurrently, the need to build up the regulatory infrastructure and programs (including public information programs) and to train staff of the local environmental committees, which will have the bulk of responsibility for "on the ground" regulatory work in the future; and

(iv) attention to the following priority problems: transboundary pollution, eutrophication of water courses, risks from growth of economic activities, waste management (both municipal and industrial), impact of agriculture, depletion of biodiversity and landscape degradation, inefficient use of natural resources, and low quality of drinking water.

1.9 MOEPRD has recently taken a number of steps to address these themes, including launching programs to support water/wastewater treatment and waste management

services in small communities throughout the country. It is working with EU PHARE to develop a new Environment Fund (Latvia Environmental Investment Fund, or LEIF), through which some of the needed local investments could be financed. The country has recently passed a Natural Resource Taxation Law, which will provide some of the revenue for LEIF. For various aspects of institutional and regulatory development, it is supported by several bilateral donors as well as EU PHARE and the World Bank (the latter under an IDF program).

1.10 In 1995, the GOL ratified the Framework Convention on Climate Change and later prepared the National Communication of the Republic of Latvia under the UN Framework Convention on Climate Change (UNFCCC). The latter document presents an overview of the existing situation, characterizes a set of policies and activities to reduce greenhouse gases (GHG) emissions, and sets targets for the year 2000. Among the important issues raised in the document, of particular relevance to this Project, are waste disposal sites -- one of the major sources of methane emissions in Latvia. The MOEPRD has declared that "reduction and collection of methane from the solid waste disposal sites is one of the Government's priorities for the reduction of greenhouse gases."

Waste Management Needs

1.11 Currently, all municipal solid waste is disposed of at the nearly 500 disposal sites in various parts of the country, none of which is regarded as a well-designed sanitary landfill. Many of the existing disposal sites also pose a risk to local groundwater resources. The GOL has therefore started a program focusing specifically on upgrading or closing all existing disposal sites. To support this program institutionally, it is preparing a National Solid Waste Management Strategy, which is supported by Danish grant financing and is expected to be finished in December, 1997.

1.12 It is expected that the minimum requirement for upgrading existing disposal sites would be the implementation of mitigation measures to fulfill the environmental requirements for sanitary landfills, such as groundwater protection, leachate treatment, and daily coverage of the waste. A draft law on Solid and Industrial Waste (December 3, 1996) also states two strategic goals: (a) recovery of waste material, recognizing the scope for the increased separation and use of recyclable materials; and (b) maximum utilization of the waste energy potential. At the enterprise level, greater operating and financial accountability is needed to achieve operational efficiencies and a self-financing capability.

1.13 Waste Management in Riga. The situation is most critical in Riga, which accounts for approximately one third of the country's total population of 2.5 million and for an estimated 40 percent or more of the nation's municipal and industrial waste. Data for the Riga Region suggests that a total of 450,000-500,000 tons of solid waste, or 430-475 kilograms per inhabitant is generated each year, of which about 280,000 tons are municipal solid waste. While quite low compared with other European countries, it can be assumed that the lack of a waste registration system and, hence, inadequate data as

well as illegal dumping explain much of the difference with other European rates. Besides municipal solid waste, the Riga region generates the following amounts of waste each year: industrial waste (130,000 tons), hospital waste (3,000 tons), demolition waste (40,000 tons), and hazardous waste (44,000 tons). Although small amounts of hospital and hazardous wastes are incinerated, the bulk of all waste, *irrespective* of its hazardous nature, is dumped in disposal sites that are largely unmanaged.

1.14 Although there are some twenty smaller disposal sites in the Riga region, the largest by far is *Getlini*, situated southeast of the city within the boundaries of Stopinu Pagast, a village about 10 kilometers from the Riga City center. The *Getlini* site covers 87 hectares and is 25 years old. It receives a mixture of industrial and municipal solid waste, and has limited environment mitigation measures, such as groundwater protection. *Getlini* is inappropriately located due to its geology and high water table. The site does not have an effective natural barrier or artificial lining to protect the groundwater against percolating leachate. Through continuous leachate generation, the upper water table is contaminated, although the level is still manageable. If no measures are taken to reduce or eliminate the threat of further percolation of leachate, the lower aquifers, which are part of Riga City's water supply, are at serious and growing risk of becoming contaminated.

1.15 *Recently, GOL declared this Project to be a national priority.* The rationale is that it will provide an environmentally sound solution to nearly 40 percent of the municipal waste generated in Latvia. Furthermore, it will demonstrate state-of-the-art technology for improved waste management, and it will have a positive impact on the country's effort to reduce energy imports.

Technical Background on Waste Management and Energy Utilization

1.16 Based on environmental concerns, all modern disposal sites must adhere to standards protecting the groundwater table and the treatment of leachate. There is also an increasing demand for the collection of LFG generated during waste decomposition. Such collection has been practiced since the 1970s to reduce the risks for site fires and building explosions in the vicinity owing to gas migration and to utilize the LFG's energy content.

1.17 Modern technology for LFG collection is simple and easily implemented. It involves the placement of waste in small sealed cells, whereby the decomposition is controlled by maintaining a constant temperature and moisture content, and collection efficiency is maximized. The results of this improved technology, used since the end of the 1980s, are an increased collection of LFG and a reduced decomposition period, that is from normally 20-25 years to less than 5 years. A detailed description of the technical aspects and physical implementation of the Project is provided in **Annex 1**.

1.18 The use of landfill gas (LFG), collected during the decomposition of municipal waste, can easily be utilized as a substitute for imported fossil fuels, required for either electricity generation or district heating. The overall use of LFG in Latvia would result in

an additional capacity of 50 $MW_{Thermal}$. The energy generated from the LFG would cover about 1 percent of national heat demand or 2.4 percent of electricity consumption (1996 estimate). Technical coefficients based on the actual waste composition and waste volumes generated in Riga City show that the LFG is sufficient to feed a 20 MW boiler, or a 6 MW gas engine for electricity generation with methane captured under the proposed Project.

1.19 Utilization of the LFG would result in a revenue stream that would cover capital and operational costs. Thus, the proposed Project would create a technically, environmentally sound and financially self-sustaining acceptable solution for the municipalities. It would be the first sanitary landfill in the Baltic States, and the first project in the Baltic States where LFG is captured and then utilized as fuel for energy production.

1.20 The optimal use of LFG entails connection with large energy suppliers, such as district heating systems, power plants, combined heat and power plants, or for production of electricity, delivered directly to the grid. The Project could serve as a demonstration project and reference point for further improvement of the waste management sector in the region. For instance, owing to the extensive use of district heating systems in Eastern Europe and the former Soviet republics, future use of waste management technologies maximizing LFG collection is both attractive and feasible.

C. Bank Strategy and Experience

1.21 The Bank's overall strategy in Latvia is to support the country's efforts to accelerate structural reforms leading to a full transition to market-based economy and, concurrently, to support efficient investments in high-priority sectors to facilitate economic growth. A list of Bank Group's investments in Latvia are provided in **Annex 2**.

1.22 The Bank's strategy concerning environmental issues is to support a limited number of priority investments that have significant impact in terms of achieving operating efficiencies and reducing pollution. The Bank seeks to develop projects which can also mobilize resources from other international financial institutions, bilateral donors, and nongovernmental organizations; it is also concerned with introduction of appropriate new technologies. The Bank strategy also recognizes the need to support policy and regulatory measures. In this regard, MOEPRD has received an IDF grant last year to revise air quality standards and related regulatory programs, considering in particular its interest in harmonizing with European Union (EU) environmental directives, and meeting other international commitments. This work will be coordinated closely with a Danish-supported program to build local capacity for "integrated pollution prevention and control" (IPPC), based on a new EU environmental directive.

1.23 With this proposed Project, the involvement of the Bank and the Global Environment Facility (GEF) would provide an opportunity to support Latvian efforts to: (a) find a sustainable solution for a cost-effective treatment of municipal solid waste; (b) reduce the emission of greenhouse gases and groundwater contamination; and (c) reduce the dependence on imported energy and fossil fuels for electricity and heating purposes. Project preparation has brought to Latvia new technologies to which it would otherwise not have had access.

1.24 Already, this involvement has resulted in the decision to establish a new company with the intention of adopting an entrepreneurial and commercial approach to the exploitation of the new technologies and expanding implementation to other sites. It has also resulted in the preparation of a business plan for the company's involvement in the further development of cost-effective waste management and generation of energy from municipal waste. The technology introduced under the Project allows for quick recuperation of its own costs, both capital costs and recurrent costs. Thus, private sector interest may develop in the future at similar sites elsewhere in the region.

2. THE PROJECT

A. Project Origin and Formulation

2.1 The Municipal Solid Waste Management Project was originally a component of the Municipal Services Development Project[2] (MSDP), but as the identification of a new disposal site would have delayed the finalization and implementation of the MSDP, it was delinked. The original project concept was based on the development of a new location for the future management of the Riga City waste, given preliminary indications that the groundwater was threatened by the leachate emanating from the *Getlini* disposal site.

2.2 However, there was also evidence that groundwater contamination was restricted to the most shallow aquifer, which was not a key water supply resource. A study[3] financed by the Swedish government was made of the different aquifers underlying the disposal site and the potential for remaining at the *Getlini* site.

2.3 The study found that the contamination of the groundwater was limited to the most shallow Quaternary aquifer, while the more important and deeper aquifers, the Plavinas and Amata, used as resources for the water supply to Riga, had not yet been contaminated. The study also forecasted that the Plavinas aquifer would show signs of contamination about the year 2002, and the Amata aquifer about year 2020. The study concluded, however, that with the benefits from the Project, the water supply could be saved from further risks of leachate contamination. A more detailed description of the geohydrological conditions is presented in Annex 1.

2.4 The study also indicated that operation of the Getlini site could continue for an additional 50 years. With further utilization of by-products, the lifetime of the site would be 100-200 years. Finally, the study concluded that investments based on the collection of LFG to generate electricity would provide a cost-effective and sustainable solution to the current waste management problem for Riga City.

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2 Loan No. 34584-LV.

3 Feasibility Study and preliminary Design of Remediation and Continued Operation of the Getlini Site, carried out by Sweco, during August 1996-January 1997.

B. Project Rationale

2.5 In view of the large number of disposal sites that need to be either remediated and closed, or remediated for continued operation, Latvia has a large investment program ahead. Given that improved waste management normally results in a substantial increase of the disposal fee, the development of improved waste management will need to be phased in gradually to make the improvements affordable to consumers.

2.6 The proposed Project would provide a solution to meet western sanitary landfill standards without requiring a necessary increase in disposal fees, thereby demonstrating a replicable technology and reducing the current waste management problems in a cost-effective way.

C. Rationale for Involvement of GEF and Other Donors

2.7 The involvement of the Bank/GEF in the proposed Project would provide an opportunity to support Latvian efforts to improve solid waste management, reduce dependence on imported energy, and improve global environmental quality through the reduction of GHG. In the absence of Bank/GEF involvement, it is unlikely that the country would be able to mobilize the technical assistance and financial resources required to implement a project of this nature.

2.8 The Project is consistent with the guidance for accessing the Climate Change short-term window of the GEF Operational Strategy, in that: (a) it is technically, environmentally, and socially sustainable; (b) it is a national priority in the National Climate Change Mitigation Plan (1995) as well as in the Environmental National Policy Plan; (c) it provides the means of abating GHG at a cost of US $3.41 per ton of carbon, which is below the maximum acceptable US $10 per ton carbon; (d) it includes an essential transfer of technology through twinning arrangements and managerial assistance during project implementation; and (e) it would develop the current emission of methane, a potent greenhouse gas, into an indigenous energy resource.

2.9 In addition, the Project would provide a mechanism for the GEF to support the development of a cost-effective waste management technology as a means of reducing greenhouse gas emissions. With successful implementation, the Project could serve as a paradigm for most of the municipalities in the Baltic Region, all of which face the requirement of improving the management of solid waste. The high potential for reducing greenhouse gases has lead the GEF Council to approve a grant equivalent of US $5.12 million.

2.10 The Swedish International Development Agency (SIDA) has declared its willingness to support the Project with a US $1.5 million investment grant. The rationale

is that the Project would eliminate the ongoing discharge of untreated leachate and polluted runoff water from the Getlini site to River Daugava, a tributary to the Baltic Sea. Baltic Sea cleanup has become an environmental priority for Sweden.

D. Project Objectives

2.11 The Project would introduce modern, self-sustaining management of municipal solid waste to Latvia. This would be accomplished by the maximum collection of generated methane, thereby reducing greenhouse gas emissions and creating a revenue stream to cover capital and operational costs of the improved landfill. Other objectives include: (a) simplifying the separation of recyclable material; (b) reducing environmental impact for neighbors of the disposal site; (c) demonstrating how outdated and obsolete disposal sites can be remediated and converted into sanitary landfills to enable continued operation; and (d) arresting the ongoing contamination of groundwater. The Project would develop the indigenous Latvian LFG into an energy resource, thereby mitigating an otherwise constant emission of methane into the atmosphere, and at the same time, decreasing the dependence on imported fossil fuel for electricity generation, heating purposes, or both.

E. Donor and Public Participation during Project Preparation

2.12 The project has received broad media coverage because of its innovative aspects. A first public meeting was held on May 25, 1996. It was followed by another public meeting on October 26, 1996, and a third public meeting on December 14, 1996. In attendance were a wide range of stakeholders, including affected communities, local, regional, national, and international government project counterparts, the media, NGOs, and the currently operating solid waste management enterprise. The meetings were broadcast on television as well as national and local radio, and covered by major newspapers in Latvia. In addition, there have been several meetings with the inhabitants of neighboring communities to ensure that their concerns relating to the Project are addressed.

2.13 During the public meeting in December 1996, the results from the draft feasibility study and the draft environmental assessment were presented. The participants clearly expressed an interest in the implementation of the Project, because it would reduce noise, odor, and safeguard existing job opportunities for the regular staff at the site. Especially important to meeting participants is the arrest of the contamination of the most shallow aquifer, which is frequently used for irrigation purposes. The environmental assessment as well as the feasibility study were made available in several local public institutions to enable the local people to read the reports and provide comments to the Bank and RCC. SIDA representatives have participated both in public meetings and in Project preparation.

F. Project Components and Description

2.14 The Project is directed toward the remediation and continued operation of the *Getlini* waste disposal site. The Project would finance the following activities:

(a) remediation of the existing disposal site;

(b) technical and operational improvements to meet western sanitary landfill standards;

(c) establishment of a sorting line for separation of recyclable materials and arranging separate areas for the storage of separated material as well as hazardous waste, which would later be transported to another site;

(d) establishment of a modern waste management technology based on energy cells for enhanced degradation of easily biodegradable waste;

(e) collection of LFG containing about 50 percent methane, CH_4;

(f) site generation of electricity by use of gas engines with direct delivery to the grid;

(g) technical assistance through twinning arrangements to enable the staff of the disposal site to efficiently operate the waste processing system and to achieve maximum revenues from the generated LFG and separated by-products: and

(h) managerial assistance during the implementation period to facilitate the future development of the company.

2.15 The aforementioned activities would be grouped in three integrated investment components and one technical assistance component:

(a) remediation of the existing site to meet environmental requirements in regard to leachate treatment and to avoidance of future groundwater contamination;

(b) technical and operational improvements to meet western sanitary landfill standards, and arrangements for improving the separation of recyclable materials;

(c) establishment of energy cells for enhanced degradation of easily biodegradable waste, collection of landfill, and generation of electricity; and

(d) technical and managerial assistance through twinning arrangements.

2.16 The proposed Project would remediate the existing waste pile covering about 35 hectares to arrest ongoing groundwater contamination. It would utilize the remaining area of about 52 hectares to establish special waste cells for enhanced decomposition of the future waste to be disposed at the site. The remediation will ensure that the current uncovered pile of waste will be totally covered and sealed against infiltration of rain water, thereby minimizing the future generation of leachate. The remaining area will be prepared to completely fulfill modern sanitary landfill requirements to avoid future negative environmental impacts. Landfill gas will be extracted from both the existing waste pile and the new cells. A more detailed description of the necessary measures to be undertaken during the Project implementation is presented in **Annex 1**. To ensure that leachate is not reaching the groundwater, separate ditches around the waste pile will be established, and groundwater wells will be established downstream to control penetration of leachate into the groundwater. Energy cells for enhanced degradation of easily biodegradable organic content will be established within the remaining area (52 of 87 allocated hectares). After decomposition, the waste will be either further separated into a compost fraction or a fuel fraction, or disposed of on top of the existing waste pile. When this pile has reached its final height (currently estimated at 45 meters), energy cells will be located on top of this pile, and the area initially occupied by the energy cells would then begin to be filled up.

2.17 Recyclable materials are currently separated by semiformal workers,[4] who sift through the refuse as soon as it has been delivered to the waste site. Under this Project, this activity will be transformed to achieve less hazardous working conditions. The workers will be organized to remove recyclable materials[5] from a conveyor belt at the waste receiving point, instead of working directly on top of delivered waste, with consequent reduction in accidents. After this separation, the remaining waste will be shredded and further transported on a conveyer belt to the energy cell area, thereby avoiding unnecessary traffic within the disposal site. The recyclables will be awaiting transport and sale to other companies. Hazardous waste might by mistake be transported to the site, and therefore the Project also includes a facility to enable temporary storage of that type of waste.

2.18 It is anticipated that the National Waste Management Strategy and new regulations will lead to an improved "quality" of the raw waste entering the site resulting in acceptable levels of heavy metals. To maximize the collection of LFG, about two or three cells will be established each year. The limited size and the short lives of the cells will allow the cells to be opened after about five years and the decomposed material to be moved to another facility for processing as compostable waste. At the site, it is presently

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4 These employees have been termed semiformal workers because they are not formally employed by GLC, the current management company.

5 Current separation of recyclable materials includes paper and board, bottles, cans, aluminum, metal scrap, wood, tires, batteries, etc.

possible to separate a fuel fraction from the decomposed waste, and use this in a boiler constructed for coal, wood chips, and peat briquettes. In the near- or long-term, it should be possible to utilize up to 80 percent of the original waste volume after compacting. Thereby, the lifetime of the Getlini site could be 200 years. In the Project scenario, these possibilities have not been included, and the lifetime has been calculated to about 50 years.

G. Project Costs

2.19 The total cost of the Project is estimated to be US $25.21 million or Ls 13.61 million equivalent, including contingencies, recurring costs during project implementation, and interest during construction. The estimated costs for the project subcomponents is shown in **Table 2.1**.

2.20 The base investment cost is estimated at US $16.49 million and the base for recurrent costs at US $3.79 million, resulting in a total base cost of US $20.28 million. Physical contingencies are estimated at US $1.06 million. Price contingencies between January 1, 1997 and December 31, 2001 would amount to approximately US $2.65 million,[6] or 12.4 percent of total base cost plus physical contingencies. Total contingencies represent 18.3 percent of the base cost. The foreign exchange component is estimated at approximately US $14.31 million, including contingencies and interest during construction, or 56 percent of the total project cost.

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6 Assumptions

Local inflation : 1997 = 9.8%; 1998 = 9.0%; 1999 = 7.0%; 2000 = 6.0%; 2001 = 6.0%

International inflation: 1997 = 1.7%; 1998 = 2.2%; 1999 = 2.6%; 2000 = 2.8%; 2001 = 2.6%

Table 2.1: Project Cost Summary by Project Sub-Component

No.	Description	Lats '000			US $ '000			
		Local	Foreign	Total	Local	Foreign	Total	Main Financier
1	Material (incl. Transport Clay and Sand	569	142	711	1054	263	1,317	GEF
2	Earth Works/Remediation	232	58	289	429	107	536	GEF
3	Machinery/ Equipment/Building	22	18	39	40	33	73	IBRD
4	Groundwater Control/Leachate Treatment/Monitoring	123	366	489	227	678	905	SIDA
5	Detailed Design	68	270	338	125	500	625	IBRD
6	Civil Works/Buildings/Technical Improvements	339	277	616	628	513	1141	GEF
7	Earth Works/Improvements	859	215	1074	1591	398	1989	RCC
8	Weighbridge/Registration	9	34	43	16	63	79	IBRD
9	Sorting Unit/Shredder	181	724	905	335	1341	1676	IBRD
10	Container/Oil Tank	2	6	8	3	12	15	IBRD
11	Wheel/Track Loader	79	318	397	147	588	735	IBRD
12	Maintenance Bridge	1	5	6	2	9	11	RCC
13	Earth Works/Gas	276	78	354	512	144	656	RCC
14	Gas Extraction Piping	52	43	95	97	79	176	IBRD
15	Civil Works/Leachate Water	262	214	476	485	397	882	RCC
16	Regulation Station	8	32	41	15	60	75	IBRD
17	Junction Manholes	0	2	2	0	3	4	IBRD
18	Collector Well/Pumping Boiler	60	241	302	112	447	559	IBRD
19	Electricity Generation Facility	410	1642	2052	760	3040	3800	GEF/IBRD
19A	Local Staff Salary	197	0	197	365	0	365	RCC
20	International Procurement Specialist	16	146	162	30	270	300	IBRD
21	Twinning Arrangement	32	184	216	60	340	400	SIDA
22	Office Equipment	5	14	19	9	26	35	SIDA
22A	O & M Project Support Unit	16	49	65	30	90	120	RCC
23	Vehicle	3	8	11	5	15	20	GEF
	Total Recurrent Cost	846	1199	2046	1567	2221	3788	
	Total Base Cost	**4667**	**6285**	**10952**	**8642**	**11639**	**20,282**	
	Physical Contingencies	316	256	572	586	473	1059	
	Price Contingencies	1056	375	1431	1956	694	2650	
	Total Project Cost	**6039**	**6915**	**12955**	**11184**	**12806**	**23990**	
	Bank-Financed Interest during Construction		659	659		1220	1220	
	Total Financing Required	**6039**	**7574**	**13613**	**11184**	**14026**	**25210**	

H. Project Financing Arrangements

2.21 The proposed Bank loan of US $7.95 million would cover approximately 31.5 percent of total required financing, including interest during construction of US $1.22 million. The loan would finance both foreign and local costs, in the proportion described in **para. 2.41**. The loan would be made under the standard terms for a LIBOR-based single currency loan, and be repaid over a 17-year period, including 5 years of grace, at the standard IBRD variable interest rate and commitment fees.

2.22 Co-financing of the Project has been arranged, with grants from SIDA (US $1.5 million) and GEF (US $5.12 million) for a total of US $6.62 million (26.3 percent of project costs). These grants would be provided to GOL, which would pass them to the

final beneficiary Getlini-Eco Ltd. (GLE) in grant form. RCC would contribute US $6 million equivalent, partly in equity and partly as a separate, interest-free, loan to GLE. The loan, US $4 million, would be repaid over 17 years after 5 years grace. The balance of US $4.64 million, (the recurrent costs during project implementation), would be financed by GLE from the cash flow generated by the Project. A more detailed description of the financing plan is provided in **Annex 3**.

2.23 It has been agreed with the Ministry of Finance that the Bank loan would be onlent under a subsidiary loan agreement to RCC, which in turn would pass these funds to GLE under a separate onlending agreement. Terms would be similar to those obtained by GOL, except for a markup of about 0.7 percent for the government. An interest rate of 8 percent has been used in the calculations. GLE would carry the foreign exchange risk associated with the Bank loan.

2.24 *Execution of subsidiary loan agreement between GOL and RCC and GLE is a condition of loan effectiveness.*

I. Procurement

2.25 **Table 2.2** summarizes the procurement arrangements. A more detailed presentation of procurement arrangements can be found in **Annex 4.1, Procurement Plan**, and in **Annex 4.2, Use of funds for Different Procurement Packages over the Implementation Period**, and in **Annex 4.3, Procurement Information**. The General Procurement Notice was published on March 31, 1997. *During negotiations, agreement was reached that all the procurement funded by the Bank and GEF would be carried out in accordance with the Bank's Guidelines for Procurement under IBRD Loans and IDA Credits (January 1995, revised January and August 1996), and Guidelines for Use of Consultants by World Bank Borrowers and by the World Bank as Executing Agency (August 1981).*

2.26 Procurement under parallel cofinancing arrangements would be carried out through tied procurement in accordance with the regulations of the Government of Sweden.

2.27 Contracts earmarked for financing from RCC funds would be procured following national procedures, which are acceptable to the Bank.

2.28 Procurement Management. Responsibility for procurement (and disbursement) will be with the Project Procurement Unit (PPU) to be set up under the RCC, and located at the offices of RCC (see **Annex 8**). This unit will be assisted by international consultants with experience in Bank procurement, disbursement and reporting requirements (for details see **paras. 3.8 - 3.11**). The project launch workshop is planned for July 1998.

Table 2.2: Procurement Arrangements

Project Element	ICB	NCB	Other	NBF	Total Cost
Civil Works					
		2101		4765	6866
		145*			145*
		1607**			1607**
Equipment					
	7381	1623	547	944	10495
	5136*		498*		5634*
	2117**	1375**	21**		3513**
Consultant Services					
			314	1038	1352
			314*		314*
PPF - Design			637		637
			637*		637*
Total Procurement					
TOTAL	7381	3724	1184	6747	19350
Bank	5136*	145*	1135*		6730*
GEF	2117**	2982**	21**		5120**

ICB = international competitive bidding;
NCB = national competitive bidding;
NBF = not Bank financed
* Bank Loan Financed Procurement
** GEF Financed Procurement
Note: Consulting Services for project design (estimated to cost US $673 thousand) PPF funding, and advisory services (US $314 thousand) will be procured in accordance with Bank Guidelines for Use of Consultants (August 1981). International Shopping is estimated at US $400 thousand, and National Shopping is estimated at US $50 thousand.

2.29 Civil Works (US $1.8 million). All civil works would be procured through national competitive bidding (NCB). These civil works are mainly labor intensive, that is, earth works and construction. The Borrower would be using bidding documents for NCB contracts developed for the ECA region.

2.30 Goods and Material (US $9.2 million). All Bank-funded contracts (with the exception of the procurement of clay and sand) valued at more than US $300,000 would be procured under International Competitive Bidding (ICB). The borrower would use the Bank's Standard Bidding Documents for Goods. Procurement of sand and clay (estimated to cost US $1.6 million) would be done in accordance with NCB procedures. There are more than ten local suppliers able to provide clay and sand at competitive prices. The bidding documents would be based on the Standard Bidding Documents for Procurement of Commodities. International Shopping (IS), based on comparison of price quotations obtained from at least three suppliers from two eligible countries, will be used for procurement of small specialized equipment estimated to cost less than US $300,000 with an aggregate amount of US $500,000. National Shopping (NS), based on the comparison of price quotations from at least three eligible suppliers, will be used for

procurement of office equipment and furniture estimated to cost less than US $50,000 with an aggregated amount of US $50,000.

2.31 Consultant Services These would consist of consultant contracts for detailed design (US $0.6 million) and for the consultant support for the PPU (US $0.3 million). Potential firms would be shortlisted and selected on the competitive basis according to Bank Guidelines. Given the circumstances that: (i) the shortlists and Terms of References for the consultant services were prepared and approved in the beginning of March; and (ii) the use of the new Guidelines for Procurement of Consultant Services in practice would delay the physical project implementation with one year and increase the project cost with about US $1 million, the Bank, in consultation with the Chief Procurement Advisor, agreed to exempt the Project from following the new guidelines.

2.32 Preference for domestic manufacturers will be granted in accordance with standard Bank procedures.

2.33 Procurement Review. All packages procured through ICB, the first two packages procured through NCB, and the first packages procured through IS would be subject to the Bank's prior review and approval. For consulting services, prior review is required for all contracts with individuals exceeding US $50,000, all contracts with consulting firms exceeding US $100,000; and terms of reference are required for all consultants' contracts irrespective of the contract value, and including the proposed twinning arrangement. Other procurement would be subject to the Bank's post review during supervision of the Project in accordance with the Bank's Procurement Guidelines.

2.34 Procurement Plan and Monitoring. Procurement data will be collected and recorded by PPU. The Borrower will prepare quarterly progress reports on the procurement of goods and services under the Project.

J. Disbursements

2.35 The proposed Project is expected to be disbursed over a period of six Bank fiscal years (1998-2003) with an estimated closing date of July 31, 2003. Disbursements per Bank fiscal year are shown in **Table 2.3**. **Table 2.4** shows the disbursement, for fiscal year, of all the financier's contributions for the project. Descriptions of all the Bank loan and GEF grant proceeds and forecasts of expenditure and disbursement for the proposed Project are shown in **Annex 5.1**. The disbursement schedule is shown in **Annex 5.2**.

Table 2.3: Project Disbursement by Bank Fiscal Year (in Millions of US $)

Year	1998	1999	2000	2001	2002	2003
Annual	0.2	5.68	9.06	4.36	3.84	2.07
Cumulative	0.2	5.88	14.93	19.30	23.14	25.21
Cumulative % of Total	1	23	59	77	92	100

Table 2.4: Financing Plan by Bank Fiscal Year (in Million US $)

Financiers	1998	1999	2000	2001	2002	2003	Total
Riga City	0	1.23	1.85	1.17	1.12	0.63	6.00
World Bank	0.20	1.56	2.74	1.73	1.12	0.60	7.95
GEF	0	2.44	2.57	0.10	0.00	0.00	5.12
SIDA	0	0.25	0.97	0.11	0.11	0.06	1.50
Getlini-Eco Ltd.	0	0.20	0.92	1.25	1.49	0.78	4.64
TOTAL	0.20	5.68	9.06	4.36	3.84	2.07	25.21

2.36 The pace of the estimated disbursement for the Project is somewhat advanced compared with the standard Bank disbursement schedules for the sector. The necessity of safeguarding the groundwater from further contamination and of enabling an early revenue stream to cover recurrent costs during implementation makes it crucial to implement heavy investments during the second year of the implementation period. Furthermore, the substantial technical assistance (through an international procurement specialist and through twinning arrangements) serves as a guarantee for timely implementation.

2.37 It is expected that first disbursements will be made against the SIDA and GEF grants. This sequence will minimize interest payments during construction. The RCC equity contribution of US $0.6 million will be paid over the five years, at US $0.12 million a year. The RCC equity will be disbursed over four years, from 1999 to 2003; in this way, the overall contribution of RCC will be spaced over time so as to avoid liquidity problems for the city administration.

2.38 **Appendix 2** of **Annex 7** shows the estimated disbursement schedule for the entire funding package, including GLE's contribution from its own funds. The Bank loan will be disbursed starting in 1998, and the final disbursement is foreseen for the year 2002.

2.39 *The disbursement schedule for RCC finance and details on opening of bank account(s) were agreed upon during negotiations. A separate financing agreement between RCC and GLE is a condition for loan effectiveness.*

2.40 The proceeds of the Bank loan and the GEF grant would be disbursed against:

(a) For goods: 100 percent of foreign expenditures, 100 percent of local ex-factory expenditures and 80 percent of local expenditures for other items procured locally;

(b) For works: 100 percent of foreign expenditures and 82 percent of local expenditures; and

(c) For consultancy services: 100 percent of expenditures for project design, technical assistance and training.

The proceeds of the GEF grant would be used for 100 percent of all types of expenditures, except local taxes. All cofinancers would manage their own disbursements.

2.41 Disbursement requests would be prepared and submitted to the Bank by the PPU to be established with the RCC. It is expected that the PPU staff would attend disbursement training courses organized by the Bank (**see para. 3.8 - 3.11**).

2.42 Disbursement would be made against standard Bank documentation. The documentation to support these expenditures would be retained by the PPU for review by Bank supervision missions and verification by external audits. Disbursement requests would be fully documented except for expenditures under contracts for goods and equipment and consultant services valued at less than US $250,000 equivalent, where statements of expenditure (SOE) would be used. The minimum size of the application for direct payment from the loan account and issuance of a special commitment is 20 percent of the current deposit to the special account.

2.43 To facilitate Project implementation, the Borrower would establish a Special Account in one of the major foreign commercial banks on terms and conditions satisfactory to the Bank to cover the Bank's share of expenditures. The authorized allocation would be US $790,00, representing about four months of average expenditures made through the Special Account. During the early stages of the Project, the initial allocation to the Special Account would be limited to US $500,000. However, when the aggregate disbursement under the Bank loan has reached the level of US $2,000,000, the initial allocation may be increased to the authorized allocation of US $790,000 by submitting the relevant application for withdrawal. Applications for replenishment of the Special Account would be submitted monthly or when one third of the amount has been withdrawn, whichever occurs earlier. Documentation requirements for replenishment would follow the standard Bank procedure as described in Chapter 6 of the Disbursement Handbook. In addition, monthly bank statements of the Special Account, which have been reconciled by the Borrower, would accompany all replenishment requests. *During negotiations, the terms and conditions of the establishment and operation of the Special Account were set forth.*

K. Environmental Aspects

2.44 The results from the environmental assessment indicates that the Project would result in considerable local environmental improvements by reducing: (a) groundwater pollution; (b) surface water pollution; (c) dust and air pollution caused by fires; (d) noise from activities on the site; and (e) odors from uncovered waste material. The Project would on the national level substitute either import of 6 MW power or fossil fuels imported to generate that capacity at domestic power plants, and it would on the global

level contribute to a cost effective reduction of GHG; US $3.4/ton of carbon (see para 2.8). The Project would also substantially improve the working conditions for individuals involved in the separation and recycling of waste material.

2.45 Project preparation included a comprehensive environmental assessment consistent with the applicable procedures of GOL and the provisions of World Bank Operational Directive 4.01, Environmental Assessment (EA) for a Category A project. The EA also included a social assessment of the situation for neighbors, employees at GLC, semiformal workers, and food- and waste pickers. Following this assessment, the design of the Project was changed from opening of a new landfill some 40 kilometers outside Riga to the rehabilitation and modernization of the existing site, and it was not until the feasibility study was finished it became clear that a B-rating for the Project better reflected the circumstances. The Environmental Data Sheet is presented in **Annex 6.1.**

2.46 The sole negative impacts associated with the Project consist of exclusion of semiformal workers and food- and waste pickers at the site. Semiformal workers receive payment by the kilogram or volume of recovered recyclable materials, and in many cases, do not come to the site every day for work. This group is estimated to number approximately 220. Food- and waste pickers are defined as those individuals who visit the site illegally to gather food items and items of possible value. Exact numbers of this group are unknown and are very difficult to estimate, but current estimates range from 50 to 500.

2.47 Covering the existing waste pile and off-loading waste into a confined, controlled, and safe manner in keeping with modern waste management practices will exclude both of these groups. This impact is considered potentially significant given Latvia's transition economy. However, picking waste at a waste site is neither a safe nor healthy means of earning, or supplementing, an income. International practice universally recommends excluding all but management company employees from municipal waste disposal sites for reasons of health and safety. Considering human safety and health risks, the use of the *Getlini* site as a temporary remedy for social and employment problems is not appropriate. The national and municipal governments of Latvia have established a social safety net for the unemployed and destitute. A summary of the entire environmental assessment can be found in **Annex 6.2**.

2.48 Food- and wastepickers will be informed through a public information drive about the consequences of project implementation and the date from which there will be no further access to the site. A special office will be set up within RCC, where food- and waste-pickers will be provided guidance regarding existing social welfare provisions. The semiformal workers will be offered the opportunity to be employed on a contractual basis to continue to separate waste along a picking belt. The number of job opportunities for this purpose has not yet been defined, but is expected to be about 30-40.

3. PROJECT IMPLEMENTATION

A. Background

3.1 Currently, the disposal site at *Getlini*, located in the Stopinu Pagast, is operated by Geltini-2 Ltd (GLC). GLC is jointly owned by the Riga City Council (RCC) (49 percent of the shares) and the Stopinu Pagast Council (SPC) (51 percent of shares). This company started operation on July 1, 1995. In order to implement the Project, RCC and SPC decided to establish a new company, Getlini-Eco Ltd. (GLE), in which RCC would have 60 percent of the shares and SPC would have 40 percent of the shares. Until the Bank loan is repaid, however, GOL through the Ministry of Environmental Protection and Regional Development (MOEPRD) would buy 5 percent of the shares from both RCC and SPC, resulting in an initial owner structure in which RCC owns 55 percent, SPC owns 35 percent, and GOL owns 10 percent. Initially, GLC was planned to be a wholly owned subsidiary of GLE in order to continue operating the site. However, during negotiations the parties declared that instead GLC would remain as an independent company and that the operation would be tendered on an open competitive basis. *The company GLE was registered as a joint stock company on November 21, 1997.*

3.2 In accordance with the Business Development Plan for GLE, it would be developed into a leading waste management entity in Latvia, and be involved in replicating the proposed technology at other sites. Furthermore, GLE is expected to expand its involvement into other waste management related activities.

B. Implementation

3.3 RCC would have overall responsibility for project, through the already constituted Project Steering Committee (PSC). While RCC would supervise implementation, the actual realization of the investments would be delegated to the new company, GLE. The company would have a management structure that would facilitate the remediation efforts of the existing landfill and allow it to oversee the production of LFG. Proposals for management and technical assistance are contained in **Annex 7**. The actual operation of the landfill would be delegated to the external contractor through a management contract. A detailed schedule for activities up to the estimated start of the physical implementation is presented in **Annex 8.** The schedule for the physical project implementation is

presented in **Annex 4.1.** *Agreement on implementation schedules was reached during negotiations.*

3.4 To assist with procurement and disbursements, a Project Procurement Unit (PPU) will be set up as a separate unit within RCC, under a unit head who reports directly to the chairman of the PSC. Furthermore, to assist the Steering Committee to supervise project implementation during the first two years, an international and a local Project Adviser will be employed. Their role will be to make sure that all necessary documents are prepared and permits required to maintain the project's implementation schedule.

3.5 The technical assistance required for the physical project implementation has been included under project costs, and will be provided through twinning arrangements under the SIDA grant. The proposed twinning agreement would provide expertise to both GLE and the contracted company for operation of the energy cells. *The terms of reference for the twinning arrangements was discussed and agreed upon at negotiations. Several suitable counterparts have already been identified.*

C. Organization and Management

Project Steering Committee

3.6 The PSC consists of members of RCC, SPC, and the Ministries of Environmental Protection and Regional Development, Economy, and Finance, and Riga Region Environmental Board. The Managing Director of GLE is also a member of the committee. The PSC is chaired by a member of RCC, and the head of the PPU is its Secretary. *During negotiations agreement was reached concerning the composition and responsibilities of the PSC, and that the RCC budget would finance PSC activities.*

3.7 The PSC is anticipated to meet at least once a month during the first 2 years of project implementation and thereafter every third month to maintain close monitoring of the Project and to help resolve any outstanding issues. In particular, its functions would include:

- ensuring that Project implementation is on schedule;
- resolving any issues likely to delay realization of Project objectives;
- liaising between representatives of GLE, PPU, GOL, RCC and SPC;
- providing a focal point for the Bank and other donor agencies concerning the Project; and
- assisting the PPU and GLE in any day-to-day issues that may arise during implementation of the Project.

Project Procurement Unit

3.8 The PPU would be created to be in charge of all procurement and disbursement under the Project. It would be a separate unit within RCC, and its staff would be hired under normal Government salary conditions, supplemented by a premium. The head of PPU, a Latvian national, would be appointed by RCC for the duration of project implementation. *The Bank would be consulted before this appointment is made.*

3.9 The responsibilities of the PPU would include: (a) preparation of a standard set of bidding documents (both for World Bank, other donor finance and locally financed contracts); (b) submission of bidding documents together with technical specifications to the Bank for no objection; (c) publication and dispatch of invitations to tender; (d) evaluation of bids and recommendation for award; (e) all procurement and disbursement related to the Project; and (f) maintenance of the Project accounts. The preparation of technical specifications for all contracts will be the responsibility of the consulting firm chosen for the detailed design. A Letter of Invitation has been submitted to short listed consultants for detailed design and preparation of tender documents, and the award of a contract for these tasks is planned for March 1998. The PPU would also be responsible, under the PSC, for maintaining relations with the Bank and other donors regarding all procurement and disbursement matters.

3.10 In addition to the unit head, PPU would have two local professionals, a procurement specialist and an accounting/disbursement officer, as well as one driver/messenger and one bilingual secretary. An external IBRD procurement specialist would be engaged (full-time for the initial year and part-time thereafter) to assist in preparing necessary procurement documentation, as mentioned in **para 3.9** above, and to train staff in Bank procurement and disbursement procedures. The external specialist, hired under Bank Guidelines for Use of Consultant Services (1981), would also provide on-the-job training of local staff and organize, together with the Bank, a local seminar for all project staff concerned.

3.11 Up to loan effectiveness, the operational and equipment costs of the PPU would be financed from a Japanese grant from the Policy and Human Resources Development Fund(PHRD), for which the agreements have been signed. Thereafter, transportation and operating expenses would be financed by the Project. The RCC would make available suitable office space and furniture. *During negotiations all aspects (number of staff, salary levels, operating expenses, office space, etc.) relative to the PPU were agreed on.*

Getlini-Eco Ltd. (GLE)

3.12 The new company, GLE, to be established under the Project would be jointly owned by RCC, SPC, and GOL, **see para 3.2**. This company would be directly responsible for the implementation of the Project and its operation thereafter. The proposed key staffing is as follows:

- Managing Director, a Latvian national of sufficient experience and stature to guide the new company, to supervise implementation of the Project and to control the operations of the wholly owned subsidiary, GLC. *The Bank has been consulted on the appointment of the Managing Director of GLE.*

- Manager of Technical Department, a Latvian national with extensive industry experience, to oversee technical implementation and to supervise the project. All environmental matters would also be dealt with by the Technical Department. The manager would be assisted by an expatriate consultant engaged on a part-time basis. There would also be a junior engineer to assist the manager in the day-to-day tasks.

- Manager of Finance Department, a Latvian national, who would be responsible for all financial and commercial aspects of the project and the accounting and budgeting of the company. The manager would be assisted by an accountant.

3.13 In addition, there would be one bilingual secretary and a driver/messenger. The GLE would have an office in Riga. The operational costs of this office, including staff, has not been included in the Project cost because this new company is an additional structure recommended by the GOL to ensure a smooth implementation of the Project. However, it is foreseen that the additional operational cost would be financed from Government's 30 percent share of the Natural Resource Tax.[7] This would be confirmed during negotiations. After Project completion, all costs relative to the new company would be financed from its revenues. *During negotiations, MOEPRD confirmed that GOL's share of the National Resource Tax would remain at GLE to cover its administrative costs.*

3.14 The proposed twinning arrangement would be made with GLE. This would be of great assistance to the new company and instrumental in getting the project off to a timely start. This arrangement is expected to be made with a waste management company in Sweden complemented by consultants with large experience in business management and practical implementation of waste management technologies.

3.15 Company revenues would be derived from the waste disposal fee and from the sale of recovered materials and of electricity generated from LFG.

Operating Company

[7] Disposal of all waste requires the payment of a Natural Resource Tax (NRT), which will be shared by the national government (30 percent), the regional government (30 percent), and the municipality where the disposal site is located (40 percent). The NRT is anticipated to be used for environmental improvements, with specific emphasis on waste management.

3.16 Under the agreements between GOL, RCC, and SPC made on December 18, 1996 and January 7, 1997, the ownership of the existing GLC would be transferred to GLE, and GLC would become a wholly owned subsidiary of GLE. However, as previously mentioned, **para. 3.1**, this transfer will not take place, and instead the operation of the site will be contracted, and the operating company will be selected on an open competitive bidding for the operation of the new landfill (based on the energy cell concept) and gas extraction from the old landfill. As a condition for the successful realization of these tasks, the actual management would need to be strengthened. *The details of this technical assistance would need to be worked out in the context of the proposed twinning arrangement agreed upon during negotiations.*

3.17 GLE would enter into a contractual arrangement with the operating company, initially for a two-year period and to be reviewed annually thereafter. The contractor would be paid a fee for receiving and processing the waste, based on the quantity of household and industrial waste delivered to the site, estimated at a total of 250,000 tons per year.

D. Project Implementation Schedule and Supervision

3.18 Preparation for Project implementation would start immediately upon negotiations, while the physical implementation of the project would be realized over four calendar years, starting early 1999 until the end of 2002, with an additional six months for the payment of financial obligations entered into prior to project completion. The PPU and the GLE will be assisted by international consultants to support preparation of technical specifications, bidding documents, and supervision of civil works and equipment installation.

3.19 The proposed Project would be supervised by the Bank from both headquarters and the Riga Regional Mission for the Baltic Countries. Representatives of SIDA would also participate in supervision missions. A proposed supervision plan is presented in **Annex 9.1.**

3.20 Recognizing that the proposed Project would be the first Bank project in the region involving establishment of innovative, revenue-generating waste management technology, it might require significant supervision (about 20 staff weeks a year). This supervision would be particularly intensive during the first two years when considerable input would be required for engineering and procurement aspects. A mid-term review is scheduled in August 2000.

E. Reporting Requirements, Accounts and Audits

3.21 The PSC staff would have overall responsibility for monitoring project implementation. It would call on PPU and the new company GLE to complete the detailed schedules required by the Bank. *During negotiations, an understanding was*

reached on the scope of reporting financial, managerial and technical matters pertaining to GLE in general, and the Project in particular. In particular GLE is expected, with the support of the PSC, to submit to the Bank semi-annual progress reports on each Project subcomponent, estimated and revised costs, schedule, objective and activity.

3.22 To record project expenditures, separate accounts would be kept by the PPU in accordance with international accounting rules. These accounts would be audited annually by a certified accounting firm acceptable to the Bank.

3.23 In addition, modern accounting methods would be introduced for the accounts of GLE. These accounts would also be audited by certified accountants acceptable to the Bank.

3.24 *To monitor the financial performance of GLE, assurances were obtained during negotiations that: (a) it will submit on a semi-annual basis financial progress reports in which the actual results would be compared with the Budget's; and (b) it will appoint independent auditors satisfactory to the Bank to audit its accounts on an annual basis, and the audit reports will be submitted to the Bank within four months of the end of the fiscal year. GLE also agreed during negotiations to submit Progress Reports and Completion Report in accordance with Bank Guidelines.*

F. Monitoring and Evaluation

3.25 In order to enable monitoring of key development indicators throughout the project cycle some essential commercial, operational, financial, and environmental indicators have been developed. These are further explained in **Annex 9.2.** *Agreement on these monitoring indicators was reached during negotiations.*

4. FINANCIAL ASPECTS

A. Background

4.1 RCC will be the subborrower of the Bank loan, through GOL, with proceeds to be onlent to GLE. In addition, RCC will make US $6 million available for the Project, part as equity and part as an interest-free loan. To ascertain whether RCC will be able to assume these financial charges, an analysis has been made of its present and future financial position. Details are in **Annex 10**. The analysis shows that RCC would be able to provide the US $6 million contribution from its own funds, spaced over five years, as well as to repay the Bank loan in the (unlikely) event that GLE would not be able to service that debt.

4.2 The final beneficiary of the project, as well as its primary implementing agent, will be the new enterprise, GLE, to be founded in 1997, when it will formally start its operations. To prepare the company for the project implementation, technical assistance is required. This assistance would be largely defined in the context of the Business Development Plan (BDP), to be formulated by Bank consultants by early 1997. It will most likely take the form of:

- a twinning arrangement with an experienced foreign company; and
- the constitution of a technical department with specialized staff (some short-term foreign staff).

4.3 The final BDP was presented in March 1997. It includes the Articles of Association, the Shareholder's Agreement, the slate of the Board of Directors, job descriptions, company strategic plans, as well as a draft Power Purchase Agreement (PPA) between GLE and Latvenergo. *The BDP and modifications of proposed major documents included in the BDP were discussed during negotiations. Submission of a signed Power Purchase Agreement is a condition of loan effectiveness.*

B. Tariff Levels and Affordability

4.4 Charges for household waste collection are fixed by the RCC. The annual charge for each inhabitant is at present, Ls 2.35 per m^3 (with the average waste per year calculated at 1.30 m^3 per person for an annual charge of Ls 3.05). The charge is based on: (a) a disposal fee payable to GLE of Ls. 0.40/m^3; (b) collection and transportation fees of Ls 1.30/m^3; (c) replacement of containers Ls 0.40/m^3; and (d) a Natural Resource Tax of

Ls 0.25/m^3. The latter is distributed to GOL (30 percent), the Riga District (30 percent), and SPC (40 percent). Charges for industrial waste vary by type of waste, between Ls 0.85 and Ls 1.06 per m^3.

4.5 It is difficult to assess the affordability of the waste disposal fee because it is levied on the inhabitants as part of an overall charge that includes rent and utilities, i.e., water, heat and electricity. For the newly urban poor, elderly and unemployed persons, these charges are too high and arrears are substantial. However, for those with a steady income, the fee structure is quite affordable. Moreover, the financial analysis shows that the Project can be financed and implemented without an increase in disposal fees.

C. Organization of and Financial Projections for Getlini-Eco

4.6 GLE would be incorporated in late 1997 as a limited liability company with three shareholders: RCC (55 percent), Stopinu Pagast (35 percent) and GOL (10 percent). GLE would be responsible for project implementation. Details are presented in **Annex 7.**

4.7 GLE would have a relatively small staff (its organization is discussed in para. 3.12), but its quality needs to be high in order to coordinate and supervise project implementation. For this reason, the managing director must be selected carefully and foreign expertise made available. The proposed twinning arrangement would be crucial in this regard. GLE would be responsible for continued operation of the project and expansion of the company's activities as proposed in the BDP.

4.8 Prospects of the new company are good; the cash flow projections are favorable and with the acquisition of modern waste management technology, GLE is set to become the country's leader in this field (where much remains to be done). Future cooperation with other Baltic or other former Soviet Union states could also be developed.

4.9 The main revenues for the company are the disposal fee for the received amount of waste and the sale of electricity to Latvenergo. In addition, further improvements in waste separation would lead to additional revenues from the sale of compost and a fuel fraction based on the nondegraded organic waste material. The Project also guarantees a substantial amount of energy, heat not recovered during the generation of electricity, which can be sold to either a district heating company or to industries. A separate study will be carried out under the Project to identify possible arrangements for using this resource. However, these arrangements will not be included in the Project. The sale of electricity to Latvenergo would be crucial to maintain a financially viable enterprise. The sale will be regulated through a PPA between GLE and Latvenergo, as mentioned in **para. 4.3.** *A draft Power Purchase Agreement has been submitted and presents a purchase price acceptable to safeguard the financial sustainablity of GLE.*

4.10 A detailed profit and loss statement and cash flow projections have been made for the company, both in constant terms and adjusted for inflation are presented in **Appendix**

4.10 A detailed profit and loss statement and cash flow projections have been made for the company, both in constant terms and adjusted for inflation are presented in **Appendix 3** to **Annex 7**. The assumptions are listed in **Annex 7**. The projection with "constant 1996 prices" indicates that cash flow during the years of project implementation is adequate to cover recurring costs as well as interest during construction (which in fact is earmarked for Bank financing). The cash flow, in the first year after project completion, rises from 28 percent of revenues to 50 percent toward the end of the loan repayment period. Cash flow is in fact more than adequate to cover loan repayments; the ratio of loan repayment over the cash flow (debt-service ratio). The debt service ratio is about 30 percent for the first 6 years, and then rises to 59 percent in the last repayment year, due to falling electricity production. Finally, the cumulative cash flow after loan repayment rises from US $5.4 million in the first year after project completion, to US $18.6 million in the year 2019.

4.11 The results for the "inflation adjusted" projection are more favorable--for example, the debt-service ratio is 27 percent in the first year of repayment (2004) and rises to 29 percent in the last year. The cumulative cash flow after loan repayment goes from US $6.7 million in 2003 to US $38.4 million in the last year of the projection. Furthermore, the debt-service ratio (cash flow after tax over interest and principal from the year the loan will start to be repaid, 2004) is above two.

D. Past Financial Performance of Getlini-2 Ltd

4.12 GLC started operations in July 1996 and has therefore only a brief financial history, with audited accounts for 1995 and nine-month figures for 1996. These figures (presented in **Appendix 4** of **Annex 7**) show that the company is profitable, indicating that the disposal tariff now in force (see **para. 4.3**), and set by Riga City, is adequate to cover the company's current expenditures and to provide a reasonable return on invested capital. The retained net profit during 1995 is 15.9 percent and from January to September 1996, 9.9 percent. The main sources of revenue are the disposal fee and income from the sale of recyclable materials. For details, see **Annex 7.**

4.13 The company's accounting system should be modernized by adopting internationally accepted accounting standards

E. Future Financial Performance

4.14 Cash flow projections for GLE (**Appendix 3** of **Annex 7**) indicate that the company would be able to cover loan repayments, while continuing to generate surpluses for future investment. The inflation-adjusted figures are even more favorable. For details, see **Annex 7.**

4.15 For GLC, as an example of an operating company, cash flow projections have been presented in **Appendix 6 of Annex 7**, while the text of **Annex 7** contains detailed comments.

4.16 The projections, based on nine-month figures for 1996, show that the company will be able to generate a solid cash flow (above 16 percent as a percent of net turnover and calculated on constant streams), part of which will be transferred to GLE. These calculations have been made using the present disposal tariffs; therefore, the implementation of the overall investment program does not require any tariff increases.

F. Organizational Issues

4.17 There are three components to be considered: (a) organization and management of the new company GLE; (b) creation and staffing of the PPU within RCC; and (c) technical assistance to *Getlini*-2. The BDP Consultancy would propose detailed recommendations for points (a) and (c), respectively. These recommendations, once approved by RCC and SPC, would be incorporated into the onlending agreement between RCC and GLE, and implemented at an early. PPU staffing is discussed in **paras. 3.8 - 3.11**, with details in **Annex 8**.

G. Financial Standing of Riga City

4.18 Riga is Latvia's largest city with an estimated 826,000 inhabitants, as well as the country's capital, its major port and the principal commercial and cultural center. Since the decentralization introduced in 1991, local municipal government has become increasingly independent from central government, with the right to manage its affairs autonomously through local democratic representation. As a result, the municipal authorities have a responsibility, often shared with the central government, for providing inter alia territorial infrastructure, environmental protection and municipal services (water, heat, sewerage, waste collection and disposal). Municipal authorities are also responsible for the educational, cultural, health and social welfare needs of the inhabitants. This Project therefore falls under the responsibility of Riga City.

4.19 Local government finance is based on the concept of autonomy linked to accountability. To reinforce this link, collection of tax revenue from personal income -- but not the setting of rates -- has been delegated to the municipal level. For Riga City, these taxes represented almost 80 percent of total revenues budgeted for 1996. Land and property taxes are set and collected by the state and then redistributed to the municipalities and the districts. Their share of revenues was about 18 percent in 1996. Government also contributes directly to the city's revenues, but with decentralization, these subsidies have become insignificant.

4.20 Among the principal 1996 expenditure items for the Riga City are health care (about 30 percent); education (26 percent); housing and sanitation (13 percent); and welfare (9 percent). Capital expenditures, estimated at less that 5 percent of the 1996 budget, are included with recurrent expenditures.

4.21 The city's budget is prepared by its finance department, in close cooperation with the Ministry of Finance. Municipalities report monthly to the Ministry of Finance on the execution of their budgets, followed by a detailed annual report. These and other reporting requirements of the municipalities are regulated by laws on local government budgets and on budget and financial management.

4.22 The normal budget for 1996 shows net revenues of Ls 68.5 million; expenditures are budgeted at Ls 59.0 million, plus debt service of Ls 9.5 million. This leaves the budget balanced, which is a legal requirement. Any borrowing, local or foreign, has to be approved by Government.

4.23 The 1997 budget had not yet been prepared. To assess the ability of the city to contribute to the Municipal Solid Waste Management Project, as currently foreseen, a budget projection for the period 1997-2005 has been prepared. In fact, RCC is scheduled to fund US $6.0 million or almost 24 percent of investments, in addition to its other engagements under the Water Supply and Municipal Services projects.[8] Furthermore, the city would be the borrower of IBRD's proposed US $7.95 million loan to the Municipal Solid Waste Management Project. These funds would be onlent, and hence repaid, by the final beneficiary, GLE, but Riga would be the guarantor for repayment in the event the company would not be able to do so.

4.24 The projections are presented in detail in **Annex 10**. They are based on assumptions made by the RCC forecast regarding revenue increases of 11 percent in 1997 and by 10 percent in 1998, with the increase tapering of to 5 percent by 2003 (basically in line with the inflation forecast) and expenditures (constant annual growth of 3.5 percent in real terms). The forecasts indicate that the city generate surpluses going from Ls 8.1 million (US $15.0 million) in 1997 to Ls 18.6m (US $34.4 million) in 2000, then decreasing thereafter to LS 9.5 million (US $17.6 million) by 2005. After taking account of Riga's aforementioned commitments (water supply and municipal services projects), the forecast confirms its ability (a) to make available US $6 million over the period 1998-2001, as well as (b) to assume repayment of the Bank loan, for which it is the guarantor, in the event of default of the final beneficiary, GLE.

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8 It has been assumed that the EIB and IBRD loans taken on by Riga city for respectively the Water Supply and Municipal Services projects will be onlent, and hence repaid, to the respective enterprises. Riga City would therefore only be the guarantor of these loans and for this reason their repayment has been excluded from the projections.

H. Financial Standing of Stopinu Pagast

4.25 The *Getlini* site is located within the boundaries of Stopinu Pagast, a village at about 10 kilometers from the Riga City center. The municipality adjoins Riga City to the south; is lightly populated, with some 7,170 inhabitants by end-1996; and is largely forested and agricultural with little industry.

4.26 Budget information (see **Annex 11**) provided for 1995 (actuals) and 1996 confirm the small size of the municipality compared to Riga City. While SPC's 1995 revenues and expenditures amounted to Ls 630,000, those of Riga City were about Ls 60 million. The municipality has no loans outstanding. As for Riga, the main revenue categories are Income Tax (directly received by the municipality), Property and Land Taxes, and its share of the Natural Resource Tax. Expenditures consist primarily of Housing and Utilities; Social, Educational and Cultural Activities, and Public Administration.

4.27 From the above, it is clear that Stopinu Pagast lacks the monitary resources to contribute to the financing of the Project or to put up its share of the proposed US $1.0 million share capital of the new company GLE. For this reason, it has been decided to estimate the value of the land, occupied by the Getlini site to US $400,000 to equalize the part of Stopinu Pagast's contribution of GLE equity.

5. PROJECT JUSTIFICATION - BENEFITS AND RISKS

5.1 The Riga Solid Waste Management Project is aimed at establishing an environmentally safe and cost-effective system of waste disposal for Riga City, representing 45 percent of the waste volume generated in Latvia. The Project would: (a) remediate the existing waste disposal site at *Getlini* and arrest the ongoing contamination of groundwater and discharge of untreated wastewater, including leachate, to the river Daugava; (b) improve the technical and operational situation on the existing site also leading to an increased separation of recyclable materials; (c) use the LFG for energy generation purposes, thereby creating substantial financial revenues as well as environmental benefits by reducing the emission of methane, a potent greenhouse gas; and (d) assist in the structural and managerial development of the existing company in charge of the site to a profit-oriented enterprise.

5.2 The Project would result in the first sanitary landfill in Latvia and the entire Baltic region to reach international standards. The revenues generated by the use of the LFG would strengthen the financial replicability of the proposed Project and make investments in environmentally sound waste management more attractive and feasible. The Project would also demonstrate a cost-effective and affordable solution for meeting sanitary landfill standards, which are expected to be a mandatory requirement in the near future as a result of the National Waste Management Strategy, currently under preparation.

A. The Without Project Case

5.3 Not taking any action in the current situation would lead to leachate contamination of the two aquifers (Plavinas and Amata) underneath the most shallow groundwater layer of quaternary sand. According to hydrogeological projections by Geo Konsultants Ltd., the involved consulting company, the upper part (Plavinas) and lower part (Amata) of the Dolomite aquifer would be affected by leachate from the landfill starting in 2002 (Plavinas) and 2020 (Amata), respectively. Because the contaminant plume would move to the river Daugava, the surface water quality of this river. Since rehabilitation of contaminated groundwater layers is usually connected with prohibitive costs, even if technically feasible, the contamination would have to be interpreted as irreversible. The GOL is currently investing in improving the water quality of the Daugava River, and under HELCOM, the quality of the Baltic Sea. Therefore, any additional sources of pollution would counteract the effects of the current efforts.

5.4 Without the project, the remaining lifetime of the landfill would be about ten to fifteen years, depending upon the amounts of waste disposed of and the height of the waste pile. Another solution for Riga's solid waste would have to be found well ahead of the end of the lifetime of the landfill. This would make necessary the identification of a suitable site, with its inherent additional costs for investment, and in finding a publicly accepted solution. At the same time, the landfill would go on being a source of ground- and surface water contamination, which most likely would force the site to be cleared even earlier. No solution to the need for a regular landfill could also lead to illegal dumping of waste in potentially sensitive areas with the associated environmental costs.

5.5 Based on the groundwater problem mentioned in **para. 5.3**, the Project was originally designed to: (a) remediate and close the existing Getlini site, (b) identify and establish a new site in the Riga area, and (c) strengthen bridges and up-grade access roads to the new site. The investment cost for that project was estimated at US $30-35 million, and would have resulted in an increase of the disposal fee with about US $21 per ton, and an increase in the hauling cost with about 400 percent. The preparation of the Project shows that the operation at *Getlini* can continue, and that a much more cost-effective solution can be implemented.

B. Project Benefits

5.6 For assessing the project's economic viability, four options will be compared. All of them are based on the continued use of the existing waste disposal site. Option 1 would include environmental remediation only, without technical and operational improvements. Option 2 consists of environmental remediation, technical and operational improvements, leading to a sanitary landfill in compliance with international standards. Options 3 and 4 comprise of environmental remediation, technical and operational improvements as well as LFG collection, but differ in the use of the gas (district heating for Option 3, and electricity generation for Option 4). In both of the last two options, managerial assistance would be provided to the company running the landfill (**Table 5.1**).

Table 5.1: Options for Project Economic Viability

Option 1 **Environmental Remediation**	**Option 2** **Sanitary Landfill**	**Option 3** **Gas for Heating**	**Option 4** **Gas for Electricity**
Continued Disposal Leachate Control/ Treatment/ Remediation	Continued Disposal Leachate Control/ Treatment/ Remediation Technical/ Operational Improvements	Continued Disposal Leachate Control/ Treatment/ Remediation Technical/ Operational Improvements Gas Collection (conventional and energy cells) Managerial Assistance	Continued Disposal Leachate Control/ Treatment/ Remediation Technical/ Operational Improvements Gas Collection (conventional and Energy Cells) Managerial Assistance

5.7 Only parts of the project benefits can be readily quantified. These are revenues from gas collection, incremental revenues from improved waste sorting, and recycling and global environmental benefits from reduced emissions of methane. Gas collection revenues are calculated by using international prices for electricity (US $0.034 per kWh) and natural gas (US $107.41 per 1000 m^3). The projected gas amounts are the sum of the methane production of the existing waste plus the projected gas generation from an annual waste disposal of a conservatively estimated 200,000 tons. The waste amount is assumed to be constant over the project period of 25 years, a declining population of Riga is expected to compensate for increasing per capita amounts of waste in the course of economic development. For the calculation of the produced electricity, an efficiency factor of 35 percent is used for the gas engines transforming gas into electricity. The incremental revenues from sorting and recycling are estimates by the director of GLC. Values for the global environmental benefits are derived by using internationally accepted monetary values for carbon dioxide emissions and converted into methane equivalents by using a factor that reflects the respective impacts of the two as greenhouse gases.

5.8 Apart from the tangible benefits, substantial unquantified benefits are associated with all project options in terms of ground- and surface water protection, through occupational safety and health improvements for existing company staff as well as positive aesthetic and odor impacts through covering of the site for the residents living close to the landfill (**Table 5.2**).

Table 5.2: Calculation of Project Benefits

Economic Benefits	Option 1 **Remediation**	Option 2 **Sanitary Landfill**	Option 3 **Gas for Heating**	Option 4 **Gas for Electricity**
Electricity				Product of: Gas/ Conversion Factor Electricity/ Efficiency Factor/International Price
Heating			Product of: Gas (amount), int. Price, seasonal adjustment	
Recycling		Incremental revenues	Incremental revenues	Incremental revenues
Environmental Benefits (Global)			Product of: Gas (amount), Monetary value for methane emissions	Product of: Gas (amount), Monetary value for methane emissions

C. Project Economic Costs

5.9 All investments as well as operating and maintenance costs were provided in a feasibility study by technical consultants (SWECO, Sweden) and processed under domestic costing. Adjustments were made for VAT (imported goods will be VAT exempt) and a social welfare tax for the salaries (**Table 5.3**).

Table 5.3: Economic Cost for Project Options (in Thousands of US Dollars)

	Option 1 **Remediation**	Option 2 **Sanitary Landfill**	Option 3 **Gas for Heating**	Option 4 **Gas for Electricity**
Investment Cost	2,588	9,402	12,916	15,773
Recurrent Cost	619	1,978	3,435	3,854
Total	3,207	11,380	16,351	19,627

5.10 Total investment (in economic terms) for the four project option varies between US $3.2 million for Option 1 (Remediation only), US $11.4 million for Option 2 (Sanitary Landfill), US $16.4 million for Option 3 (gas for district heating) and US $19.6 million for Option 4 (gas for electricity generation).

- Investment costs include physical contingencies and technical assistance (for Options 3 and 4). For a cost summary of the project components for the four options, see **Annex 14.**
- Recurrent Costs include operation and maintenance as well as incremental salaries.

D. Economic Rate of Return

5.11 **Table 5.4** compares the base case economic rates of return as well as net present values (NPV). These are based on the costs and benefits indicated in the previous tables. **Annex 13 provides more detailed information.**

Table 5.4: Economic Rates of Return for Project Options (NPV_{10} in Thousands of US Dollars)

	Option 1 **Remediation**	Option 2 **Sanitary Landfill**	Option 3 **Gas for Heating**	Option 4 **Gas for Electricity**
NPV w/ global benefits	NA	NA	4,082	4,719
NPV w/o global benefits	-3,627	-10,697	-5,820	-5,200
EIRR w/ global benefits	NA	NA	15	15
EIRR w/o global benefits	NA	NA	1	4

Note: NPV_{10} Assumes a 10 percent discount rate.

5.12 Option 4 (use of collected LFG for electricity) shows slightly better rates than Option 3 (gas for heating), and Option 4 is the best of all four alternatives. As mutually exclusive options, the higher NPV is the crucial performance indicator. For both options, global environmental benefits have a strong impact on internal rates of return and NPV. As will be seen in the sensitivity analysis, the decisive factor for the electricity and the heating option are the prices for natural gas and electricity. For the gas, the European price for natural gas has been used plus 10 percent for transport and losses.[9] The electricity price for the economic analysis was derived from the boarder price for electricity imports from Lithuania.

5.13 The remediation-only scenario produces only negative net benefits; therefore, no internal rate of return can be calculated. This option would have to be justified by the unquantified environmental benefits for ground- and surface water, odor aesthetics, and occupational safety and health improvements. The annual benefits after project implementation for these unquantified benefits would have to be in the range of US $495,000 to produce a zero NPV. The same is true for Option 2 (the sanitary landfill) with even higher required unquantified benefits of US $1.45 million annually for a zero NPV.

E. Project Risks and Sensitivity Analysis

5.14 The technology introduced by the project is considered to be manageable without requiring specialized expertise. Owing to its comparatively recent development, practical applications are still limited, mostly to Western Europe and North America. The investment would also change the character of the existing operation in terms of commercial management. Managerial capacity therefore has to be considered a project risk. Other risks relate to the actual amount of waste, its composition and the resulting gas generation. Projections for natural gas predict stable prices, but rates for imported electricity are expected to increase. It is assumed that Riga's decline in population will be offset by increasing amounts of waste per capita with a constant fraction of decomposable waste. The groundwater flows have been examined extensively.

5.15 A comparatively small risk remains that the project will not succeed in stopping the contamination of further aquifers underneath the landfill. Because the project will change the character of the existing landfill operation, currently informally employed food and waste pickers on the site would only partly be able to stay working on the landfill under the changed operational conditions that would result from the project.

[9] World Bank Quarterly, Commodity Markets and the Developing Countries, Nov. 1996

Table 5.5: Sensitivity Analysis: Net Present Values for Different Scenarios With and Without Global Environmental Benefits (in Thousands of US Dollars)

	Option 1 Remediation		Option 2 Sanitary Landfill		Option 3 Gas for Heating		Option 4 Gas for Electricity	
	NPV w/o GEB	NPV w/ GEB	NPV w/o GEB	NPV w/ GEB	NPV w/o GEB	NPV w/ GEB	NPV w/o GEB	NPV w/ GEB
Basic Model		NA		NA	-5,820	4,082	-5,200	4,719
Price: Gas/ Electricity-10%		NA		NA	-6,944	2,959	-6,724	3,195
Price: Gas/ Electricity +10%		NA		NA	-4697	5,206	-3,677	6,210
Gas Amount -5%		NA		NA	-6,382	3,521	-5,863	3,621
Gas Amount -10%		NA		NA	-6,944	2,959	-6,525	2,540
Investment Cost +10 %		NA		NA	-7,078	2,816	-6,641	3,261
Investment Cost +20 %		NA		NA	-8,353	1,549	-8,082	1,821
Gas Revenue:		NA		NA				
Delayed by 1 year		NA		NA	-6,568	2,676	-6,214	3,030
Delayed by 2 years		NA		NA	-7,508	908	-7,488	927

Note: Assumes a discount rate of 10 percent.

Table 5.6: Sensitivity Analysis: Rates of Return for Different Scenarios With and Without Global Environmental Benefits (in Thousands of US Dollars)

	Option 1 Remediation		Option 2 Sanitary Landfill		Option 3 Gas for Heating		Option 3 Gas for Electricity	
	IRR w/o GEB	IRR w/ GEB	IRR w/o GEB	IRR w/ GEB	IRR w/o GEB	IRR w/ GEB	IRR w/o GEB	IRR w/ GEB
Basic Model		NA		NA	1	15	4	15
Price: Gas/ Electricity -10%		NA		NA	-1	14	1	13
Gas/ Electricity +10%		NA		NA	3	16	6	16
Gas Amount: -5%		NA		NA	0	14	3	14
Gas Amount: -10%		NA		NA	-1	14	2	13
Investment Cost +10 %		NA		NA	0	13	2	13
Investment Cost +20 %		NA		NA	-1	12	1	12
Gas Revenue:								
Delayed by 1 year		NA		NA	1	13	3	13
Delayed by 2 years		NA		NA	0	11	2	11

Note: Assumes a discount rate of 10%.

5.16 Scenarios for the sensitivity analysis have been derived from discussions with experts from the Riga City Council, SWECO (the consulting company responsible for the feasibility study), the local authorities and the current management of the landfill, to be as close to reality as possible. As in the base case, Options 1 and 2 (only remediating and modernizing the landfill) do not produce positive benefit streams in any project year without taking into account the unquantified environmental benefits. Because methane emissions are assumed to be only reduced by negligible amounts, no global environmental benefits would occur.

5.17 Option 3 produces positive NPVs under all scenarios with global environmental benefits included. Without the global environmental benefits, the gas use for heating is consistently producing negative NPVs and rates of return of 1 percent for the base case going down to -1 percent for gas use reduced by 10 percent or Investment Costs up by 20 percent. Option 4 results in positive NPVs for all sensitivity scenarios including the global environmental benefits. Rates of return are ranging from 15 percent in the base scenario down to 11 percent in case of a delay in gas use by two years for electricity with global environmental benefits. For the base case, Option 4 produces a better NPV than Option 3 but is more sensitive to cost increases and revenue decreases. Without the global environmental benefits from the methane not emitted, the benefits resulting from the groundwater protection efforts of the project have to be taken into account to justify it from a national perspective (like all other project options). Under both Options 3 and 4, the Project is clearly sensitive to cost increases and delays in creating revenues. These are Project risks that have to be taken into account during implementation.

F. Financial Returns for the Project

5.18 From a sustainable perspective, Option 4 (generation of electricity) has been regarded as the most attractive. The reason is that there would not be any disruption in the energy generated to the grid. In the case of delivery of gas for heat generation, the project would be dependent on the operating capability of the receiving boiler house, which has to be closed down for maintenance and repair several months a year. Furthermore, it was clearly expressed by the receiving company, Latvenergo, that electricity was the preferred option. Finally, according to current legislation, small electricity producers (below 12 MW_E) are currently given an attractive tariff for the sale of electricity.

5.19 Based on the investment costs calculated by the Sweco consultants adjusted for physical contingencies, and recurrent costs during project implementation, costs for the Project Procurement Unit, Technical Assistance provided under Twinning Arrangements, and projected revenues from the sale of electricity and recyclable materials, the Project receives an FIRR of almost 10 percent, which should be regarded as very satisfactory for

an environmental protection project without including any increase of the disposal fee or the waste management tariff.

5.20 A sensitivity analyses shows that in the worst case scenario, a reduction in electricity sales by 15 percent and a delay of revenues for one-year yields an FIRR of 5.34 percent, which still should be regarded as acceptable for a municipal services project. However, in such a case, an increase of the disposal fee would be considered to protect the company's cash flow. A more detailed description of the financial return calculations and the sensitivity analyses is provided in **Annex 14**.

6. AGREEMENTS REACHED AND RECOMMENDATION

A. Agreements Reached During Negotiations

6.1 The following agreements were reached during negotiations:

(a) All procurement funded by the Bank and GEF would be carried out in accordance with the Bank Guidelines for Procurement under IBRD loans and IDA Credits (January 1995, revised January and August 1996), and Guidelines for Use of Consultants by World Bank Borrowers and by the World Bank as Executing Agency (January 1981), (para. 2.25);

(b) The disbursement schedule for RCC finance and details on opening of bank account(s), (para. 2.39);

(c) The terms and conditions of the establishment of and operation of a special account, (para. 2.43);

(d) Agreement on implementation schedules, (para. 3.3);

(e) The terms of reference for the twinning arrangements, (para. 3.5);

(f) Composition and responsibilities of the Project Steering Committee, (para. 3.6);

(g) Financing of PSC activities from the RCC budget, (para. 3.6);

(h) All aspects relative to the PPU (number of staff, salary levels, operating expenses, office space, etc.), (para. 3.11);

(i) GOL's share of the National Resource Tax would remain at GLE to cover its administrative costs, (para. 3.13;.

(j) Details of technical assistance in the context of the proposed GLE twinning arrangement, (para. 3.16);

(k) The scope of reporting financial, managerial, and technical matters pertaining to GLE in general, and the Project in particular, (para. 3.21);

(l) Monitoring of the financial performance of GLE will be provided through: (i) submittance on semi-annual financial progress reports in which the actual results would be compared with the budgets; and (ii) audit of GLE's accounts on an annual basis by independent auditors satisfactory to the Bank, and submittance of the audit reports to the Bank within six months of the end of the fiscal year. GLE will also submit progress reports and a Completion Report in accordance with Bank Guidelines, (para. 3.24); and

(m) Key monitoring indicators, (para. 3.25).

B. Condition of Effectiveness

6.2 Conditions of Loan Effectiveness would include:

(a) Execution of a subsidiary loan agreement between GOL and RCC and GLE, (para. 2.24).

(b) Execution of a separate financing agreement between RCC and GLE (para. 2.39).

(c) Submission of Power Purchase Agreement signed by GLE and Latvenergo (para. 4.3).

C. Recommendation

6.21 With the above agreements and conditions, the proposed Project would be suitable for a Bank loan of US $7.95 million equivalent to the standard variable interest rate with a maturity of 17 years, including 5 years grace period. The Borrower would be the Republic of Latvia.

LATVIA
MUNICIPAL SOLID WASTE MANAGEMENT PROJECT

ANNEXES

February 2, 1998

LATVIA

MUNICIPAL SOLID WASTE MANAGEMENT PROJECT

ANNEX 1

PROPOSED TECHNOLOGY AND DESCRIPTION OF THE PHYSICAL PROJECT IMPLEMENTATION

ANNEX 1

PROPOSED TECHNOLOGY AND DESCRIPTION OF THE PHYSICAL PROJECT IMPLEMENTATION

Different technologies for landfill gas extraction

The basic technique used for gas extraction is to cover the waste body area with a number of gas wells. The wells are equipped with pumping devices, which create a sub-pressure in the waste body, andenable collection of the generated landfill gas.

There are different conditions and techniques of implementation of gas generation and extraction systems. The general techniques presentedbelow are gas extraction system from existing landfills and/or from new constructed landfills, and gas extraction from new constructed landfills with energy cells (enhanced anaerobic digestion).

Landfill gas extraction systems in existing landfills and new constructed landfills

In existing landfills, gas wells are drilled vertically into the landfill body. The well is constructed with perforated pipes with a total length which is almost the same as the depth of the waste pile. If the landfill is under construction, the gas wells or horizontal gas drains can also be constructed during disposal of waste.

Each gas well is connected to a gas regulation station where the gas from each well can be regulated and condensate removed. The regulation station is connected to a central pumping station by main pipes which provides a sub-pressure in the landfill body and recover the generated landfill gas.

Landfill Gas Extraction System Using Energy Cells

General

The degradation process which is presented in the previous section can, by implementation of appropriate technology equipment, be enhanced. Instead of traditional disposal in a huge landfill body, the waste is disposed in separate cells, called energy cells.

In the energy cell, the decomposition is performed under enhanced anaerobic conditions. In order to accelerate the anaerobic decomposition process suitable conditions for bacteria growth are created. By control of, among other things, waste particle size, humidity, acidity, temperature and possible relation between coal/nitrogen the forming of methane gas and the decomposition of refuse is accelerated. The aim is to reduce the decomposition period from normally 20-25 years to about 5 years in an energy cell.

The process which we include in the expression energy cell can shortly be described as follows:

- the refuse is shredded and placed in a closed space, the energy cell - where free supply of oxygen is prevented

- the generated gas, is extracted continuously

- the leachate collected is reinjected into the cells in order to stabilise the humidity of the waste at a high level, about 70%, enhancing the degradation process

- the energy cell is supplied with heat via a leachate water system to receive an optimum temperature in the refuse, about 37°. The energy for this is acquired by eg heat exchanging from the gas pumping station and/or an internal gas engine using extracted gas for electricity generation

- the cell is excavated after completed decomposition and the residues are sieved in two or three fractions. At this stage the residues can be divided into the following rest products:

* extracted gas	20% of weight
* soil	30-35% of weight
* combustible materials	30-35% of weight
* inert material	10-20% of weight

Technique

An energy cell can be laid on natural ground or filled up ground, in the same way as ordinary refuse deposits. The bottom is levelled, slightly sloping towards a low point and sealed with a layer of fine earth compacted with a roller or a sleigh. In the low point, a plastic drainage pipe is laid in a shallow, open trench.

The heating system is a closed circuit and designed for supplying enough energy to keep the inner part of the cell at a temperature of about 37°C.

The refuse must be fragmented, particularly the domestic refuse, before being disposed at the finished bottom layer. This is best achieved by a shredder. The shredded refuse is carefully spread in layers on the finished bottom surface. Further compaction besides that of moving vehicles is not needed.

The cell should be covered by a impermeable layer. This layer will be established during construction of the cell. An example of layer design is a loose layer of second-rate peat about 0,3

m with an additional top layer of about 0,3 m with rather impermeable earth (such as fine till). The peat layer will, apart from reducing the infiltration together with the top layer, have an important function of insulation of the cell. The surface is slightly compacted.

Pipes (perforated steel pipes) for gas extraction and leachate water injection are installed in the cell from its surface and each type of pipe is connected with flexible plastic tubes and a connection pipe to the gas pumping station and the leachate collection pond respectively. From the gas pumping station the gas is sucked from the cell with a slight sub-pressure.

In order to reach a maximum rate of decomposition in an energy cell during anaerobic conditions it is necessary that

- the refuse is shredded
- the relation between available carbon and nitrogen is about 60/1 or less
- the refuse moisture is high
- the pH value is about 7
- heat is added for control of the cell temperature, normally 37°C.

Summary of conditions at Getlini

Gas pumping tests

Gas pumping tests carried out during September and October in 1996, shows that the gas generation follows the extraction estimated from theoretical calculations.

Waste amounts and composition

Each year, approximately 205 000 tonnes of *municipal waste* is received at Getlini. In addition, about 45 000 tonnes of industrial waste is also delivered at the site.

The dry substance content in *municipal waste* is estimated to be 62%. The corresponding organic content is estimated to 39% of the total waste (or 63% of dry substance). Of the organic content, 62% is considered to be biodegradable (or 24% of total weight).

The potential landfill gas production from *industrial waste* is basically related to the content of paper. The paper is estimated to have a dry substance content of 95% and a corresponding organic content of 90% of total amount (ie 95% of dry substance content). Biodegradable part is estimated to be 72% of total amount (ie 80% of organic content).

Lifetime of the site

An important information for the decision of the waste management method to use is the lifetime of the site, and to what extent different systems affect the total duration of the operation at the specific location.

The lifetime of a site depends of various factors as operation methods, local regulations, etc. Below, the lifetime of the site for some different alternatives has been simulated. The motives for these figures are not to show an exact figure for the lifetime of the Getlini site but do illustrate how significant the choice of operation method is for the lifetime of the site.

Regulatory factors

Today there are no local regulations that limit the height of a landfill. The current highest point of the landfill is about +38 metres above sea level. Thus, it has been assumed that future alternatives for the maximum height is +45, 50 or +55 metres above sea level. The physical maximum height equals +62 m above sea level.

The available volumes that can be disposed at the landfill in accordance with the regulation factors presented above, have been calculated for different landfill altitudes are presented below:

Maximum height (above sea level)	Available volumes for disposal (in million m^3)
+45 m	8.5
+50 m	9.6
+55 m	10.4
+62 m	11.3

The precondition used for the estimate of available volumes is that the landfill slope is 1:3.

Simulated alternatives

Two main alternatives has been investigated:

- Alternative A, where the current operation continues without any changes in general disposal technique

- Alternative B, where the general disposal technique is changed to energy cell technique

Overall conditions, such as incoming amounts of waste etc. is assumed to in accordance with results presented in section 3.

For alternative A, 10 % of incoming waste is assumed to be sorted out as recovered material before disposed in the landfill.

For alternative B, the full operation of new disposal technique is assumed to be implemented after 2 years. Until then the conditions are the same as for alternative A. After full implementation 20 % of incoming waste is assumed to be sorted out. During the decomposition 20% of the material is converted into landfill gas which is extracted.

After 5 years, the energy cells is considered to be excavated. The fraction of the remaining cell residue that will be disposed in the landfill can vary from 20% (best case) - 80% (worst case) depending of the recovery possibilities.

Results

Below, the comparable results from the simulations are presented in a matrix form. The alternatives +40 metres and +62 metres above sea level has not been further simulated.

Regulated maximum height (m above sea level)	Lifetime alternative A (no change of current conditions)	Lifetime alternative B - worst case (energy cell + 80% disposed at landfill)	Lifetime alternative B - best case (energy cell + 20% disposed at landfill)
+45	22 years	50 years	180 years
+50	24 years	56 years	206 years

The results give the following conclusions:

- current operation practise results in a shorter lifetime of the landfill

- the energy cell technique makes it possible to extend the life time of the site for at least another 50 years

It should again be emphasised that these figures just show an example in order to indicate the difference in life time using different techniques.

Implementation of the recommended system at Getlini

Existing landfill

The proposed concept assumes that the existing landfill pile will be penetrated by gas extraction wells. Thus, the proposed landfill gas extraction system may comprise up to 200 gas extraction wells. However, areas where the waste pile is less than 5 m deep and in areas which today are paved and used for other operation activities will not be included in the extraction system. The landfill gas system will be constructed integrated with the covering activities.

The wells are drilled vertically into the landfill. Each well has an estimated circular reception area of about 1250 m^2, which equals a radial distance of about 20 m from the gas well. The gas extraction well is constructed of perforated steel pipes with a total length of the waste pile's thickness.

The gas well is connected to a gas lateral-pipe which conveys the gas to a control station, where the gas flow from each well can be controlled and condensate removed. All pipes will be laid in common pipe trenches. A main gas pipe is leading to the gas pumping station.

In general, collected leachate water is injected into the pile in order to enhance the degradation of waste. Under the existing circumstances where the ground water table is located a few metres above the waste bottom, the moisture content in the waste is normally sufficient and a leachate water injection system is not necessary.

Energy cells

Each cell includes waste generated from about half a year, ie two cells are constructed each year. The estimated volume of domestic waste (depending on the sorting results) is 105 000-120 000 m^3 (with a compaction level of about 800 kg/m^3) each 6 months.

The height of each cell is about 12 m and the area is 95 · 180 m, including earth walls and covering. The cell is sloping 1:7 from the top meeting the cell walls which are sloping 1:2.

The natural ground is levelled and compacted and a sealing layer of clay is applied. The thickness of the bottom layer will vary from 0.2 to 0.4 metres when the permeability of the sealing material varies from 10^{-11} m/s to 10^{-10} m/s. The bottom is sloping towards one corner.

When the cell is filled to the top it will be covered with a soil layer. This layer shall be 0.3 m thick and comprise of soils with a permeability of 10^{-9} m/s or less. The surface is lightly compacted by a tracked vehicle.

Gas is extracted via perforated steel pipes driven into the waste pile and connected via a pipe system with gas pumping station. In the gas pumping station a compressor sucks gas from the cell with a slight under-pressure.

Leachate water from energy cells

Leachate water is proposed to be circulated through the cells to maintain the moisture content and keep temperature at a suitable level of 37°C in the decomposing waste. Recirculation of leachate water also prevents loss of organic substances. The circulation system is closed outside the cells also to prevent uncontrolled pollution of other waters.

Pipes for leachate water injection are installed in the cell from its surface. The leachate water is collected in the energy cell watertight bottom at the sloping by a perforated drainage pipe. The drainage pipe discharges by gravity into a watertight concrete well containing a heat coil. The leachate water is heated up to some 42°C. It is then pumped back to the cells for injection at the top of the cell. The water is trickling through the waste to the bottom to start another circulation cycle. The water temperature would then be some 32°C.

The total quantity of circulating leachate water is decided by the energy that is required to keep a cell at 37°C. The heat required for heating of the leachate water is generated with an internal heat coil with the extracted gas as fuel. If the main gas boiler or power station utilises all extracted gas, the leachate can be heated by the surplus heat from these facilities.

When the digestion is completed in a cell the gas extraction and leachate water circulation is ended. The pipe and well system of the cell will be removed. The cell will then be excavated and its content can be sieved to separate soil from non digested waste.

Benefits from chosen system

From the general technique used, the site can be in operation for many years in the future. As indicated in section 6.3, the lifetime of the site is, at worst case, limited to about 50 years but is most likely significantly longer than that due to two reasons:

- the disposal area can be extended another few hectares and still be within the borders of the site (how much is to be discussed in the future)
- the residues from the excavated cells will at least into some extent, most likely be possible to use for other purposes that to be disposed at the landfill

Both these reasons makes it most likely that the operation of the site can continue for another many years, probably 50 - 70 years.

During the operation, gas will also be extracted. In **figure 6.2** below, the accumulated extracted energy content in extracted gas from now and in the future are presented, assuming a continuous extraction.

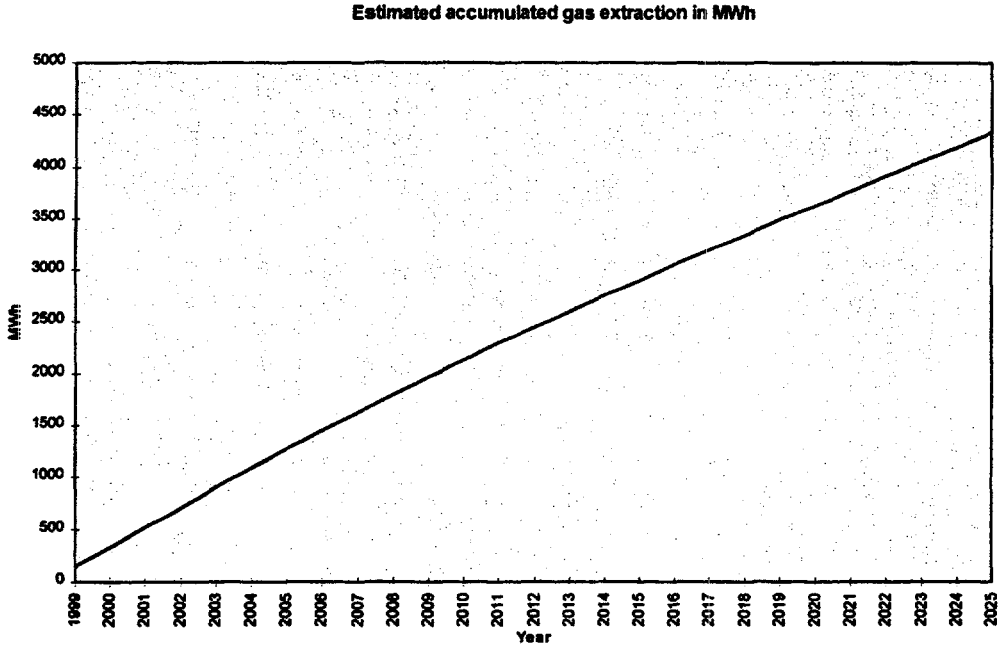


Figure 6.2 Accumulated landfill gas production in GWh for suggested system until year 2025.

Basic conditions for future activities

The proposal for future operation of at Getlini is based on the following:

- the environmental impacts from the landfill will be minimized. The main measures undertaken is covering of the existing landfill area, implementation of gas extraction system, collection and treatment of polluted leachate water and establishment of a hydrological barrier in the groundwater aquifer to control the infiltrated leachate and future infiltration of leachate into the aquifers

- the site will be equipped with an efficient biogas extraction system both in the existing landfill and in the future extended area. Landfill gas extraction will reduce the environmental impacts from the site and generate revenues to the operation of the landfill

- no unsorted waste is supposed to be disposed at the landfill. Thus, central sorting activities will be implemented. These activities will extend the life span of the site (since less material is disposed), generate revenues to the operation of the landfill, and will decrease the environmental impacts from the landfill

- the operation has to be monitored from different points of view. Of special interest is

  - groundwater quality monitoring programme
  - quality of surface runoff and treated leachate water discharged into River Daugava
  - registration of delivered waste with respect to content, classification and amount

- the operation of the landfill should be possible to extend for a many years in the future,through all activities and measures undertaken

- for years to come landfilling will be restricted to wastes which cause minimal harm to environment. Municipal wastes will, after sorting, be digested in energy cells for approximately 5 years. After fulfilled digestion, the cell will be excavated and a new cell be constructed on the same base. The residue can be separated by sieving and separated into 3 fractions. The rest fraction could be sold or stored as inert waste at the landfill area. The compost fraction can be used as covering material on site or sold as compost while the fuel fraction can be used as fuel for eg district heating.

- the site will not accept any hazardous waste mixed with other wastes. At the site, temporarily storage, but no treatment, of sorted hazardous waste is available. However, the site is not designed for treatment or storage of special hazardous waste such as radio active wastes, toxic wastes or hospital waste (sharp and sticking materials, infectious wastes etc). These types of wastes should

instead be sorted at source and be directed to assigned plants for appropriate treatment.

Overview of area and the daily operation

The future operation of the landfill site to be implemented is hereafter briefly presented. In the presentation, each activity refers to different areas at the site. The proposed location of different activities are shown in **Attachment 1** (with area notation A to H).

For specific systems chosen, detailed discussions and analyses are presented in previous sections on remediation activities, sorting facilities, and gas extraction systems.

The proposed operation at the landfill can shortly be described as follows:

- incoming waste is weighted and registered (area A),

- municipal waste is unloaded at a central sorting area where recyclables is sorted out both by mechanical sorting devices and manually by hand (area B),

- industrial waste is unloaded at a sorting area where the waste is sorted, mainly by mechanical sorting devices (area C),

- other sorted material (such as filling, compost etc.) is directed to separate areas where the material is used or treated for future use such as composting, covering, access roads etc (area D&H),

- recycled material is stored in separate areas awaiting delivery to consumer/recycling facility. Other materials sorted out, such as hazardous waste, are also stored for future delivery to treatment or recycling facilities (area D),

- gas extraction system is constructed both in the existing landfill as well as in the new extended energy cell area (area F &G),

- sorted domestic waste is shredded and disposed in energy cells. The energy cells are constructed aiming at a forced degradation and maximised landfill gas production under controlled circumstances (area F). After the degradation is finished, the cell is excavated and the material is sieved and utilized and/or disposed at the landfill,

- sorted industrial waste is considered to be mainly inert and is disposed at the existing landfill, used for filling or construction of track roads (area G),

- to collect water generated at the site, new ditches are constructed and old ones are restored. Leachate from landfill is collected, stored, and treated in leachate ponds within the area (area H). Leachate from the energy cell area is collected separately, heated and reinjected into the energy cells to enhance the biogas production. Non polluted surface runoff water is collected and passing settling ponds before discharged into surface ditches, connected to Daugava River, surrounding the site

- the existing landfill and energy cells are covered with suitable material (such as clay or sandy clay) in order to minimise the infiltration of precipitation and to enhance the gas generation and extraction conditions (area F & G),

- the whole area is fenced.

Implementation program

General discussion

A major demand for the implementation and construction works is that the daily operation of Getlini must be possible to continue. The implementation of all proposed activities is proposed in different phases so that daily operation may continue with minimal disturbance.

Therefore, the construction of different activities and facilities will require a relatively long time. As a rough estimate the new systems can be in full operation in 2003.

It is assumed that the implementation of the proposed technologies and facilities will start as soon as possible. Hence, the following time schedule is estimated as basis for the proposals:

Construction year 0	
- Executive implementation decisions	In 1998
- Detailed design	Completed end of 1998
Construction year 1	
- Tender activities	Beginning of 1999
- Construction works, 1st implementation phase	During 1999
Construction year 2	
- Start of new Operation System	Beginning of 2000
Construction year 3 - 6	

- Implementation of additional facilities and elements of the proposed system and development of the operation	Year 2001 - 2004

Implementation activities

In this section, activities suggested for each year of implementation are presented. In the implementation layout, which is presented in reduced scale in **Attachment 2,** activities undertaken each year are summarized in a drawing.

Construction year 0

This year will be assigned for executive implementation decisions and detailed design of the activities and facilities proposed for Getlini Waste Disposal Site.

· Municipal wastes are continued to be disposed at the existing landfill.

It is important that these disposal activities is in line with the future operation activities. Thus, the design team and Getlini 2 Ltd should have a frequent contact also during the design period in order to reach an efficient waste disposal.

Construction year 1

During this year the construction works will start and the remediation of the existing landfill will be completed.

· Municipal wastes are continued to be disposed at assigned areas at the existing landfill.

· The landfill gas system will be constructed simultaneously with the covering of the existing landfill. The time estimated for this work is about one year. These activities include;

- provision of materials as gas wells, injection water wells, hoses and valves etc,
- installation of wells,
- assembling and laying of pipe system,
- transportation of covering material,
- grading and compaction of waste and cover material

· At the end of the year, the paved area for the gas plant is prepared. The prefabricated gas pumping station will be provided and installed. 4 blowing machines will be installed. Installation of gas boiler or power generation station.

· The existing landfill must be slightly shaped since slopes are 1:2. To secure the future landfill slopes, a recommended general slope is 1:3. These slopes should be shaped before the covering and gas extraction works start.

· Construction of the ground water control system.

· The leachate water pond will be constructed and treatment equipment installed. The bottom will be sealed by clay or sandy clay with a permeability of $<10^{-9}$ m/s. Some of the pumping equipment will be installed. These activities include;

- stripping of top soil
- grading excavation,
- lining/sealing of bottom and walls.

· Relatively large amounts of site materials, mainly sand, will be redistributed among different areas at site. Surplus soil from excavation works needed for the leachate water pond will be used as filling material for existing ditches and pools.

· Preparation of bottom for cell IA and IB will be carried out during this year so that municipal waste could be disposed in energy cells from the very beginning of construction year 2. This activity includes; stripping, grading, compaction and sealing.

· Laying of energy cell main pipe system, gas pipes, and leachate water injection- and drainage pipes in trenches. This activity include;

- provision of material,
- excavation, preparation of pipe beds,
- backfilling and compaction.

· Installation of junction manholes (area F) for the energy cell gas pipe system. In these, pipes are connected (the gas pipes, water injection pipes and drainage pipes) and the gas controlled. This activity include;

- provision and installation,
- excavation,
- preparation of bed,

- backfilling and compaction of prefabricated concrete rings,
- assembly of wells and valves.

· Installation of prefabricated gas control stations for the landfill gas system. This activity include assembly and connection of pipes.

· The area for unloading, sorting and shredding municipal waste will be prepared. Includes;

- preparation of surface, excavation, levelling and paving of natural ground,
- provision of roof and walls,
- installation of conveyor belts to cell I A+B.

· Surface runoff water ditches around the site is excavated and the water is directed to the existing ditch outside the site area for further transportation to the Daugava River.

· The entrance area with weighbridges, gates and fence are prepared to be able to start weighing and registration of waste from construction year 2. A new administration building and a parking area will be built near the entrance. The surface will not be paved but compacted.

· Provision and installation of a prefabricated septic tank. This activity includes; excavation, preparation of foundation, backfilling.

· A smaller section (about 25%) of the total area intended for temporary storage and treatment of recoverable wastes is prepared. The surface will be compacted, containers for glass provided and an access road built.

· Preparation of storage area for metals. The surface will not be paved but compacted.

· Foundation for hazardous waste area will be prepared. A roofed storage building for hazardous waste will be constructed.

· Maintenance bridge is provided to the workshop building. Pressurised fresh water is connected.

· The fence including gates will be constructed.

Total area that will be paved year 1 is 31 000 m^2.
Total area that will be compacted year 1 is 19 000 m^2.

Equipment that will be provided year 1 are presented in **Table 1** below.

Table 1; Equipment and facilities provided during construction year 1

Equipment	Nos of units
· Weighbridge and registration utilities	2
· Shredder	2
· Wheel loader, front	1
· Mobile excavator with gripping device	1
· Track loader	1
· Belt conveyors	1
· Maintenance bridge	1
· Regulation station	3
· Junction manholes	3
· Gas pumping station	1
· Blowing machines	4

In addition to the equipment presented in **Table 1**, a number of containers for transport and storage of waste is required.

Construction Year 2

· The construction of energy cells by disposal of sorted municipal waste will start. Within five years the energy cell is expected to give the designed amount of landfill gas.

· Two energy cells will be constructed during this year and gas extraction will start both from energy cells and existing landfill. Starting this extraction requires the following main activities during construction year 2: provision of materials as gas wells, injection water wells, valves, installation of wells, and assembling and laying of pipe system for the energy cells.

· Modernizing of workshop building and provision of adequate machinery.

· The old registration building and weighbridges will be demolished (and reused as much as possible)

· A system for leachate water recirculation will be constructed in form of a collector well with heating coil. This activity includes; concrete well cast in situ. Excavation, installation and backfilling. Provision and installation of the leachate water pump and prefabricated heating coil.

· The bottom of cell II A+B will be prepared.

· The area for sorting of industrial waste will be prepared and paved.

· The preparation of the area for sorting of municipal waste will be completed by installation of a picking belt facility, including the sorting device together with feeders, containers, and picking and transportation belt,

· The area for treatment and storage of recoverable wastes as glass, plastics, papers tyres and wood will be extended as much as needed along with a track road. Some sorting of garden waste will start as well at the assigned area where the natural ground is levelled and compacted.

· The staff building will be modernized and extended.

Total area that will be paved year 2 is 9 000 m².
Total area that will be compacted year 2 is 6 000 m².

Equipment that will be provided year 2 are presented in **Table 2** below.

Table 2; Equipment and facilities provided during construction year 2

Equipment	Nos of units
· Containers	(nos to be decided)
· Wheel loader, front	1
· Sorting unit	2
· Mobile excavator with gripping device	2
· Track loader	1
· Gas boiler	1

Construction year 3

· Dismounting and mobilization of the mobile part of the conveyor belt so that sorted municipal waste can be transported to the cells II A and B.

· Two cells, II A+B, will be built up during the year and the bottom of cell III A+B prepared.

· The area for treatment and storage of recoverable wastes as glass, plastics, papers, tyres, and wood will be extended in accordance with the needs. An access road to the areas are also included.

· The area for garden waste will be extended if needed.

Total area that will be compacted year 3 is estimated to 7 000 m².

Construction year 4

· Dismounting and mobilization of the mobile part of the conveyor belt so that sorted municipal waste can be transported to the cells III A and B. Two cells, III A+B, will be built up during the year and the bottom of cell IV A+B prepared.

· Installation of another 2 blowing machines in the gas pumping station.

· The area for treatment and storage of recoverable wastes as glass, plastics, paper, tyres, and wood (as well as the access road) will be extended in accordance with the expected requirements.

· The area for garden waste will be extended in accordance with the expected requirements.

· A recovery station for public use will be built near the entrance and visible from the administration building. The area will be fenced in to prevent unauthorized vehicles to enter the site. Height of fence about 3 m and length about 200 m.

Total area that will be compacted year 4 is estimated as 4 000 m².

Construction year 5

· Only the stationary part of the conveyor belt is needed to transport sorted municipal waste to the cells IV A and B. Two cells, IV A+B, will be built up during the year and the bottom of cell V A+B prepared.

· The area for treatment and storage of recoverable wastes as glass, plastics, papers, tyres, and wood as well as composting of garden waste will be developed in accordance with the required needs (including access road).

Construction year 6

· Only the stationary part of the conveyor belt is needed to transport sorted municipal waste to the cells V A and B. The two cells V A+B will be built up during this year and the bottom of a new cell prepared.

· After year 6, the first energy cell can be excavated. Thus, if considered as required (economically feasible), the sieve can be purchased and installed.

Groundwater contamination

Type and intensity

The groundwater investigation confirms that groundwater in the quaternary aquifer is seriously contaminated. In the core of the contaminant plume dry residue reaches 11 g/l due to NaCl content. Concentrations of the remaining components exceed the background concentrations hundreds of times. The major contaminants and contamination indicators are: chloride, Na, Total N, ammonia, COD-Cr, BOD and Cr.

Hydro chemical and geophysical information confirms a wide-spread contamination of the Quaternary aquifer in the area. The contaminated area is 1.5 km^2 and the groundwater volume within the contour of the contaminant plume is about 4.5 million m^3.

The contamination is highest in the lower part of the Quaternary aquifer. There is a dilution of the plume mainly due to infiltration from above. The uppermost layer in the Quaternary aquifer is practically unpolluted close to the edge of the plume and the real volume of contaminated water is about 3 million m^3, rather that 4.5 million m^3 as earlier stated.

It can also be concluded from the results of the hydrogeological modelling, that an important influx of contaminated water into the Quaternary aquifer is due to the deepened channels at the landfill site. These channels, especially the one south of the pond, have been the source for gravel/sand excavation and in this a direct contact with more permeable layers within the Quaternary aquifer have been established.

Contaminant distribution in the Plavinas aquifer

The contaminant distribution in the Plavinas aquifer is, compared to Quaternary aquifer, much less known. Limited contamination of the Plavinas aquifer (groundwater samples) was found in two wells: No 7b and No 2. The contamination may, however, be explained by problems with the casing during drilling. These two walls were established in 1995.

Contaminant distribution in the Amata and Gauja aquifers

It is unlikely, that the Amata aquifer is contaminated by the leachate from the site, because the lower part of the Plavinas- and the upper part of the Amata formations (found in all wells in the area) consist of low permeable sediments.

Even less likely is contamination of the Gauja aquifer - the main aquifer, situated more that 100 m below surface, used for water supply. The two wells producing from this aquifer (well Nos. 5814 and 6632) never show any sign of contamination. The last sampling took place in March 1996 within the Latvian - Danish project.

Historical extent of the contaminant plume

Contamination of groundwater was determined already in 1978 when the first monitoring wells were drilled. The extent of the plume was small, and the front was less than 400 m from the edge of the waste disposal area. Monitoring data showed, that the contaminant plume was moving towards SW along the main direction of groundwater flow with average velocity of 50-60 m/year.

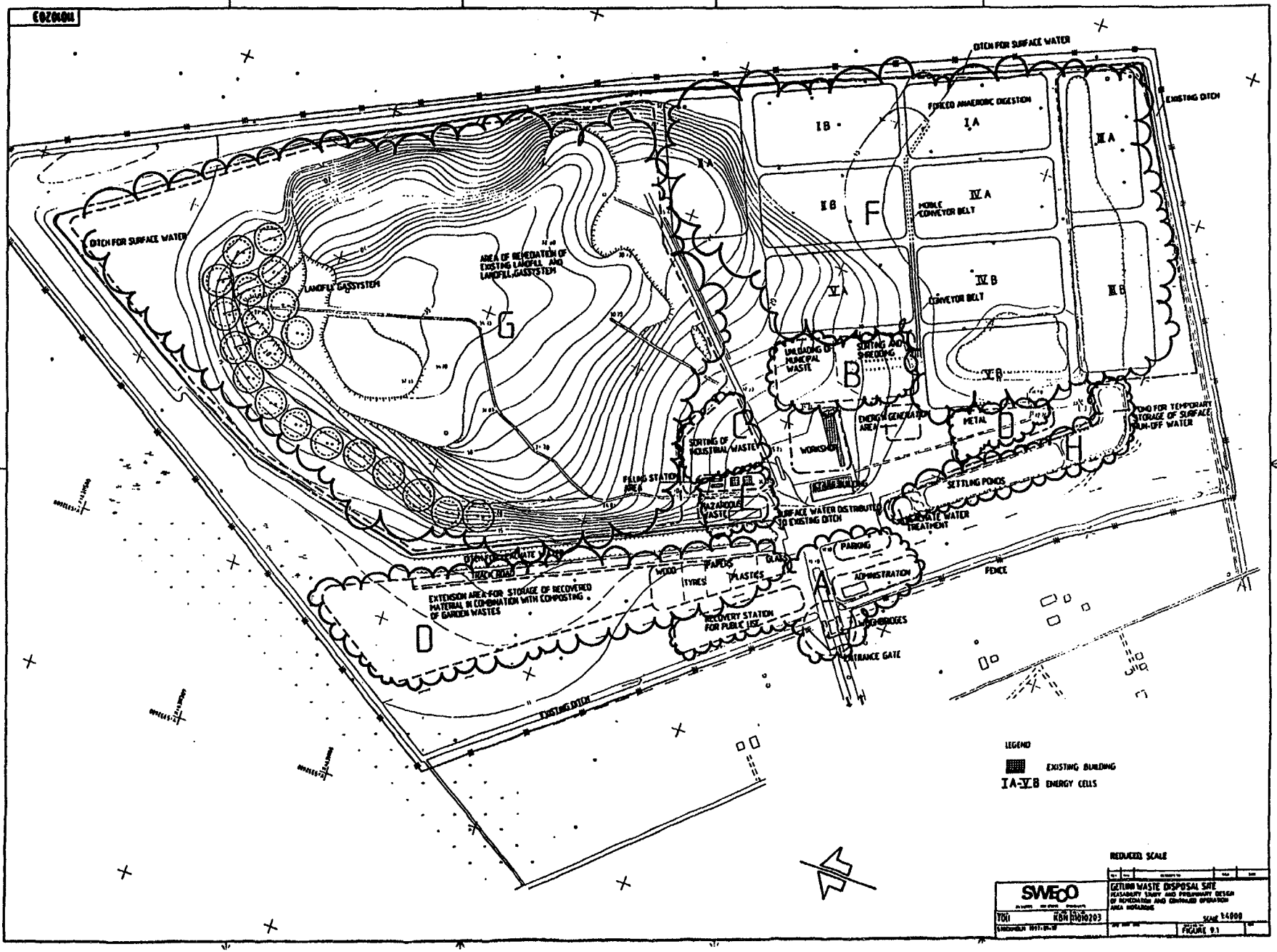
Concentrations of the different contaminants in the centre of the plume increased until end of 1980s. From this time the concentrations stabilised. It is possible, that there is a kind of equilibrium between the flux of contaminant from the waste disposal site and dilution/degradation processes in the core of contaminant plume.

Prediction of the future extent of the contaminant plume

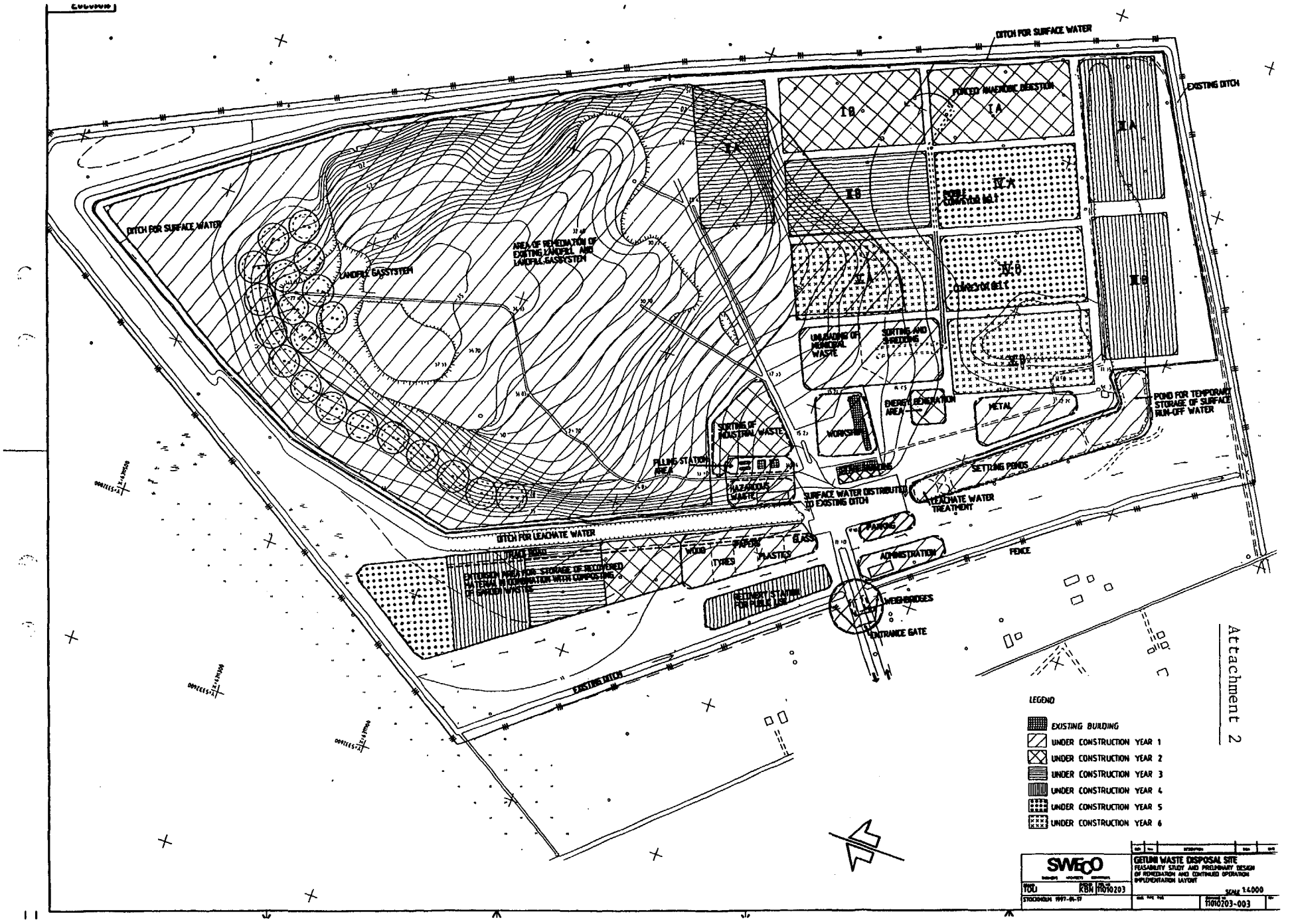
One of the tasks performed within this investigation was hydrogeological modelling of the Getlini site, inclusive simplified simulation of a future behaviour of the contaminant plume.

Under the assumption that the input of leachate continues without stop in the future several scenarios were calculated and the results can be summarised as follows, see **Attachment 3**:

- *Year 1996*: contaminant plume occupies large part of the Quaternary aquifer and infiltration of contaminant to the low permeable layer gQ has began
- *Year 2002*: contaminant infiltrates into the upper part of the Devonian aquifer sequence and reaches river Daugava
- *Year 2020*: massive contamination of the upper part of the Devonian aquifer sequence sporadic intrusion of contaminant into the low permeable layer D_3pl_{2-1}



Attachment 1



Attachment 2

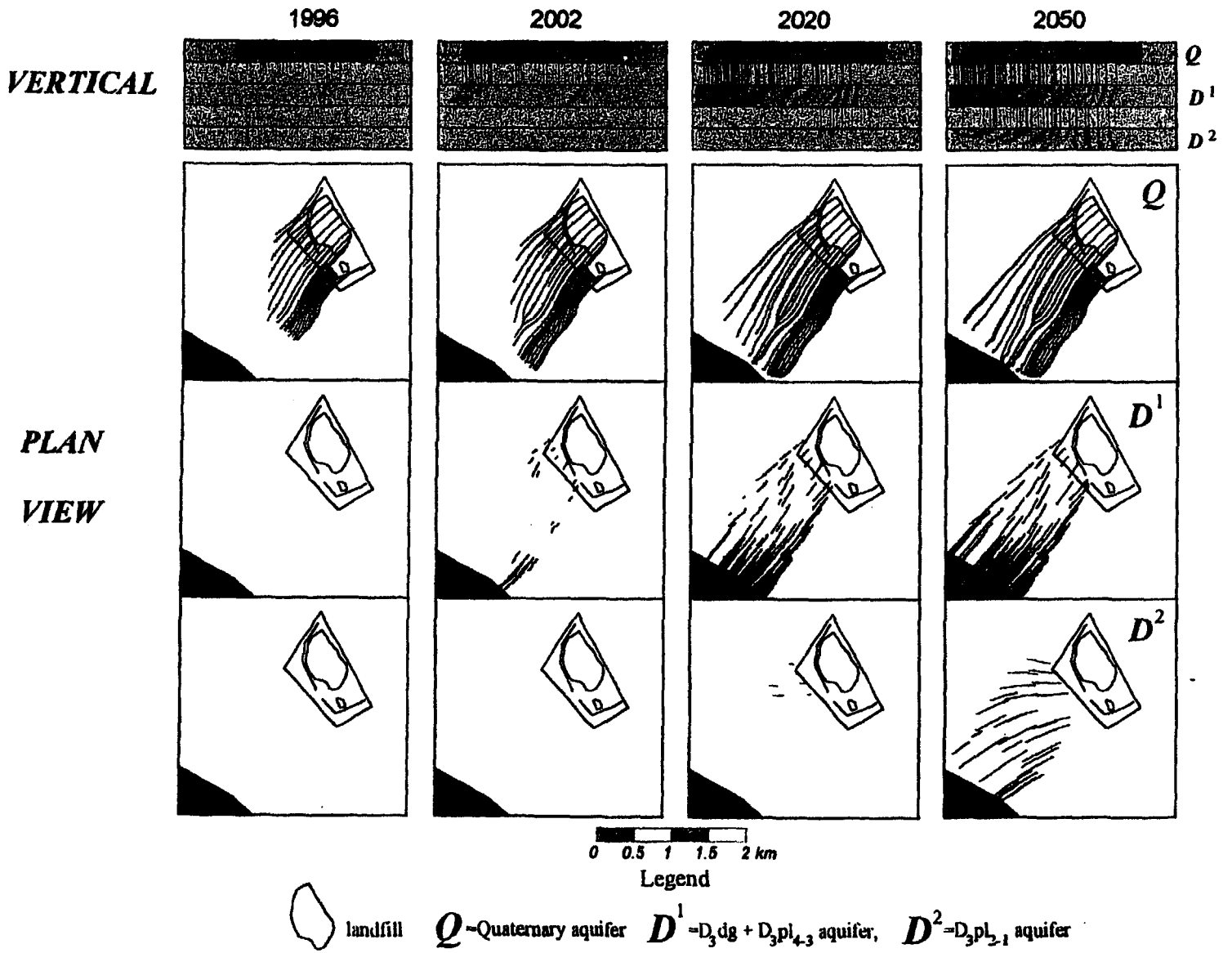


Figure 4.9 Simulated progression of the contaminant plume in the three affected aquifer; 1996 - 2050

Attachment 3

LATVIA

MUNICIPAL SOLID WASTE MANAGEMENT PROJECT

ANNEX 2

BANK GROUP INVESTMENTS IN LATVIA

MUNICIPAL SOLID WASTE MANAGEMENT PROJECT

STATUS OF BANK GROUP OPERATIONS, IBRD LOANS, AND IDA CREDITS IN THE OPERATIONS PORTFOLIO

Project ID	Loan or Credit No.	Fiscal Year	Borrower	Purpose	IBRD in million US$ Original	Undisbursed	Difference between expected and actual disbursements[a]
LV-PE-35807	L41540	1997	REPUBLIC OF LATVIA	WELFARE REFORM	18.10	17.11	2.70
LV-PE-44123	L41260	1997	REPUBLIC OF LATVIA	SAL	60.00	34.00	42.24
LV-PE-8532	L41450	1197	REPUBLIC OF LATVIA	HIGHWAY	20;00	17.89	1.69
LV-PE-34584	L39640	1996	REPUBLIC OF LATVIA	MUNICIPAL SERVICES	27.30	17.94	10.04
LV-PE-8526	L38900	1995	REPUBLIC OF LATVIA	JELGAVA DIST. HEAT	14.00	6.18	.80
LV-PE-8533	L38140	1995	GOVT OF LATVIA	LIEPAJA ENVIRONMENT	4.00	.55	-.30
LV-PE-8529	L37961	1995	GOVT OF LATVIA	ENTERP. FINANC. SECT	5.00	.86	13.20
LV-PE-8529	L37960	1995	GOVT OF LATVIA	ENTERP. FINANC. SECT	10.00	5.90	13.20
LV-PE-8529	L37950	1995	GOVT OF LATVIA	ENTERP. FINANC. SECT	20.00	6.29	13.20
TOTAL					178.40	106.72	96.77

	Active Loans	Closed Loans	Total	
Total disbursed[a] (IBRD and IDA)	62.32	66.86	129.18	
of which repaid	0.00	0.00	0.00	
Total now held by IBRD and IDA	178.40	66.86	245.26	
Amount sold	0.00	0.00	0.00	
of which repaid				
Total undisbursed				106.72

[a]intended disbursements to-date, minus actual disbursements to-date as projected at appraisal.

Note: Disbursement data are updated at the end of the first week of the month.

STATUS OF IFC OPERATIONS

		Committed				Disbursed			
		IFC				IFC			
FY Approval	*Company*	*Loan*	*Equity*	*Quasi*	*Partic*	*Loan*	*Equity*	*Quasi*	*Partic*
0/95	Lattelekom SIA	5.39	13.67	0.00	0.00	2.86	13.55	0.00	0.00
1996	Vereinsbank Riga	0.00	6.05	0.00	0.00	0.00	6.05	0.00	0.00
1996	Vika Wood	4.00	0.00	0.00	0.00	4.00	0.00	0.00	0.00
	TOTAL PORTFOLIO	9.39	19.72	0.00	0.00	6.86	19.60	0.00	0.00

		Approvals Pending Commitment			
		Loan	*Equity*	*Quasi*	*Partic*
1996	HEBEDA - LATVIA	0.00	0.00	2.00	0.00
	TOTAL PENDING COMMITMENT	0.00	0.00	2.00	0.00

LATVIA

MUNICIPAL SOLID WASTE MANAGEMENT PROJECT

ANNEX 3

FINANCING PLAN

ANNEX 3

FINANCING PLAN

1. Project costs of US $23,990.00 as presented in the COSTAB tables comprise: a) design and technical assistance; b) capital investment; c) capitalized recurrent costs; to which are added, d) physical contingencies, followed by, e) price contingencies. To these costs have to be added Interest during Construction, estimated at US $1,220,000 in **Annex 7, Appendix 2.**

2. The total costs so calculated amount to US $25.21 million (Ls 13.61 million) as shown below, together with the Financing Plan.

PROJECT COSTS			FINANCING PLAN			
	usd m	%		usd m	usd m	%
Basic investment	16.49	65.4	Grants		6.62	26.3
Recurrent costs	3.79	15.0	-- SIDA	1.50		(6.0)
sub-total	20.28	80.4	-- GEF	5.12		(20.3)
Physical contingencies	1.06	4.2	Equity (RCC)		2.00	2.4
Price contingencies	2.65	10.5	Loans		11.95	52.9
sub-total	23.99	95.2	-- RCC	5.40		(21.4)
			-- IBRD	7.95		(31.5)
Interest during construction	1.22	4.8	Getlini-Eco own funds		4.64	18.4
TOTALS	25.21	100.0	TOTALS		25.21	100.0

3. The Finance Plan consists of:

- Grants : earmarked by SIDA, US $1.5 million and by GEF, US $5.12 million, for a total of US $6.62 million; this source covers 26.3% of total costs. These funds would be shown on the balance sheet of Getlini-Eco Ltd. as quasi-equity.

- Equity : the creation of Getlini-Eco's share capital of the equivalent of US $1.0 million, would be financed by RCC from the US $6 million earmarked for the Project. The equity injection represents 2.4% of total costs.

Loans : there will be two loans, one from RCC and one from IBRD, for a total of US $13.35 million or 52.9% of project costs. The RCC loan would amount to US $4 million; it would be an interest free loan, lent to Getlini-Eco, 5 years grace and 12 years repayment. The loan from IBRD would be signed with Government, which would onlend the proceeds to RCC, which in turn would onlend the funds to Getlini-Eco. The interest rate payable by Getlini-

Eco would be 8%, including a guarantee fee of 0.7% for Government. Repayment would be over 12 years, after a 5 year grace period.

- Getlini-Eco's own funds: The cash flow generated as a result of the Project would enable the company to contribute to the finance plan; it would cover both recurrent expenditures, as well as the interest payable during the construction period. The total contribution would be US $4.64 million equivalent to 18.4% of project cost.

LATVIA

MUNICIPAL SOLID WASTE MANAGEMENT PROJECT

ANNEX 4.1

PROCUREMENT PLAN

Procurement Plan: Latvia - Municipal Solid Waste Management Project

1	2	3	4	5	6			
					Estimated Schedule			
Description[1]	Type[2]	No.slices/items/ subpackages[3]	Estimated Cost[4]	Procurement Method[5]	Document Preparation	Invitation to Bid	Contract Signing	Contract Completion
ENVIRONMENTAL REMEDIATION								
Material, incl. Transport Clay and Sand	G	1	$1,623	NCB*	Oct-98	Nov-98	Feb-99	Oct-00
Earth Works/Remediation	W	4	$660	NCB**	Oct-98	Nov-98	Feb-99	Oct-00
Machinery equipment building	W	1	$87	NCB	Oct-98	Nov-98	Dec-98	Feb-99
Groundwater Control	W	1	$159	NBF	Nov-98	Jan-99	Mar-99	Jul-99
Leachate Treatment/Monitoring	G	1	$684	NBF	Nov-98	Jan-99	Mar-99	May-99
Transmission of Surface Water	G	1	$49	NBF	Nov-98	Jan-99	Mar-99	May-99
TECHNICAL/OPERATIONAL IMPROVEMENTS								
Fencing, gate, septic tank construction	W	2	$487	NCB*	Nov-99	Jan-00	Mar-99	Jun-00
Buildings, Technical Improvements	W	2	$867	NCB*	Jan-99	Mar-99	Jun-99	Mar-00
Earth Works, Improvements	W	1	$2,595	NBF	Mar-99	May-99	Jul-99	Mar-02
Weighbridge and Registration	G	1	$88	IS	Jan-99	Jan-99	Mar-99	May-99
Sorting Unit/Shreder	G	1	$1,742	ICB	Sep-99	Nov-99	Dec-99	Apr-00
Container, Oil Tank	G	1	$17	NS	Jan-99	Jan-99	Mar-99	May-99
Wheel/Track Loader	G	2	$832	ICB	Nov-98	Jan-99	Mar-99	May-99
Belt Conveyor	G	1	$147	IS	Jan-99	Jan-99	Mar-99	May-99
Maintenance Bridge	G	1	$12	NBF	Jan-99	Jan-99	Mar-99	May-99
GAS GENERATION AND ENERGY PRODUCTION								
Earth Works for Gas Utilization	W	3	$886	NBF	Mar-99	May-99	Jul-99	Mar-02
Civil Works Leachate Water	W	5	$1,125	NBF	Mar-99	May-99	Jul-99	Mar-02
Gas Extraction Piping, Energy Cells	G	1	$33	NBF	Mar-99	May-99	Jul-99	Mar-02
Gas Extraction Piping, Landfill	G	1	$186	IS	Mar-99	May-99	Jul-99	Mar-02
Regulation Station	G	1	$83	IS	Jan-99	Jan-99	Mar-99	May-99
Junction Manholes	G	1	$5	NS	Jan-00	Jan-00	Mar-99	May-00
Collector Well, Pumping Boiler	G	1	$650	ICB	Nov-99	Jan-00	Mar-99	Jul-00
Electricity Generation Facility	G	1	$4,157	ICB**	Mar-99	May-99	Jul-99	Mar-02
MANAGERIAL IMPROVEMENTS								
Laboratory Equipement	G	1	$129	NBF	Jan-99	Jan-99	Mar-99	May-99
Salary Cost Local Staff	Other	1	$457	NBF	-	-	-	-
Intern. Procurement Specialist	CF	1	$314	SLF	Sep-98	Oct-98	Nov-98	Jun-00
Twinning Arrangement	CF	1	$442	NBF	-	-	-	-
Office Equipment	G	1	$37	NBF	Oct-98	Oct-98	Nov-98	Nov-98
O & M PIU	Other	1	$139	NBF	-	-	-	-
Vehicle	G	1	$21	NS*	Oct-98	Oct-98	Nov-98	Dec-98
PPF								
Detailed Design	CF	1	$637	SLF	Feb-98	Mar-98	Apr-98	Oct-98
TOTAL Investment COST			**$19,350**					
Total Reccurrent Cost			**$4,640**					
Interest During Construction			**$1,220**					
TOTAL PROJECT COST			**$25,210**					

NOTES:

* Funded by GEF

** Funded by GEF and World Bank

[1]Name of Package

[2]Indicate CW (for civil works); S&I (for supply and install); TK (for turnkey); CF (for consultant firms): CI (for individual consultants); TR (for training).
The type is related to the use of the relevant standard bidding documents.

[3]If known, indicate number of slices, major items or subpackages in the package

[4]Expressed in US$1000

[5]Indicate ICB, LIB, NCB, IS, NS, DC (for direct contracting), FA (for Force Account), MW (for Minor works), SLF (for short-listing of consultant firms); SLI (for short-listing of individual consultants); SSF (for Sole sourcing of consultant firms); SSI (for sole sourcing of individual consultants)
Other (for recurrent costs procured on the basis of administrative proceduresbased on a schedule and budget acceptable to the Bank);

LATVIA

MUNICIPAL SOLID WASTE MANAGEMENT PROJECT

ANNEX 4.2

USE OF FUNDS FOR DIFFERENT PROCUREMENT PACKAGES

Procurement: Environmental Remediation

	Unit	Unit Cost	Totals Including Contingencies ('000) 1998				1999				2000				2001				2002				Total	Proc. Procedure	Pack. No.
			RIGA	IBRD	GEF	SIDA	RIGA	IBRD	GEF	SIDA	RIGA	IBRD	GEF	SIDA	RIGA	IBRD	GEF	SIDA	RIGA	IBRD	GEF	SIDA			
Investment Costs																									
A. Soil Material																									
Material, incl. Transport Clay and Sand	m3	8					248		1,375		-				-				-				1,623	NCB	1
B. Earth Works																							-		
Covering of Landfill	m2	4					38	71	74		-				-				-				183		
Excavation and prep. for leachate pond	m2	5					29		160		-				-				-				189		
Ditches for surface run-off water	m	4					16				-				-				-				16		
Dams and Ponds /a	Lumpsum						42		230		-				-				-				272		
Subtotal Earth Works							125	71	464		-				-				-				660	NCB	2
C. Buildings																									
Machinery equipment building /b	m2	290					13	74			-				-				-				87	IS	3
D. Construction																							-		
Groundwater Control/pumps	Number	16,100								39	-				-				-				39		
Groundwater Control/wells	Number	14,700								35	-				-				-				35		
Groundwater Control/pipes	m	17								40	-				-				-				40		
Groundwater Control/Textile	m	4								11	-				-				-				11		
Groundwater Control/Soil	m3	4								10	-				-				-				10		
Groundwater Control/Regulation	Lumpsum									16	-				-				-				16		
Groundwater Control/Installation Wells	Number	3,300								8	-				-				-				8		
Subtotal Construction										159	-				-				-				159	NBF	4
E. Equipment																							-		
Transmission of Surface Water/wells	Number	7,300					-							16	-				-				16		
Transmission of Surface Water/pipes	m	4					-							2	-				-				2		
Transmission of Surface Water/installation	Number	7,300					-							16	-				-				16		
Transmission of Surface Water/pumps	Number	6,700					-							15	-				-				15		
Subtotal														49									49	NBF	4
Heating of leachate water for treatment	lumpsum									177				-	-				-				177		
SBR Aeration /c	Number	22,100								48				-	-				-				48		
SBR Blowing Equip.	Number	14,700								48				-	-				-				48		
SBR Decant Equip.	Lumpsum									24				-	-				-				24		
SBR Instrument Equip.	Lumpsum									24				-	-				-				24		
SBR Dosing Equip./Chemicals	Lumpsum									24				-	-				-				24		
SBR Motor valves	Lumpsum									36				-	-				-				36		
SBR Shutters	Lumpsum									36				-	-				-				36		
Electricity/Regulation /d	Lumpsum									140				-	-				-				140		
Heating, Water and Sanitation /e	Lumpsum									40				-	-				-				40		
Transmission pumps /f	Number	7,400								40				-	-				-				40		
Compacted area /g	m2	15								8				-	-				-				8		
Installation well /h	Lumpsum									16				-	-				-				16		
Installation well /i	Lumpsum									8				-	-				-				8		
Groundwater Monitoring Well	Number	700								5				-	-				-				5		
Groundwater Monitoring Equipment	Lumpsum									9				-	-				-				9		
Subtotal Equipment										684					-				-				684	NBF	4
F. Design																									
Detailed Design	lumpsum			141							-				-				-				141	ICB	5
Total Investment Costs				141			386	145	1,839	843				49	-				-				3,403		

Procurement: Technical/Operational Improvements

Latvia
Riga Solid Waste Management Project
Detailed Costs
(US$)

	Unit	Unit Cost	Totals Including Contingencies ('000) 1998 RIGA	1998 IBRD	1998 GEF	1998 SIDA	1999 RIGA	1999 IBRD	1999 GEF	1999 SIDA	2000 RIGA	2000 IBRD	2000 GEF	2000 SIDA	2001 RIGA	2001 IBRD	2001 GEF	2001 SIDA	2002 RIGA	2002 IBRD	2002 GEF	2002 SIDA	Total	Proc. Procedure	Pack. No.
Investment Costs																									
A. Civil Works																									
Fence	m	23	-						107										7				114		
Entrance Gate	Number	7,400	-						8										-				8		
Fresh water piping	Lumpsum		-						26										-				26		
External lightnings and power outlets	Lumpsum		-						168										-				168		
Septic tank	Number	17,700	-						20										-				20		
Foundation oil tank	m2	7	-						50										-				50		
Roofed Storage	m2	15	-						101										-				101		
Subtotal Civil Works			-				73		407										7				487	NCB	6
B. Earth Works																									
Compacted areas, bitumenus	m2	22	-				838				262				-				-				1,100		
Compacted Areas	m2	15	-				344				232				265				494				1,336		
Internal roads, bitumenus	m2	22	-				20				44				15				16				96		
Internal roads, oily sand	m2	15	-				14				29				10				11				64		
Open storage areas	m2	2	-				0				0				0				-				0		
Subtotal Earth Works			-				1,216				566				291				521				2,594	NBF	7
C. Buildings																									
Administration building	m2	551	-						237				-										237		
Staff Building	m2	588	-						351				-										351		
Workshop, rehabilitation	m2	221	-						-				244										244		
Hazardous waste storage building	m2	290	-						35				-										35		
Subtotal Buildings			-				95		528		36		208										867	NCB	6
D. Equipment																									
Weighbridge and registration /a	Number	39,700	-					88	-		-	-											88	IS	8
Roofing/Sheltering Sorting unit	m2	177	-					-	-		-	213											213		
General Installations Sorting Unit	lumpsum		-					-	-		-	35											35		
Picking Belts incl. staff working bridge	number	80,900	-					-	-		28	158											186		
Shredder	Number	588,200	-					1,307	-		-	-											1,307		
Belt conveyor	m	220	-					147	-		-	-											147		
Subtotal: Sorting Unit/Shredder								1,454			28	406											1,889	ICB	9
Container, oil tank	Lumpsum		-					17	-		-	-											17	NS	10
Wheel loader	Number	220,600	-					245	-		-	254											499		
Trackloader	Number	147,100	-					163	-		-	169											333		
Subtotal: Wheel/Track Loader								409				423											832	ICB	11
Maintenance bridge	Lumpsum		-				12		-		-	-											12	NBF	12
Subtotal Equipment			-				12	1,968	-	-	28	830	-	-	-	-	-	-	-	-	-	-	2,838		
E. Design																									
Detailed Design	Lumpsum			339	-		-		-		-												339	ICB	5
Total Investment Costs				339			1,396	1,968	935		630	830	208		291				528				7,125		

Procurement: Gas Generation and Energy Production

tvia
ga Solid Waste Management Project
tailed Costs
S$)

	Unit	Unit Cost	1998				1999				2000				2001				2002				Total	Proc. Procedure	Pack. No.
			RIGA	IBRD	GEF	SIDA	RIGA	IBRD	GEF	SIDA	RIGA	IBRD	GEF	SIDA	RIGA	IBRD	GEF	SIDA	RIGA	IBRD	GEF	SIDA			
Investment Costs																									
A. Earth Works	m2																								
Excavation and Prep. of Energy Cells	Lumpsum	5	-				139				148				157				165				609		
Redistribution of filling material	m2		-				9				-				-				-				9		
Soil Covering Energy Cells		2	-				-				85				90				94				269		
Subtotal Earth Works			-				148				234				246				259				886	NBF	13
B. Civil Works	lumpsum																								
Gas extraction piping, landfill	m2	47	-				28	158			-				-				-				186	ICB	14
Gas extraction piping energy cells	m		-				33				-				-				-				33		
Leachate injection water piping	m	10	-				7				-				-				-				7		
Leachate water main drainage pipe	m	15	-				11				-				-				-				11		
Leachate water perforated pipe	Number	18	-				-				8				8				8				24		
Manufacture and install gas wells, landfill	m	882	-				211				-				-				-				211		
Establishment of energy cell gas wells	m2	6	-				-				222				232				242				696		
Establishment of injection wells, energy cells		2	-				-				56				59				61				177		
			-				262				286				299				311				1,158	NBF	15
Subtotal Civil Works	No.																								
C Regulation station	Number	25,000	-					83				-				-				-			83	IS	16
Junction manholes	Lumpsum	1,470	-					-				5				-				-			5	NS	17
Collector well with pump and heating coil	Lumpsum		-					-				33				-				-			33		
Gas pumping station	Lumpsum		-					-				322				-				108			431		
Gas boiler with heat exchanger	lumpsum		-					-				187				-				-			187		
Subtotal: Collector well, pumping, boiler											83	459							17	91			650	ICB	18
Electricity Generation Facility /a			-						2,117			658				680				702			4,157	ICB	19
			-	-	-	-	-	83	2,117	-	-	1,205	-	-	-	680	-	-	-	810	-	-	4,896		
Subtotal Equipment	lumpsum																								
D Detailed Design /b				157				-				-				-				-			157	ICB	5
				157			437	241	2,117		603	1,122			545	680			587	793			7,282		
Total																									

\ a Turn-Key, including design
\ b Excluding Design for Electricity Generation Facility
\ c 50% of fuel consumption
\ d 50% of Electric Power Consumption

Procurement: Managerial Improvements

Latvia
Riga Solid Waste Management Project
Detailed Costs
(US$)

	Unit	Unit Cost	1998				1999				2000				2001				2002				Total	Proc. Procedure	Pack. No.
			Totals Including Contingencies ('000)																						
			RIGA	IBRD	GEF	SIDA	RIGA	IBRD	GEF	SIDA	RIGA	IBRD	GEF	SIDA	RIGA	IBRD	GEF	SIDA	RIGA	IBRD	GEF	SIDA			
Investment Costs																									
A. Equipment																									
AAS	Number	50,000	-		-				-		-			58									58		
Auto Titrator	Number	20,000	-		-				-		-			23									23		
ph-Meter	Number	5,000	-		-				-		-			6									6		
Portable Laboratory	Number	7,000	-		-				-		-			8									8		
Hood	Number	10,000	-		-				-		-			12									12		
Glass Wares	Lumpsum		-		-				-		-			12									12		
Chemicals	Lumpsum		-		-				-		-			12									12		
Subtotal Equipment			-		-				-		-			129									129	NBF	4
B. Project Support Unit																							-		
Salary cost local staff	US$		49				83				96				108				120				457	NBF	
Intern. procurement specialist	month	25,000		76				157	-		-	81											314	QBCS	20
Twinning Arrangement /a	Lumpsum		-							105				109				112				116	442	NBF	21
Office equipment	Lumpsum				-	37	-		-		-												37	NBF	22
O & M PSU	Lumpsum		26				27				28				29				30				139	NBF	
Vehicle (4-wheel-drive)	Lumpsum				21		-		-		-												21	IS	23
Total			75	76	21	37	110	157		105	124	81		238	137			112	150			116	1,539		

\a including 12 person months of technical supervision (at US$25,000) and training

Summary Table

Remediation	-	141	-	-	386	145	1,839	843	-	-	-	49	-	-	-	-	-	-	-	-	3,403		
Technical Improvements	0	339	0	0	1396	1968	935	0	630	630	208	0	291	0	0	0	528	0	0	0	7125		
Gas Collection and Electr. Generation	0	157	0	0	437	241	2117	0	603	1122	0	0	545	680	0	0	587	793	0	0	7282		
Managerial Improvements	75	76	21	37	110	157	-	105	124	81	-	238	137	-	-	112	150	-	-	116	1,539		
																					19,350		
Total Use of Funds for Investments																							**Target**
RIGA	75				2,330				1,357				973				1,265				6000		6000
IBRD		713				2,511				2,033				680				793			6730		6730
GEF			21				4,891				208				-				-		5120		5120
Sida				37				949				287				112				116	1500		1500
																					19350		19350

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MUNICIPAL SOLID WASTE MANAGEMENT PROJECT

ANNEX 4.3

PROCUREMENT INFORMATION

Latvia: Municipal Solid Waste
Procurement Information

Section 1: Procurement Review					
Element (Goods/Works)	ICB	NCB	IS	NS	Other methods
1. Procurement method thresholds	goods $300,000 works n.a.	works $1,000,000 goods clay&sand	< $300,000	< $50,000	prior approval of annual budget for recurrent costs
2. Prior Review	all ICB	first two packages	first package	first package	yes

Element (Consultant Services)	QBCS	QBS	Sole Sourcing	Minor Contracts	Other methods
3. Procurement method thresholds	$200,000	n.a.	n.a.	n.a.	n.a.
4. Prior Review	yes	yes	yes	yes	yes
5. Ex-post Review: contracts not subject to the prior review	Explain briefly the ex-post review mechanism: Ex-post review will be done in accordance with Appendix 1 of the *Guidelines for Procuremet under IBRD Loans and IDA Credits*				

Section 2. Capacity of the Implementing Agency in Procurement and Technical Assistance requirements	
6. Brief statement: Primary responsibility for overseeing implementation of procurement procedures will rest with the staff of the PIU. Its capacity will be strengthen by procuremnt consultant.	
7. Country Procurement Assessment Report or Country Procurement Strategy Paper status: Country Procurement Strategy Paper was finalized in July 1995.	8 Are the bidding documents for the procurement actions of the first year ready by negotiations? Yes

Section 3. Training, Information and Development on Procurement				
9. Estimated date of Project Launch Workshop: Jul. 1998	10. Estimated date of General Procurement Notice publication May 1997	11. Indicate if contracts are subject to mandatory SPN in Development Business: Yes (every consultant assignement above $200,000)	12. Domestic Preference for Goods/Works:Yes/No	13. Domestic Preference for Consultant Services: Yes
14. Retroactive financing No			15. Advanced Procurement No	
16. Explain briefly the Procurement Monitoring System and Information System: In addition, the PIU will develop a monitoring/reporting system for timely implementation of procureemnt. *The reports will be submitted to the Bank montly.*				

Section 4. Procurement Staffing		
17 Indicate name of Procurement Staff as part of Project Team: Snezana Mitrovic, Procurement Analyst, x32182, with back-up from Sergei Popov, Consultant	Sector Unit: ECSRE	Ext. 32182
18. Explain briefly the expected role of the Field Office in Procurement: Field Office will provide back-up on procurement issues to project team. 19. Procurement Audit Planned: NO		

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MUNICIPAL SOLID WASTE MANAGEMENT PROJECT

ANNEX 5.1

DISBURSEMENTS OF BANK LOAN AND GEF GRANT

DISBURSEMENT OF WORLD BANK-LOAN AND GEF-GRANT FOR INVESTMENTS

	Year		1998			1999			2000			2001			2002			TOTAL	FINANCIERS				
	Semester	Finance	First		Second		First		Second		First		Second		First		Second			WB	%	GEF	%	Riga
	Sub-Components						total		total		total		total		total		total							
	Civil Works and Larger Equipment																							
1	Material, incl. Transport Clay and Sand	Foreign					812	688	812	688												1375	26.9	
		Local						124		124														248
2	Earth Works/Remediation	Foreign					330	268	330	267										71	1.1	464	9.1	
		Local						62		63														125
6	Civil Works/Buildings, Technical Improvemen	Foreign					480	407	623	526	122	104	122	104								1143	22.3	4
		Local						73		95		18		18										207
9	Sorting Unit/Shredder	Foreign					727	727	727	727	217	203	217	203						1860	27.6			
		Local										14		14										28
11	Wheel/Track Loader	Foreign							409	409	212	212	212	212						832	12.4			
		Local																						
18	Collector Well, Pumping, Boiler	Foreign									271	230	271	229					54	46	54	45		
		Local										41		42						8		9		100
19	Electricity Generation Facility	Foreign					1059	1059	1059	1059	329	329	329	329	340	340	340	340	351	351	351	351		2040	30.3	2117	41.3	
	Smaller Equipment																							
3	Machinery equipment building /b	Foreign							67	74										74	1.1			
		Local								13														13
8	Weighbridge and Registration	Foreign					88	88												88	1.3			
		Local						0																
10	Container, Oil Tank	Foreign					17	17												17	0.3			
		Local																						
14	Gas Extraction Piping	Foreign					93	79	93	79										158	2.3			
		Local						14		14														28
16	Regulation Station	Foreign							83	83										83	1.2			
		Local																						
17	Junction Manholes	Foreign									5	5								5	0.1			
		Local																						
23	Vehicle	Foreign			21	21																21	0.4	
	Consultant Services																							
5	Detailed Design	Foreign		200		437														637	9.5			
		Local																						
20	Intern. Procurement Specialist	Foreign			76	76	79	79	79	79	41	41	41	41						314	4.7			
		Local																						
																			Total	6730	100	5120	100	753
	DISBURSEMENT OF WORLD BANK LOAN																		Total					
	Investment			200		513		990		1522		1019		1013		340		340		397		396	6730	
	Interest during construction					15	0	39	0	79	0	119	0	157		223		184		195		208	1220	
	Total		0	200	0	528	0	1029	0	1601	0	1138	0	1170	0	563	0	524	0	592	0	604	7950	
	Disbursement per Semester																							
	IBRD/World Bank (incl. Interest)			200		528		1029		1601		1138		1170		563		524		592		604	7950	
	Global Environment Facility - GEF					21		2421		2470		104		104									5120	

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MUNICIPAL SOLID WASTE MANAGEMENT PROJECT

ANNEX 5.2

DETAILED DISBURSEMENT SCHEDULE FOR BANK LOAN

DETAILED DISBURSEMENT SCHEDULE FOR BANK LOAN

Estimated Schedule for Disbursement
(US $ million)

		Loan Disbursement			Disbursement Profiles				
	Quarter	This	Cumulative	Cumulative	All Regions	All Regions	All Regions	ECA Region	ECA Region
	Since Approval	Semester		Total %	Invest. Loan	Sector *	Sector **	Sector *	Sector **
FY 1999	December, 1998	0.73	0.73	9%	0	0	0	0	0
	June, 1999	1.03	1.76	22%	3	3	3	3	3
FY 2000	December, 1999	1.6	3.36	42%	6	6	10	6	10
	June, 2000	1.14	4.5	57%	10	10	18	6	18
FY 2001	December, 2000	1.17	5.67	71%	18	18	26	14	26
	June, 2001	0.56	6.23	78%	26	26	42	18	46
FY 2002	December, 2001	0.52	6.75	85%	38	38	54	26	54
	June, 2002	0.59	7.34	92%	50	50	66	30	70
FY 2003	December, 2002	0.6	7.95	100%	62	58	78	50	90
	June, 2003				70	66	86	58	94
	Loan Closing Date		July 31 2003						

*Subsector Set - Environmental Control

**Subsector Set - Energy

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MUNICIPAL SOLID WASTE MANAGEMENT PROJECT

ANNEX 6.1

ENVIRONMENTAL DATA SHEET

ENVIRONMENTAL DATA SHEET FOR PROJECTS
in the IBRD/IDA Lending Program

Country:	LATVIA	Project ID No:	LV-PA-40533
Project Name:	Municipal Solid Waste Management Project	Total Project Cost:	$25.1 million
Appraisal Date:	March, 1997	Task Manager:	Anders Halldin
Board Date:	May, 1997	Sector:	Environment and Energy
Managing Division:	EC4NR	Status:	Preparation
Lending Instruments:	IBRD	Date Assigned:	February 10, 1997
Date (est) for receipt of EA by Bank:	January, 1997		
EA Category (A/B/C):	B		

Date Sheet Prepared/Updated February 10, 1997

(Please do not leave any items blank: use "N/A" or "To be developed" when appropriate)

Major Project Components: (presents description of project components)

The project would consist of: (a) remediation of the existing disposal site; (b) technical and managerial improvements in order to increase separation of recyclable materials; (c) establishment of energy cells for enforced degradation of easily biodegradable waste; (d) collection of landfill gas (LFG) containing about 50% methane (CH_4); (e) co-generation of electricity and heat based on the collected LFG thereby replacing other fossil fuels; (f) technical assistance through twinning arrangements to enable staff to operate the waste processing system efficiently and achieve maximum revenues from the generated and separated by-products: and (g) managerial assistance during the implementation period to facilitate the future development of the company.

Major Environmental Issues: (describes major environmental issues identified or suspected in project)

Major positive environmental results would be obtained through: (a) efficient remediation of the existing Getlini Disposal site; (b) measures to safe guard the aquifers from future additional contamination from percolating leachate; (c) treatment of polluted surface water before its discharge to River Daugava; and (d) reduction of greenhouse gases through the collection of LFG.

Other Environmental Issues: (describes environmental issues of lesser scope associated with project)

Positive: (a) Improved management and separation of recyclable material; (b) utilization of by-products as a result of the waste processing technology; and (c) substantially prolonged lifetime of the disposal site at Getlini.

Negative: Currently, there are a number of semi-formal workers involved in recycling activities and food-pickers looking for food wastes and cloths. The implementation of the project would not allow the food-pickers to be inside the area at all, and would also result in a reduced number of semi-formal workers.

Local Consultation and Beneficiary Participation: A strong participatory approach has been adopted from the early beginning of project preparation, due to the sensitive socio-political nature of a landfill project. Three public meetings have been held (on May 25, October 26, and December 14, 1996), with the participation of all major key stakeholders in the project, including affected communities, garden societies and inhabitants close to the Getlini site, mass media, Riga City Council, Stopinu Pagasts Council, regional and national government officials, NGOs, and the operating waste management enterprise. The meetings as well as the development of the project during the preparation phase have been widely recorded in TV, radio, and newspapers.

Major concern among the affected parties has been to assure that the groundwater would be improved and possible to use for irrigation purposes. In order to evaluate the actual problem the Bank has initiated a separate investigation of all private wells in the area, which results are expected to be available before end of March 1997.

Proposed Actions: (describes actions proposed to mitigate environmental issues described in project)

Based on the technical feasibility study and the environmental assessment, it is evident that the project would result in a number of beneficial measures. However, the social impact mentioned above would be mitigated through creation of new job opportunities for some of the semi-formal workers. The food-pickers would be informed, well in advance, that their access to the site would cease. There is, however, a social safety net in place which would require food-pickers be registered.

A Monitring Plan would be created in agreement with the environmental authorities - Ministry of Environmental Protection and Regional Development and Riga Region Environmental Board - in order to provide all stakeholders continued information about the project

Justification/Rationale for Environmental Category: (reasons for environmental category selected & explanation of any changes from initial

The proposed project would present a state-of-the-art solution for more than 40% of the municipal solid waste generated in Latvia, and would continue to use a site which would otherwise be forced to shut down, causing considerable extra expense. Originally, the project was supposed to identify and establish a new disposal site, and include the means for closure of the existing site. However, the feasibility study including comprehensive groundwater investigations show that the actual groundwater contamination can be arrested and the operation can be continued through investments in modern waste management technology. The implementation of the project would result in a number of positive environmental impacts: (a) elimination of groundwater contamination; (b) reduction of surface water contamination; (c) improved living conditions for the neighbors through reduction of noise and odor; (d) reduction of greenhouse gas emissions through collection of the landfill; and (e) reduction of imported fuel and other greenhouse emissions through utilizing the landfill gas for electricity generation and heat production.

Status of Category A Environmental Assessment: (presents EA start-up date, EA first draft, and current status)

An environmental assessment in accordance with OD 4.01 has been carried out and presented to the Bank in January 1997.
Complete government approved EA: February, 1997.

Remarks: (gives status of any other environmental studies, lists local groups and local NGOs consulted, tells whether borrower has given permission to

Active NGOs: Environmental Protection Club, Latvia Greens
Partial list of prior studies: (i) Riga Region Solid Waste Plan, Carl Bro 1993 and 1994; (ii) Landfill Siting Study, Carl Bro Sept. 1994; (iii) Hydrogeological Study on Getlini, Baltec, 1994 and 1995; (iv) Closure and Remediation Options for Getlini, Baltec, 1995; (v) Preliminary EA for two proposed sites, Carl Bro Sept. 1994.

Signed by:	Signed by:
Geoffrey Fox, Chief, EC4NR for	Anand Seth (EMTEN), Regional Environment Division Chief

LATVIA

MUNICIPAL SOLID WASTE MANAGEMENT PROJECT

ANNEX 6.2

SUMMARY OF ENVIRONMENTAL ASSESSMENT

ANNEX 6.2

SUMMARY OF ENVIRONMENTAL ASSESSMENT

Introduction

Environmental Resources Management (ERM) was commissioned by the World Bank to prepare an Environmental Assessment (EA) report of the proposed remediation extended operation of the Getlini waste disposal site, Riga, Latvia. The project has been classified as Category A and a full EA is required in accordance with World Bank OD 4.01 and applicable Latvian legislation (eg the Law on State Ecological Expertise). The EA work was carried out in parallel with a technical feasibility study, conducted under a separate Terms of Reference (ToR) by SWECO of Sweden.

The EA project commenced on 26 August 1996, and was carried out over a period of approximately four months, with a Final Report in January, 1997.

The Setting

The Getlini waste disposal site is located approximately 12 kilometres south-east of the centre of Riga City in Stopini Pagast [1]. Getlini is situated in the Daugava River basin approximately 1.7 km north of the river on the right bank.

The site is located in a level plain where sandy, glacial sediments form a sandy surface aquifer. This unconfined surface aquifer is not locally important for drinking water supply, because its water quality is affected by a large peat bog and ground-water pollution from the Getlini disposal site; however, there are a number of shallow wells in the vicinity used primarily for irrigation purposes. Underlying the surface aquifer are deeper aquifers which represent an important, regional water resource. Contamination has not yet reached the deeper aquifers, but hydrogeologic modelling indicates that it eventually will unless remedial measures are carried out.

Adjacent to the waste disposal site territory are 54 permanent households with a resident population of 117 people of which 14 households are in close proximity to the site.

The dominant land use in the area has for centuries been agriculture and to a lesser extent forestry. The surrounding landscape consists of a matrix of agricultural fields, pasture, forest, and bogs or other wetlands. The local population consists mainly of unskilled labourers and pensioners who supplement their income with agricultural produce from garden plots. Also there are groupings of small garden plots which are essentially the gardens of Riga residents and are a source of food for many city households and additional income for many families.

Getlini Bog borders the site to the north and east. There are narrow belts of forest along the western and southern edges which block the waste pile from view. Larger

[1] A Pagast is local municipal district.

tracts of forest border the eastern and northern edges of Getlini bog and block view of the site from these directions.

The Getlini Waste Disposal Site

The Getlini Waste Disposal Site is a Soviet era municipal waste dump serving Riga City and the surrounding area. The site has been in use since 1973 without benefit of modern sanitary landfilling practices. Conditions in the recent past were quite poor, with continual open fires and poorly controlled access. In mid 1995, a new company, Getlini-2, jointly owned by the local municipality and Riga City, took over daily management of the site. Getlini-2 has significantly improved management at the site, reduced some of the minor, negative environmental impacts such as fires and uncontrolled dumping, and instituted a manual materials recovery program at the tipping face. However, contamination of the surface aquifer by leachate from the waste pile is ongoing and no effective measures have been implemented to abate this problem. Moreover, while the landfilling operations are better controlled, they consist simply of waste tipping on a large waste pile without benefit of daily covering or compaction. Landfill gas is not collected or managed in any way.

The site is 87 hectares in area of which approximately 36 hectares have been covered with deposited waste. The waste pile is approximately 24 metres in height at its highest point with an estimated total volume of waste of 3.7 million m^3. The site presently receives approximately 205,000 tonnes of municipal waste per year and 45,000 tonnes of industrial waste for a total of 250,000 tonnes/year. The bulk of the industrial waste consists of concrete rubble and other inert materials.

Project Description

The project proposes to remediate environmental pollution and modernize the Getlini site to international good practice standards. The resulting environmental benefits include abatement of ongoing ground and surface water contamination which will result in improved ground and surface water quality, improved site management and control to assure receipt and handling of appropriate waste only, general improvement in site appearance, and management and control of landfill gas and utilisation for energy production.

The project will meet these objectives through the following proposed works on the original site area:

- capping or covering of the existing waste pile with a layer of soil material to significantly reduce the infiltration of precipitation and therefore leachate generation;

- removing contaminated water by installing wells to capture leachate and contaminated ground water, and construction of a surface drainage control system to capture surface runoff;

- construction of water treatment facilities to treat the contaminated waters prior to release to the River Daugava;

- establishing an efficient management and waste control system at the site in line with good international practice; and

- construction of gas collection and pumping facilities to control and utilise landfill gas for energy production.

Public Consultation

Consultation was carried out in accordance with World Bank policy and guidelines. Furthermore, stakeholders were identified during the course of a social assessment to identify in particular those members of the general public whose environmental or social situation might be materially affected by the project. Key consultation activities included:

- meetings with public authorities, key NGOs, current site management and other institutional stakeholders;

- public meetings at which stakeholders were brought together and encouraged to discuss issues in general session facilitated by a member of the Environmental Assessment team; and

- a series of interviews with randomly selected members of the local community, site workers, and informal waste/food pickers (scavengers) at the site.

In addition, information has been made available to the Latvian media throughout the development of the project and will continue to be disseminated during the construction and operation phases.

In response to the findings of the consultation, chemical analyses of soil from surrounding agricultural lands were carried out to determine if there had been pollution caused by previous landfill activity, and operational improvements have been recommended for the future management of Getlini-2. Measures to address the remaining minor concerns of stakeholders were also developed and incorporated into the site Environmental Management Plan (EMP).

Potential Impacts

ERM conducted a preliminary assessment of potential impacts of the proposed project and the likely significance of the impacts, and recommended measures to manage and monitor environmental effects. As the project proposes to remedy past environmental degradation, the predicted impacts are overwhelmingly positive in terms of the local environment. However, all engineering projects also have the potential for adverse effects on local and social conditions. The EA indicates the types of impacts expected and the types of mitigation measures likely to be necessary and presents these in an outline Environmental Management Plan (EMP). After the detailed engineering design is completed, a revised EMP should be produced containing a timetable and costed proposals for implementation.

Issues/impacts known to occur in landfill development and of most concern to stakeholders were identified during an August-September 1996 scoping exercise and fell into eight areas:

- social, socio-economic and cultural;
- hydrogeology, hydrology and water quality;
- health and safety;
- air quality;
- noise;
- ecology;
- off-site traffic; and
- visual/landscape.

Most significant of these were social impacts, including the loss of income for the semi-formal waste workers and the loss of access to the waste for the informal waste/food pickers. In both cases the impact is associated with the economic difficulties of the transition economy, and may dissipate if the Latvian economy improves. Semi-formal workers are those who benefited from the manual materials recovery/recycling program initiated by Getlini-2. Effects on this group may be mitigated by phasing the modernisation of the materials recovery operation such that there are continued, if decreasing, collection and recycling opportunities over the next one to three years.

The informal waste/food pickers' practice of scavenging food from the waste pile poses health and safety risks and is clearly undesirable. The only feasible measure to reduce the impact of the opportunity loss is to make sure that the affected people are warned in advance about the coming management changes and the implications. The exclusion of this group is an inevitable consequence of capping the existing waste pile which is a key

component of the ground-water remediation program, and which will have long term environmental benefits for the locality and region.

Discharge of the treated effluent is unlikely to have an adverse impact on the water quality of the Daugava and the Gulf of Riga. However, there is some concern that local effluent standards may be inappropriately stringent, as they were intended to apply to domestic wastewater and not landfill leachate. Agreement on appropriate treatment levels for the landfill effluent, and hence quality standards, must be reached between Latvian environmental authorities, the World Bank, and the project design engineers.

Mitigation and Environmental Management

The benefits of the project will be fully achieved only if the landfill is operated properly. The necessary engineering measures and operational practice will be built into the design of the project. Additional measures to ensure the findings of the EA are implemented are summarized in the following table.

Outline of Environmental Management Plan

Measure		Timing	Monitoring Agency
Manage the transition of the materials recovery regime to minimise effects on the semi-formal workers	Project implementation engineers	Years 1-3 of the remediation programme	Riga City Council
Publish information leaflet to advise semi-formal and informal workers of the impending changes to working practices	The site management company	Before the start of the remediation programme	Riga City Council
Develop a business plan which includes proposals for building institutional capacity in environmental management, restoration and aftercare, and liaison with neighbouring residents.	The site management company	Before the end of construction activities	Riga City Council
Implement a monitoring program to ensure that facilities are operate as intended and no adverse effects result from the continued operation of the site. The program should be developed in consultation with the Ministry of Environment and include monitoring of treated leachate, landfill gas, groundwater quality and response to any complaints about noise.	Project design engineers	As part of detailed engineering design	Riga City Council
Development of an operational management plan which includes environmental management, worker health and safety, and emergency response procedures.	Getlini-2 Management in consultation with design engineers	During detailed engineering design	Riga City Council
Preservation of a belt of forest around the site to provide visual screening	Project implementation engineers	During construction and future operation	Riga City Council

LATVIA

MUNICIPAL SOLID WASTE MANAGEMENT PROJECT

ANNEX 7

NOTES ON THE FINAL BENEFICIARY: GETLINI-ECO LTD.

ANNEX 7

NOTE ON THE FINAL BENEFICIARY: GETLINI-ECO LTD.

A. GENERAL BACKGROUND

1. Following the agreement signed in December 1996 between Government, Riga City Council and the Council of Stopinu Pagasts, a new company - Getlini-Eco Ltd. - would be established to implement and operate the project, at least until final repayment of all loans. The existing Getlini-2 company would become a fully-owned subsidiary of the new company; it would be responsible for the reception and processing of household and industrial waste at the Getlini site, operating as a contractor for Getlini-Eco Ltd..

2. This annex will cover, firstly, the proposed organisation, staffing and financial structure of the new company Getlini-Eco Ltd.; in addition, a financial cash flow projection has been made over a 20-year period. In addition, details of the currently operating company, Getlini-2 Ltd. will be presented as an example of the expenses of an operator.

B. GETLINI ECO LTD

Identity

3. Getlini-Eco Ltd. would be a "municipality" enterprise under Latvian law, to be incorporated as a limited liability company. It would remain operational at least until final repayment of all loans, after which the company could be wound-up and the shares restituted to the present owners MOEPRD, Riga City Council, and Stopinu Pagasts.

Capital and Shareholders

4. Getlini-Eco Ltd.'s share capital is proposed to be set at US $1 million (LVL 540,000), which is to be paid up over four years. Capital will be held for 55% by Riga City Council; for 35% by the Council of Stopinu Pagasts; and for 10% by Government (Ministry of Environmental Protection and Regional Development - MOEPRD).

Activities

5. The company would be responsible for implementation of the Project and supervision of the continued operation of the landfill (with new technology), including more extensive selection and sale of recoverable waste. Physical management of the landfill and the new energy cells would be carried out by an external contractor under a management contract.

Staff

6. The organigramme and staffing of the new company would be as follows:

- **Managing Director**, a Latvian national of sufficient experience and stature to guide the new company, to supervise implementation of the project and to control the landfill operations carried out by the contracted company.

- **Head of Technical Department**, also a Latvian national with extensive experience in industry; responsible for the technical implementation and supervision of the project. In addition, all environmental matters would be covered by this department. The Head would be assisted by an expatriate consultant engaged on a part-time basis. There would also be a junior engineer to assist the Technical Director in the day-to-day tasks.

- **Head of Finance Department**, a Latvian national, who would be responsible for all financial and commercial aspects of the project, and for the accounting and budgeting of the company. He would be assisted by an accountant.

In addition, there would be one bi-lingual secretary and a driver/messenger. Getlini-Eco Ltd. would have an office in Riga. Part of the operating expenses of the new company are included under the Managerial Improvements under project Costs, including the Twinning Agreement. In addition, Government has proposed that its share of the Natural Resources Tax (**see para. 10**) over the project implementation period would be earmarked for covering the operational expenses of the new company.

Management

7. The company's management would consist of the Managing Director and the Heads of the Technical and Finance Departments. Under the Project it would be necessary to extend technical assistance, in particular regarding the new technology being introduced, management of a multi-million enterprise and accounting. The proposed twinning arrangement could fulfil all of these requirements.

Position in the Sector

8. The Getlini landfill is the only major disposal site in the County of Riga (and in the country); it receives close to 40% of all domestic waste generated in the country, as well as an unknown share of the country's industrial waste (of which part is toxic). With the introduction of new waste processing technology, Getlini-Eco Ltd. could well become the country's leading waste processor, in part by attracting more waste to the Getlini site, in part by taking over for management other disposal sites in the country.

Operations and Revenues

Volume of Waste

9. Total waste received at the site has been estimated at over 1.3 million m3 per annum[1], equivalent to around 250.000 ton. Of this quantity about 80% is household waste, with the remainder industrial waste. No hazardous waste is accepted or stored permanently at the site.

Tariffs

10. For household waste collection the charge per year and per inhabitant is at present Ls 2.35 per m^3 (with the average waste per year calculated at 1.30 m^3 per person for an annual charge of Ls 3.05); charges are fixed by the RCC. The charge is based on: (a) a disposal fee payable to Getlini-Eco Ltd. of Ls 0.40/m^3; (b) collection and transportation of Ls 1.30/m^3; (c) replacement of containers at Ls 0.40/m^3; and, (d) the Natural Resource Tax of Ls 0.25/m^3. The latter is distributed to Government (30%), Riga District (30%) and the Stopinu Pagasts (40%). Charges for industrial waste vary by type of waste, between Ls 0.85 and Ls 1.06 per m^3.

Revenues

11. In addition to the disposal fee, the new company would also receive sales proceeds from recovered waste materials and electricity sales to Latvenergo. Details are in the cash flow projections **(see Appendix 3)**.

Financial Structure

Balance Sheets

12. **Appendix 1** illustrates the future financial structure of the company after project implementation, at the end of 2002. Assets would consist of: a) intangibles (design, supervision, consultants) for US $1.85 million (9% of the balance sheet); b) buildings, machinery and equipment, valued at US $17.50 million (81% of balance sheet totals); and current assets, estimated at 10% of the balance sheet. On the liabilities side, Net Worth, or shareholders' equity, consists of US $1 million share capital and US $6.62 million of grants, shown here as quasi-equity; total Net Worth is around 40% of the balance sheet. Long term debts represent lending from the World Bank and Riga City Council, for a total of US $11.95 million or around 55% of the balance sheet, while current liabilities have been estimated at 5% of the balance sheet.

[1] The preliminary figure for 1996 is 1,227 thousand m^3.

Prospects

Forecast Operating Results

13. The 20-year projection consists of two parts; the first in constant terms, based on revenue projections and estimates of recurrent costs prepared by the Consultants. The second projection incorporates an inflation correction; recurrent costs have been increased with the projected GDP deflator, while the same deflator has been applied to revenues, but lagged by one year. Revenues include sale of electricity and of incremental recovery of waste materials. The disposal fee has not been incorporated in the analysis, as it will basically be used to compensate the contractor for its operations on the site.

14. Recurrent or operational costs include provisions for maintenance and replacement of spare parts; in addition, depreciation has been added, equivalent to 5% of the total investment, including contingencies (physical only for the projection in constant terms). Interest charges have been derived from the projected inflows of the World bank loan, as the RCC loan has been taken as interest free, but repayable over 12 years (see **Appendix 2**). After deduction of 25% company tax the retained earnings, together with depreciation, constitute the Project's cash flow available for coverage of recurrent costs during project implementation (the company's contribution to the project's finance plan) and of loan repayment. Application of the GDP deflator at 100% on costs, and lagged by one year on revenues and depreciation, improves the generated cash flows substantially. The results are shown in **Appendix 3**.

15. The projection without inflation correction indicates that the cash flow after loan repayment remains positive throughout the period, and that the company is able to cover recurrent costs during project implementation. The cumulative cash flow shows substantial positive balances, at around US $4.2 million by 2003, rising to US $15.1 million by the year 2019. This surplus would be available for dividend payments to shareholders and/or the financing of further investments.

16. The inflation corrected cash flows are even more favourable.

17. A ratio-analysis has also been carried out (see **Appendix 3**). In the projection in constant terms, the cash flow as a percentage of revenues rises from 28% after project implementation to around 42% after 5 years, to reach 50% towards the end of the projection. The Cash flow after loan repayment, as a percent of revenues, amounts to 17% in the first year of loan repayment, rises to 26% in 2005 to then drop gradually to 12% in the last year of loan repayment. The debt-service ratio, taken as a ratio of loan repayment over cash flow after interest payment rises from 49% in the first year of loan repayment to 72% in the last year, 2015. These ratios indicate that the company/project is able to meet its debt repayment obligations comfortably. The results of the inflation corrected analysis are even more favourable.

Tariff Adjustments

16. The cash flow projections discussed above indicate that the Project is financially attractive. For this reason there is no need for tariff increases.

Long-Term Perspectives

17. As shown in the previous sections, the outlook for the company for the next 15 years is quite good, with cash flows accumulating rapidly after loan repayment has been completed. As the Project would increase the economic life of the site considerably, by up to 100 years, without additional investments, the long term perspectives of Getlini-Eco Ltd. appear excellent.

Risks

Managerial

18. The new management would need technical assistance in order to supervise project implementation, as well as the efficient operation of a modern, multi-million landfill operation. This technical assistance would be provided in the context of a twinning arrangement with an experienced Swedish company. If the proposed twinning arrangement does not work out, there would be a risk of sub-optimal returns, and hence a shortfall in the cash flows to repay the loans.

Technical

19. The new technology has only been tried out in a limited number of landfill operations in Sweden. There is therefore a risk in its efficient application in Latvia, where the business environment is quite different. Technical assistance in this area would be important for the correct implementation of the new technology and the financial success of the Project.

C. GETLINI - 2 COMPANY LTD.

Identity

20. "Getlini - 2" Ltd. (GLC) is a "municipality" enterprise under Latvian law, incorporated in 1994 as a limited liability company.

Capital and Shareholders

21. GLC's share capital was initially fixed at Ls 100, but was increased in 1996 to LVL 2000. It is held for 51% by the Stopinu Pagasts Council and for 49% by the Riga City Council. Under the agreement signed in December 1996 between Government, Riga City Council and Stopinu Pagasts Council, the shares would be transferred to the new Getlini-Eco Ltd., and Getlini-2 would thus become a wholly owned subsidiary.

Activities

22. The company was set up in 1994 to take over the landfill activities at the Getlini site from one of the major waste collection companies in Riga, which had been responsible for managing the site since its inception in 1973. However, this take-over became effective only in July 1995.

23. Present activities include receiving waste, overseeing its deposit on the landfill, as well as selection and sale of recoverable waste. Physical management of the fill is also an important activity and includes construction of access roads to the top of the landfill, some 30 m above the surrounding area. The company has provided for a minimum of protection against pollution from the waste pile, primarily by digging drainage ditches around the site.

24. Under the new arrangement, GLC or another company will be hired under a management contract to continue operate the site, as well as implement the new energy cell technology on the site, under supervision of Getlini-Eco Ltd.. This operation should be formalised in a contract, initially for 2 years and to be renegotiated regularly thereafter.

Staff

25. At present some 85 staff are on the company's payroll, of whom 13 in administration. In addition, between 250 to 400 persons work on an irregular basis and informally employed on the landfill as scavengers, engaged in waste selection for sale to the company. The informal workers will, however, no longer be allowed on the site once the new technology has been implemented; a limited number may well be engaged to work on the waste recovery line.

Management

26. The company's management consists of the managing-director, who is very dynamic, and a deputy with poorly defined tasks and few obvious responsibilities. The director has been able to transform a poorly organised waste dump into a well-run landfill operation. While he is a good organiser, he is also autocratic and reluctant to take advice. Under the Project it would be necessary to extend technical assistance, in particular regarding the new technology being introduced, management of a multi-million enterprise and accounting. The proposed twinning arrangement could fulfill all of these requirements.

Operations and Revenues

Volume of Waste

27. Total waste received at the site has been estimated at over 1.3 million m^3 per annum, equivalent to an estimated 250.000 tons, of which over 80% household waste.

Revenues

28. Accounts indicate that for 1995 revenues of Ls 347,723 consisted of Ls 310,317 (89.2%) in disposal fees. The sale of selected waste materials, which started only when the new management took over in mid-1995, accounted for Ls 35,332 (10.2%), while sale of firewood and other represented the final 0.6%. For the first 9 months of 1996 overall revenues were Ls 501,670, of which Ls 87,564 (or 17.5%) represented the sale of selected waste materials.

29. In future, the contractor would no longer receive the disposal fee from waste haulage companies, but would be paid a fee by Getlini-Eco Ltd.. The sale proceeds from recovered waste materials would also accrue directly to Getlini-Eco Ltd..

Profitability

Cash Flow

30. **Appendix 4** shows the Profit and Loss accounts for 1995 and the first 9 months of 1996. The data indicate that the cash flow for 1995 amounted to Ls 60,643, equivalent to 17.4% of net revenues. For the first 9 months of 1996 the approximate cash flow is Ls 49,700, or only 9.9% of net revenues; the reasons for this decline are not clear. As the time series is short and the data is rather limited, there seems little point in calculating ratios.

Comments

31. The accounts have been audited by a recognised local firm. However, accounting methods at GLC are not entirely clear and would need to be improved. For example, depreciation are included under operational expenditure; overheads have not been indicated separately, and "social" expenses have been classified as production costs.

Financial Structure

Balance Sheets

32. **Appendix 5** illustrates the financial structure of the company at the end of 1995, as well as after the first 9 months of 1996. For 1995 net fixed assets consist of land, buildings and equipment, valued at Ls 47,339 (32.2% of the balance sheet totals). Current assets of Ls 99,662 (67.8%) consisted

primarily of cash and debtors. On the liabilities side, there are no long term debts, but creditors of Ls 86,259 represented 59% of the balance sheet. Net worth, or shareholders' equity of Ls 60,742 accounted for 41%.

33. The 9 months figures for 1996 show a substantial increase in the balance sheet totals (+59.3%), reflecting a build-up of assets, primarily current assets, and on the liability side an increase in Net Worth and in the creditors position.

Sources and Uses

34. The company derives its financial revenues solely from collection of disposal fees and sale of selected waste materials. For 1995 it is impossible to discuss sources and uses, as the comparative balance sheet for 1994 is not available. For the first 9 months of 1996 the cash flow amounted to around Ls 50,000, reflected in the increase of net worth, to which should be added the rise in creditors for total additional resources of around Ls 87,000.

35. Regarding uses, a list of investment items approved for expenditure during 1996 of around Ls 500,000 had been signed by only one of the shareholders, while its financing was left unclear. However, the provisional balance sheet for the first 9 months of 1996 indicates that only a modest amount of fixed asset formation has so far taken place (Ls 14,802 in fixed assets and in current equipment), with the balance retained primarily under "cash and banks." The increase in debtors accounts for the balance of uses.

Comments

36. The accounts indicate that GLC has a solid financial base, with net worth representing at the end of the first nine months of 1996 over 47% of the balance sheet, against 41% at end-1995. Accounting methods need to be improved.

Prospects

Forecast Operating Results

37. A projection of future cash flows has been made, assuming that revenues would be maintained at the 1996 level. The results are shown in **Appendix 6** in constant 1996 Lats.

38. The projection, based on the 9-months' figures of 1996, assumes a stationary situation, which is a conservative hypothesis because there are possibilities for increased revenues through better waste selection (estimated at Ls 100,000 net per year by management) and for reduced costs, primarily by cutting back on staff (it is estimated that a similar landfill operation in Sweden would require only half the present staff). The annual cash flow in constant Lats would be around Ls 115,000, or 16.3% of net revenues. Application of the GDP deflator at 100% on costs, and lagged by one year on revenues and depreciation, would improve the generated cash flows substantially; this has however not been calculated.

Tariff Adjustments

39. The cash flow projection discussed above indicates that GLC is financially viable and that there is no need for tariff increases.

Risks

Managerial

40. Present management, while dynamic, is not well prepared to operate a modern, multi-million landfill operation. If the new arrangement with Getlini-Eco Ltd. and/or the proposed twinning arrangement do not work out, there would be a risk of sub-optimal returns, and hence a shortfall in the cash flows to repay the loans.

Technical

41. As was already mentioned under the section on Getlini-Eco Ltd., the new technology has only been tried out in a limited number of landfill operations in Poland and Sweden. There is therefore a risk in its efficient application in Latvia, where the business environment is quite different. Technical assistance in this area would be important for the correct implementation of the new technology and the financial success of the Project.

Getlini-Eco Future Balance Sheet

	ASSETS			LIABILITIES	
	(US $'000)	%		(US $'000)	%
Intangible assets (1)	1 850	9	Share capital	2 000	9
			Quasi equity (grants)	6 620	31
Fixed assets (2)	17 500	81	Shareholders' funds	8 620	40
Current assets (3)	2 150	10	World Bank	7 950	37
(cash, spare parts, debtors)			Riga City Council	4 000	18
			Long term loans	11 950	55
			Current liabilities	930	5
TOTALS	21 500	100	TOTALS	21 500	100

(1) intangibles include detailed design and supervision (US $637,000), national (US $457,000) and international consultants (US $756,000).
(2) fixed assets are total project costs, minus intangibles and capitalised recurrent costs (23,990 - (1,850+4,645) = US $17,495,000.
(3) estimated at around US $2,150,000

Schedule of Interest and Loan Payments
(US $'000)

Assumptions: Project costs, including physical and price contingencies is US $23.99m; interest during construction is estimated at US $1.22 million.
Grants and loans will cover US $19.35 million, while Getlini-Eco will contribute US $4.64 million, which represents capitalised recurrent costs.
Interest during construction on the WB loan of US $1.22 million would be covered from the IBRD loan..

Source	Financing	Purpose and Terms
Getlini-Eco	4640	To cover recurrent costs during project implementation, capitalised under the Project.
Grant - GEF	5120	To be used for Remediation, Technical Improvement and Electricity Generation. Disburse first if possible
Grant - Sida	1500	To be used for Environmental Remediation and Managerial Improvements.
RCC	6000	To be used for creation of share capital of Getlini-Eco of US $2 million, including shares of Stopinu Pagasts and Government. The balance of US $6 million - $2 million = US $4 million will be an interest free loan, 5 years grace, 12 years repayment
IBRD	7950	For imports and Interest during Construction. Terms 7.3% IBRD + 0.7% GoL = 8%. Grace period 5 years, repayment 12 years
TOTAL COST	25210	

		1998	1999	2000	2001	2002	cumulative
Required funding	Project costs (rounded)	850	11150	5150	3150	3690	23990
	Interest during Const	0	0	250	440	530	1220
	Total costs/finance	850	11150	5400	3590	4220	25210
	cumulative	850	12000	17400	20990	25210	
Drawdown	Getlini-Eco	0	450	1270	1390	1530	4640
	Grant - GEF	20	4850	240	0	10	5120
	Grant - Sida	40	950	280	110	120	1500
	RCC - equity	75	150	150	150	75	600
	RCC - loan	0	2350	1060	820	1170	5400
	IBRD - project	715	2400	2150	680	785	6730
	IBRD - interest(rounded)	0	0	250	440	530	1220
	sub-total IBRD	715	2400	2400	1120	1315	7950
Total disbursed	annual	850	11150	5400	3590	4220	25210
	cumulative	850	12000	17400	20990	25210	

Schedule of Interest and Loan Payments
(US$'000)

		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
RCC loan	drawdown	0	2350	1060	820	1170													
	cumulative	0	2350	3410	4230	5400	5400												
(pm item)	annuity 12 yrs/10%	not used in the calculation						793	793	793	793	793	793	793	793	793	793	793	793
actual	repayment 12 years	0	0	0	0	0	0	450	450	450	450	450	450	450	450	450	450	450	450
	loan outstanding	0	2350	3410	4230	5400	5400	4950	4500	4050	3600	3150	2700	2250	1800	1350	900	450	0
	interest payment (0%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IBRD loan	drawdown	715	2400	2400	1120	1315	7950												
	cumulative	715	3115	5515	6635	7950													
	annuity 12 yrs/8%							893	893	893	893	893	893	893	893	893	893	893	893
	repayment 12 years	0	0	0	0	0	0	257	278	300	324	350	378	408	441	476	514	555	599
	loan outstanding	0	3115	5515	6635	7950	7950	7693	7415	7116	6792	6442	6064	5657	5216	4740	4226	3671	3072
	interest payment (8%)	0	0	249	441	531	636	636	615	593	569	543	515	485	453	417	379	338	294
Interest payment	IBRD	0	0	249	441	531	636	636	615	593	569	543	515	485	453	417	379	338	294
Loan repayment	sum RCC and IBRD	0	0	0	0	0	0	707	728	750	774	800	828	858	891	926	964	1005	1049
Total debt service		0	0	249	441	531	636	1343	1343	1343	1343	1343	1343	1343	1343	1343	1343	1343	1343

Getlini-Eco Ltd. - Projected Profit & Loss, and Cash Flow Statements
(US$'000)

		1999	2000	2001	2002	2003	2004	2005	2006	2007
CASE A: constant streams, no inflation correction										
Profit & Loss Statement										
Revenues, incremental (1)	electr @ USD 0.048148/kWh+waste separati	0	2023	2796	3224	3468	3608	3690	3575	3474
Operational Costs	capitalised during the project period (2)	0	0	0	0	-1453	-1453	-1453	-1453	-1453
Gross Operating Margin Project		0	2023	2796	3224	2015	2155	2237	2122	2021
Depreciation	see footnote (3) below	0	-556	-785	-918	-1067	-1067	-1067	-1067	-1067
Net Operating Margin Project		0	1467	2011	2306	948	1088	1170	1055	954
Interest on IBRD Loan	see Appendix 2 of Annex 7 (4)	0	0	0	0	-636	-636	-615	-593	-569
Contribution to profits from Getlini-2		100	100	100	115	120	120	120	120	120
Profit before Company Taxes		100	1567	2111	2421	432	572	675	582	505
Company Taxes	25%; tax holiday on Project for 5 years	0	0	0	0	0	-143	-169	-145	-126
Retained Profit	for loan repayment/dividends/investments	100	1567	2111	2421	432	429	506	436	379
Cash Flow Adjustments										
Depreciation	see above	0	556	785	918	1067	1067	1067	1067	1067
Cashflow from Project, in constant terms		100	2123	2896	3339	1499	1496	1573	1504	1446
Contribution to investments		0	0	0	0	-544	-373	0	0	0
Contribution to project costs	recurrent costs (total USD 3.963m) (2)	-100	-1000	-1400	-1463	0	0	0	0	0
Loan Repayment	see Appendix 2 of Annex 7	0	0	0	0	0	-707	-728	-750	-774
Cashflow after Loan Repayment	available for investments or dividends	0	1123	1496	1876	955	416	845	754	672
Cumulative Cashflow after Loan Repayment		0	1123	2619	4495	5449	5866	6711	7464	8137
RATIOS										
1 - cash flow as percentage of revenues		n.a.	n.a.	n.a.	n.a.	43%	41%	43%	42%	42%
2 - cash flow after loan repayment, as percentage of revenues		n.a.	n.a.	n.a.	n.a.	28%	12%	23%	21%	19%
3 - debt service ratios, gross operating margin over sum of interest cost and loan repayment cost						3.17	1.50	1.54	1.47	1.41
3 (a) - interest payment over cash flow, before debt service payments		n.a.	n.a.	n.a.	n.a.	30%	30%	28%	28%	28%
3 (b) - loan repayment over cash flow, before debt service payments		n.a.	n.a.	n.a.	n.a.	0%	33%	33%	36%	38%
4 - depreciation as percentage of cash flow		n.a.	n.a.	n.a.	n.a.	71%	71%	68%	71%	74%
5 - gross margin as percentage of revenues		n.a.	n.a.	n.a.	n.a.	58%	60%	61%	59%	58%
6 - working ratio, operating costs over revenue						42%	40%	39%	41%	42%
7 - operating ratio, operating costs + depreciation + interest over revenues						91%	87%	85%	87%	89%

(1) Electricity production taken from Halldin, plus 15% for the base case, valued at Latvenergo's purchase price.

(2) Incremental recurrent costs, including physical contingencies only.

(3) Depreciation has been included under recurrent costs, in the form of a percentage on investments for high-level maintenance. In addition, a seperate depreciation allowance has been introduced in this cash flow at 5% of the overall investment, including physical contingencies only

(4) Interest during Construction would be covered by the IBRD loan.

Getlini-Eco Ltd. - Projected Cash Flows
(US$'000)

2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
3386	3308	3240	3179	3125	3077	3034	2995	2960	2929	2901	2875
-1453	-1453	-1453	-1453	-1453	-1453	-1453	-1453	-1453	-1453	-1453	-1453
1933	1855	1787	1726	1672	1624	1581	1542	1507	1476	1448	1422
-1067	-1067	-1067	-1067	-1067	-1067	-1067	-1067	-1067	-1067	-1067	-1067
866	788	720	659	605	557	514	475	440	409	381	355
-543	-515	-485	-453	-417	-379	-338	-294	0	0	0	0
120	120	120	120	120	120	120	120	120	120	120	120
443	393	355	326	308	298	296	301	560	529	501	475
-111	-98	-89	-81	-77	-74	-74	-75	-140	-132	-125	-119
332	295	266	244	231	223	222	226	420	397	376	356
1067	1067	1067	1067	1067	1067	1067	1067	1067	1067	1067	1067
1399	1362	1333	1312	1298	1290	1289	1293	1487	1464	1443	1423
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
-800	-828	-858	-891	-926	-964	-1005	-1050	0	0	0	0
599	534	475	421	372	326	284	243	1487	1464	1443	1423
8736	9270	9745	10166	10538	10864	11148	11391	12878	14342	15784	17208
41%	41%	41%	41%	42%	42%	42%	43%	50%	50%	50%	50%
18%	16%	15%	13%	12%	11%	9%	8%	50%	50%	50%	50%
1.36	1.31	1.26	1.22	1.19	1.15	1.12	1.09	n.a	n.a	n.a	n.a
28%	27%	27%	26%	24%	23%	21%	19%	0%	0%	0%	0%
41%	44%	47%	50%	54%	58%	62%	66%	0%	0%	0%	0%
76%	78%	80%	81%	82%	83%	83%	83%	72%	73%	74%	75%
57%	56%	55%	54%	54%	53%	52%	51%	51%	50%	50%	49%
43%	44%	45%	46%	46%	47%	48%	49%	49%	50%	50%	
90%	92%	93%	94%	94%	94%	94%	94%	85%	86%	87%	

Getlini-Eco Ltd. - Projected Profit & Loss, and Cash Flow Statements

(US$'000)

WITH PROJECT		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
CASE B - with inflation correction											
GDP deflator	as %	9.8	9	7	6	6	5	5	5	5	5
Inflation corrector, cumulative	see GDP deflator above		1.11	1.18	1.26	1.33	1.40	1.47	1.54	1.62	1.70
Profit & Loss Statement											
Revenues	10% inflation corrected, 1 year lag		0	2239	3311	4048	4614	5041	5413	5507	5620
Operating Costs	100% inflation corrected, same year		0	0	0	0	-2030	-2132	-2238	-2350	-2468
Gross Operating Margin, Project			0	2239	3311	4048	2584	2910	3175	3157	3152
Depreciation	from above with one-year lagged inflation		0	-615	-929	-1152	-1420	-1491	-1565	-1644	-1726
Net Operating Margin			0	1624	2382	2895	1164	1419	1610	1513	1426
Interest on Project Loans	see Appendix 2 of Annex 7		0	0	0	0	-636	-636	-615	-593	-569
Contribution from Getlini-2	increase by 5000 each year after 2000		100	100	110	115	120	125	130	135	140
Profit before Taxes			100	1724	2492	3010	648	908	1125	1055	997
Company Tax	25%; 5 year tax holiday		0	0	0	0	0	-227	-281	-264	-249
Retained profits	for loan repayment/dividends/investments		100	1724	2492	3010	648	681	844	791	748
Cash Flow Adjustments											
Depreciation	from above		0	615	929	1152	1420	1491	1565	1644	1726
Cashflow from Project	inflation corrected		100	2339	3421	4163	2068	2172	2409	2435	2474
Contribution to investments	inflation corrected		0	0	0	0	-760	-547	0	0	0
Contribution to Project Costs	recurrent expend, incl price contingencies		-100	-1500	-1500	-1544	0	0	0	0	0
Loan Repayment	see Appendix 2 of Annex 7		0	0	0	0	0	-707	-728	-750	-774
Cashflow after Loan Repayment	for dividends/investments		0	839	1921	2619	1308	918	1681	1685	1700
Cumulative Cashflow	after loan repayment, inflation corrected		0	839	2760	5379	6687	7604	9285	10970	12670
RATIOS											
1 - cash flow as percentage of revenues			n.a.	104%	103%	103%	45%	43%	45%	44%	44%
2 - cash flow after loan repayment, as percentage of revenues			n.a.	37%	58%	65%	28%	18%	31%	31%	30%
3 - debt service ratios, gross operating margin over sum of interest cost and loan repayment cost							4.06	2.00	2.15	2.15	2.16
3 (a) - interest payments over cash flow, before debt service			n.a.	n.a.	n.a.	n.a.	24%	23%	20%	20%	19%
3 (b) - loan repayment over cash flow, before debt service			n.a.	n.a.	n.a.	n.a.	0%	33%	30%	31%	31%
4 - depreciation as percentage of cash flow			0%	26%	27%	28%	69%	69%	65%	68%	70%
5 - gross operating margin, as percent of revenues			n.a.	n.a.	n.a.	n.a.	56%	58%	59%	57%	56%
6 - working ratio, operating costs over revenue							44%	42%	41%	43%	44%
7 - operating ratio, operating costs + depreciation + interest over revenues							89%	84%	82%	83%	85%

(1) The Bank loan is at variable interest rate; however, variations cannot be projected and the payment has been kept constant for this reason.

Getlini-Eco Ltd. - Projected Cash Flows
(US$'000)

2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
4	4	4	4	4	3	3	3	3	3	3
1.77	1.84	1.91	1.99	2.07	2.13	2.19	2.26	2.33	2.40	2.47
5751	5844	5951	6073	6209	6357	6456	6565	6684	6812	6948
-2566	-2669	-2776	-2887	-3002	-3092	-3185	-3281	-3379	-3480	-3585
3185	3175	3175	3186	3206	3265	3271	3285	3305	3331	3364
-1812	-1885	-1960	-2038	-2120	-2205	-2271	-2339	-2409	-2482	-2556
1372	1290	1215	1148	1086	1060	1000	946	896	850	808
-543	-515	-485	-453	-417	-379	-338	-294	0	0	0
145	150	155	160	165	170	175	180	185	190	195
974	925	885	855	834	851	837	832	1081	1040	1003
-244	-231	-221	-214	-209	-213	-209	-208	-270	-260	-251
731	694	664	641	626	638	628	624	811	780	752
1812	1885	1960	2038	2120	2205	2271	2339	2409	2482	2556
2543	2578	2624	2680	2746	2843	2899	2963	3220	3261	3308
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
-800	-828	-858	-891	-926	-964	-1005	-1050	0	0	0
1743	1750	1766	1789	1820	1879	1894	1913	3220	3261	3308
14413	16163	17930	19718	21538	23417	25311	27224	30444	33705	37013
44%	44%	44%	44%	44%	45%	45%	45%	48%	48%	48%
30%	30%	30%	29%	29%	30%	29%	29%	48%	48%	48%
2.19	2.19	2.20	2.21	2.23	2.27	2.28	2.29	n.a	n.a.	n.a.
18%	17%	16%	14%	13%	12%	10%	9%	0%	0%	0%
31%	32%	33%	33%	34%	34%	35%	32%	0%	0%	0%
71%	73%	75%	76%	77%	78%	78%	79%	75%	76%	77%
55%	54%	53%	52%	52%	51%	51%	50%	49%	49%	48%
45%	46%	47%	48%	48%	49%	49%	50%	51%	51%	52%
86%	87%	88%	89%	89%	89%	90%	90%	87%	88%	88%

GLC - Profit and Loss Accounts

For the year 1995 and first 9 months of 1996
(in LVL rounded)

	1995	as %		9 months 1996	as %
Net turnover	347723	100.00%		501670	100.00%
Production costs (1) - (2)	-265427	-76.33%		-430241	-85.76%
Gross Operating Margin	82296	23.67%		71429	14.24%
Depreciation	-5404	-1.55%		n.a.	n.a.
Net Operating Margin	76892	22.11%		71429	14.24%
Interest income	2074	0.60%		160	0.03%
Extraordinary income	1780	0.51%		0	0.00%
Social expenses	-7401	-2.13%		-4982	-0.99%
Other taxes	-1693	-0.49%		-297	-0.06%
Profit before Income Tax	71652	20.61%		66310	13.22%
Income taxes	-16413	-4.72%		-16652	-3.32%
Net profit retained (3)	55239	15.89%		49658	9.90%
Depreciation	5404	1.55%		n.a.	n.a.
Cash flow for the period	60643	17.44%		49 658	9.90%

(1) - the "production costs" shown by the company include: i) all administrative overheads, as well as ii) depreciation and iii) so-called social expenditures.
(2) - the increase in these costs in 1996 reflects increased buying of selected waste from scavengers.
(3) - net profit retained on the balance sheet is shown as LVL 57577.

GLC - Balance Sheet

By end-1995 and by 30.09.96
(in LVL rounded)

ASSETS	end - 1995		30.09. 1996		LIABILITIES	end - 1995		30.09. 1996	
Fixed assets (net)					Equity				
land and buildings	5985		5985		share capital	100		2000(2)	
plant and machinery	41354		50506		legal reserves	33		667	
sub-total		47339		56491	other reserves	3032		4990	
		32.20%	0.00%	24.17%	retained profits (3)	57577		102218	
Current assets					sub-total		60742		109875
cash and banks	48295		78229				41.32%		46.93%
debtors (1)	36223		80028						
raw materials	1815		0		Long term debt	0	0	0	0
fixtures, equipment	13329		18979						
sub-total		99662		177236	Current liabilities	385		397	
		67.80%		75.83%	creditors, goods	14195		1950	
					income taxes due	71679		121905	
Intangible asets	0	0	400	400	other creditors (4)				
		0.00%		0.00%	sub-total		85874		123855
							58.57%		52.99%
TOTALS		147001		233727	TOTALS		146616		233730

(1) debtors includes large outstanding amounts due by Hoetica, one of the larger waste collecting firms in Riga.

(2) the increase of share capital was finance through a transfer from retained earnings of 1995.
(3) retained profits shown in the P&L accounts is LVL 55240.
(4) creditors includes a large amount due as Natural Resource Tax.

GLC - Projected Cash Flows
in '000 LVL

Constant streams, no inflation correction	OBSERVATIONS	1995 (actuals)	1996 (9 months)	1997 (estimate)	%	1998	1999	2000 to	2017
Net turn-over	dump fees; sale of recovered waste	347.72	501.67	702.34	100.00	705.00			
Production costs (1)	incl office overheads, purchase waste	265.43	430.24	542.10	77.19	545.00			
Gross Operating Margin (2)	23.67% of 1995 net turnover	82.29	71.43	160.24	22.81	160.00	160.00	160 00	160.00
Depreciation	based on 1995 figure	-5.40	-5.50	-6.00	-0.85	-6.00			
Net Operating Margin	23.18% of 1995 net turnover	76.89	65.93	154.24	21.96	154.00	154.00	154.00	154.00
Interest and other income	incl extraordinary income 1996	3.85	0.16	1.75	)				
Social expenses	for employees, community	-7.40	-4.98	-10.00		-8.65			
Miscellaneous taxes		-1.69	-0.30	-1.50	)				
Profit before company taxes		71.65	60.81	144.49	20.57	145.35			
Company taxes	22.9% rate paid in 1996; 25% in future	-16.41	-16.65	-36.12	-5.14	-36.35			
Net profit retained		55.24	44.16	108.36	15.43	109.00	109.00	109.00	109.00
Depreciation	from above	5.40	5.50	6.00	0.85	6.00			
Cash flow available for investment	in constant terms	60.64	49.66	114.36	16.28	115.00	115.00	115.00	115.00
as % of net turn-over		17.44	9.90	16.28	16.28	16.31	16.31	16.31	16.31

(1) The accounts provided by Getlini-2 Ltd do not allow seperation of direct productive expenditures from administrative overheads.
(2) For this projection the Gross Operating Margin has been assumed fixed at the 1997 level. This is a conservative assumption as there are opportunities to increase revenues (better waste selection) and in particular to reduce operating costs, eg by cutting back on staff.

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MUNICIPAL SOLID WASTE MANAGEMENT PROJECT

ANNEX 8

PROJECT IMPLEMENTATION ARRANGEMENTS

ANNEX 8

PROJECT IMPLEMENTATION ARRANGEMENTS

A. PROJECT IMPLEMENTATION

Background

1. The Project would be realised over 5 years, from 1998 to 2002, with preparation of implementation to start immediately after negotiations. Remediation of the existing landfill will start early 1999 and extraction of landfill gas from the existing landfill is expected to commence towards the end of 1999. The establishment of the first two energy cells would be initiated already during 1998, after which the old landfill will be definitively closed and sealing completed. It is envisaged to establish two energy cells per year for 5 years in order to reach a steady state production level of landfill gas. Installation of the gas turbines for electricity production is planned for the second half of the year 1999, so that generation could commence in the year 2000.

2. Overall responsibility for Project implementation would lie with the Riga City Council (RCC), and more particularly with its Environmental Protection Board; for this purpose a Project Steering Committee (PSC) has already been established, chaired by RCC. In addition, a Project Procurement Unit (PPU) would be created, within RCC, to be responsible for all procurement under the project, as well as disbursement and project cost accounting. Actual physical implementation of the Project would be the responsibility of the new company, the Getlini-Eco Ltd. Ltd.

Project Steering Committee (PSC)

3. The PSC consists of members of Riga City Council, Stopinu Pagasts, Ministries of Economy, Environmental Protection & Regional Development and Finance, and Riga Region Environmental Protection Board; the Managing Director of Getlini-Eco Ltd. would also be a member of the committee. The PSC is chaired by a member of RCC; the Head of the PPU would be its Secretary.

4. The PSC would meet at least once a month at RCC offices to maintain close monitoring of the Project and to help resolve any outstanding issues. Its functions would include in particular:

- ensure that Project implementation is on schedule;
- resolve any issues likely to delay realisation of Project objectives;

- liaise between Getlini-Eco Ltd., PPU and representatives of Government, RCC and SP;
- provide a focal point for World Bank and other donor agencies concerning the Project; and
- assist PPU and GETLINI-ECO LTD. in any day-to-day issues that may arise during implementation of the Project.

Project Procurement Unit (PPU)

5. A PPU would be created to be in charge of all procurement and disbursement under the Project; it would be a separate unit within RCC and its staff would be hired under normal Government salary conditions, supplemented by a premium. The Head of PPU, a Latvian national, would be appointed by RCC for the duration of project implementation. **The World Bank would be consulted before making this appointment.**

6. The responsibilities of the PPU would include: i) preparation of a standard set of bidding documents (both for World Bank, other donor finance and locally financed contracts); ii) issue of bidding documents together with technical specifications to WB for" no objection"; iii) publication and dispatch of invitations to tender; iv) valuation of bids and recommendation for award; v) all procurement and disbursement related to the project; and vi) maintaining the Project accounts. However, the preparation of technical specifications for all contracts would be completed by outside consultants who would start their work in March/April 1998.The PPU would also be responsible, under the PSC, for maintaining relations with the World Bank and other donors regarding all procurement and disbursement matters.

7. In addition to the Head of the Unit, PPU would have two local professionals, a Procurement Specialist and an Accounting/Disbursement Officer, and one bi-lingual secretary. In order to train staff in World Bank procurement and disbursement procedures an external IBRD procurement specialist (International Supervisor) would be engaged, for the initial year and part-time thereafter, to prepare necessary procurement documentation, as mentioned above. He would also provide on-the-job training of local staff and organise, together with WB, a local seminar for all project staff concerned. To reduce the costs of this international consultancy an effort will be made to attract the procurement specialist from neighbouring countries in the former Soviet Union. **The World Bank would be consulted before making this appointment.**

8. Up to loan effectiveness the operational and equipment costs of the PPU would be financed from a Japanese grant (PHRD), for which the agreements have been signed. Thereafter, transportation and operating expenses would be financed by the Project. The RCC would make available suitable office space and office furniture.

GETLINI-ECO LTD.

9. The new company to be established under the project would be jointly owned by Riga City (55%), Stopinu Pagasts (35%) and Government (MOEPRD for 10%). This company would be directly responsible for the implementation of the project and its staff would therefore need to be qualified to carry out this task. The proposed organigramme and staffing is as follows:

- **Managing Director**, a Latvian national of sufficient experience and stature to guide the new company, to supervise implementation of the project and to control the operations of the wholly-owned subsidiary, the Getlini-2 Company.

- **Head of Technical Department**, also a Latvian national with extensive experience in industry; responsible for the technical implementation and supervision of the project. He would be assisted by an expatriate consultant engaged on a part-time basis. There would also be a junior engineer to assist the Technical Director in the day-to-day tasks.

- **Head of Finance Department**, a Latvian national, who would be responsible for all financial and commercial aspects of the project, and for the accounting and budgeting of the company. He would be assisted by an accountant.

In addition, there would be one bi-lingual secretary and a driver/messenger. The Getlini-Eco Ltd. would have an office in Riga, but **not located** within the RCC complex to underline the private sector orientation of the new company. The operational costs of this office would be borne by the project until 2001, and by the company thereafter.

10. The proposed twinning arrangement would be made with GETLINI-ECO LTD.; this would be of great assistance to the new company and instrumental in getting the project off to a timely start. **The World Bank would be consulted before making the appointment of the Managing Director of Getlini-Eco Ltd.**

11. Revenues of the company would consist of the waste disposal fee, sale of recovered materials and of electricity generated from landfill gas. A major expenditure item for the new company would be the waste processing fee payable to the contracted operating company, on the basis of tonnage of waste received on site.

B. Implementation schedule

12. Preparation of project implementation would start immediately after negotiations, while the physical implementation of the project would be realised over 4 years, starting early - 1999 until

of 2002, with an additional 6 months for the payment of financial obligations entered into prior to project completion. The PPU would submit a Procurement and Disbursement Report by the middle of 2003. The Getlini-Eco Ltd. would submit an Implementation Completion Report by the end of 2003. A detailed Project Implementation Schedule is attached.

C. Project Reporting

13. The PSC staff would monitor project implementation; it would call on the PPU and the new company Getlini-Eco Ltd. to complete the detailed schedules required by the World Bank. Semi-annual reports would also have to be submitted to World Bank and other donors. A mid-term review by World Bank staff would take place no later than June2000.

D. Project Supervision

14. In addition to above mentioned reporting, World Bank staff would be closely following the Project's progress through regular supervision missions. A plan for such supervision is included in the attached Project Implementation Plan.

Detailed Implementation Schedule to start of Project, January 1998

1 - PROJECT PROCESSING	AGENCIES	TARGET DATES
negotiations	WB/Government/RCC/Getlini-Eco Ltd.	November1997
loan/grant approval	WB/GEF/SIDA	February 1998
government approval	Council of Ministers	March 1998
establishment PPU by RCC	RCC	Jan 1998
establishment of GETLINI-ECO LTD.	RCC/Stopinu Pagasts/Govt	November 1997
loan/grant effectiveness	WB/GEF/SIDA	March 1997
2 - PROJECT LAUNCH		**JULY 1998**
3 - PROJECT IMPLEMENTATION		
detailed design preparation	by consultants	from early 1998 onwards
bidding documents	idem	idem
twinning/techn assistance	Swedish company/consultants	August 1998 onwards
training staff, start of	consultants	September 1998
start of tendering	consultants/PPU	Nov. 1998
4 - START OF CONSTRUCTION		**EARLY 1999**

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MUNICIPAL SOLID WASTE MANAGEMENT PROJECT

ANNEX 9.1

SUPERVISION PLAN

Supervision Plan during Implementation of the Municipal Solid Waste Management Project

	Approx. Date	Activity	Organization	Involved Specialist - Staff Weeks							Total
				TM	Fin. Anal	Econom	Waste Spec	Energy Spec	Proc. Spec	Disb Spec	
F	Jul-98	Supervision 1	Head Quarter	2	1				1	1	5
Y		Project Launch	Res. Mission					1			1
9			Sida			1					1
9											
	Oct-98	Supervision 2	Head Quarter	3	1				1		5
			Res. Mission								0
	Dec-98	Supervision 3	Head Quarter	2							2
			Res. Mission					1	1		2
			Sida			1					1
	Apr-98	Supervision 4	Head Quarter	2	1				1	1	5
			Res. Mission								
			Sida			1					1
F	Aug-99	Supervision 5	Head Quarter	3			1		1		5
Y			Res. Mission					1			1
0											
0	Dec-99	Supervision 6	Head Quarter	3							3
			Res. Mission					1			1
			Sida			1					1
	Apr-99	Supervision 7	Head Quarter	3					1		4
			Res. Mission								
F	Aug-00	Supervision 8	Head Quarter	4	2	2	2	2	2	1	15
Y		Mid-Term Review	Res. Mission					1			1
0			Sida			1					1
1											
	Dec-00	Supervision 9	Head Quarter	2							2
			Res. Mission					1			1
	May-01	Supervision 10	Head Quarter	2					1		3
			Res. Mission					1			1
F	Sep-01	Supervision 11	Head Quarter	2	1				1	1	5
Y			Res. Mission								
0											
2	Jan--02	Supervision 12	Head Quarter	2							2
			Res. Mission					1			1
F	Jul--02	Supervision 13	Head Quarter	2	1		1		1	1	6
Y			Res. Mission					1			1
0											
3	Dec--03	Supervision 14	Head Quarter	2	1		1	1	1		6
			Res. Mission					1			1
			Sida			1					1
	Feb--03	Impl. Completion Report Prep.	Head Quarter	4	2	2	1		1	1	11
			Res. Mission					1			1
			Sida			1					1

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MUNICIPAL SOLID WASTE MANAGEMENT PROJECT

ANNEX 9.2

MONITORING AND EVALUATION

ANNEX 9.2

MONITORING AND EVALUATION

A. Actions to Monitor Development Objectives

1. Project monitoring indicators were developed during appraisal in order to enable tracking of Project inputs on key development objectives throughout the Project cycle. At the mid-term review, the need to fine-tune or restructure the Project design will be based on the data received from these indicators.

B. Project Indicators

2. Given the essential role of the program monitoring and evaluation play in determining the impact of a given intervention on development objectives, a number of indicators will be used to monitor and evaluate progress during the implementation of the Municipal Solid Waste Management Project. However, the progress of these indicators would be evaluated in relative, not absolute terms. During supervision, a selected number of commercial, operational, financial and environmental indicators would be monitored in accordance with project objectives.

(a) *Commercial and Operational indicators*

- Generation of LFG from both the existing waste pile and the new energy cells are crucial for project sustainability, and has been conservatively estimated. The amount of collected LFG from both gas streams will be monitored and recorded as both streams will have a clear impact on the sale of electricity. The quantity LFG from the existing waste pile will decline over time, while the LFG quantity from the energy cells would reach a steady state after 5 years. The expected LFG amounts from the two streams are shown in **Table 1**.

- The quantity of waste received at the disposal site/month divided in different types of waste. The ratio of extracted gas/ton of waste is essential for evaluating the efficiency in gas collection as well as in regard to gas production. At a steady state, reached after approximately five years, this production should be at least 175 m^3/ton.

- The quantity of LFG from the two streams should be monitored automatically in the gas pumping station, and the content of methane should be analyzed on a monthly basis. The methane content should be in the range of 45-55%, and the amount of collected LFG should not be less than 26 million m^3/year after year 2001.

- The amount electricity produced should not be less than 39 GWh/year after year 2001.

(b) *Financial indicator.*

- In addition to the internal rate of return calculations the following standard financial indicator would be monitored:

  * A Debt Service Coverage Ratio (the extent to which the internal cash generation covers total debt services) not to fall below 1.5;

(c) *Environmental indicators*

- Amount of methane captured, which should not be less than 13 million Nm^3/year after year 2001. The amount of methane should be converted into carbon dioxide by use of conversion factor of 21.

- Quality of groundwater should be monitored on a yearly basis, and the results compared to the results reflecting the current situation in order to evaluate if the remediation measures have had expected effect on arresting the ongoing groundwater contamination.

- Monthly recording of separated waste, temporarily stored hazardous waste, and expected trends.

Table 1: Expected Amounts of Landfill Gas

	Landfill	Energy Cells	Total Gas Production
	nm^3	nm^3	nm^3
2000	20876174	0	20876174
2001	18450355	10402326	28852681
2002	16361191	16914071	33275262
2003	14556383	21229482	35785865
2004	12992314	24244972	37237286
2005	11632545	26448190	38080735
2006	10446592	26448190	36894782
2007	9408905	26448190	35857095
2008	8498033	26448190	34946223
2009	7695935	26448190	34144125
2010	6987398	26448190	33435588
2011	6359576	26448190	32807766
2012	5801594	26448190	32249784
2013	5304221	26448190	31752411
2014	4859606	26448190	31307796
2015	4461055	26448190	30909245
2016	4102842	26448190	30551032
2017	3780059	26448190	30228249
2018	3488487	26448190	29936677
2019	3224489	26448190	29672679
2020	0	26448190	26448190
2021	0	26448190	26448190
2022	0	26448190	26448190
2023	0	26448190	26448190
2024	0	26448190	26448190
2025	0	26448190	26448190
2026	0	26448190	26448190

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MUNICIPAL SOLID WASTE MANAGEMENT PROJECT

ANNEX 10

FINANCIAL SITUATION AND FORECASTS - RIGA CITY

ANNEX 10

FINANCIAL SITUATION AND FORECASTS - RIGA CITY

A. BACKGROUND

1. Riga is Latvia's largest city with an estimated 826,000 inhabitants (down from 912,000 in 1990); it is the country's capital, as well as one of its major port and the principal industrial/cultural centre. Trading therefore is well-developed, while industry includes ship building, manufacturing of electrical equipment and pharmaceuticals, processing of food and wood products. The services sector is well represented with a number of quality hotels and restaurants, a symphony orchestra, an opera and several theatres, as well as museums. The city is also the seat of the University and the Latvian Academy of Sciences. Finally, the restored mediaeval city centre and its fine 19th century architecture are beginning to attract increasing numbers of tourists.

2. Government in Latvia consists of three levels: central, regional and municipal. Since 1991 local government has become increasingly independent from Central Government, with the right to manage their affairs autonomously through local democratic representation. As a result, the municipal authorities have power to form municipal enterprises, take part in joint stock companies, acquire and dispose of assets, as well as to introduce local duties and taxes. Tax collection has also been decentralised and municipal budgets are independent of Central Government; however, by law these municipal budgets must be balanced.

3. Municipalities have a responsibility, often shared with Central Government, for providing: a) municipal services (water, heat, sewerage, waste collection and disposal); b) territorial infrastructure (roads, public lighting, cemeteries, industrial waste collection and disposal); c) environmental protection; d) education and culture; e) health care; f) social welfare; g) social housing; h) public order and various less important tasks. It is intended that health care will pass entirely to the Central Government in 1997, with the municipalities continuing to contribute to this budget, but the modalities of this change have not yet been worked out.

B. RIGA CITY COUNCIL

4. The present City Council or Dome was elected in 1994 and consists of 60 councillors, who elect a Chairman (equivalent to a mayor) and Deputy-Chairman. Total staff of the Council and its constituent departments numbered 1331 at the end of 1996, excluding the municipal institutions and enterprises.

5. The Dome has among its duties the approval of the budget, imposition of local taxes and setting of fees for services, as well as managing the municipal institutions and enterprises. The *municipal institutions do not generate income and need to be financed from the budget; they include*

schools, libraries, museums and hospitals. On the other hand, the municipal enterprises are expected to be self-financing, and perhaps even to contribute to RCC's revenues; among them are the tram and trolley-bus, the water and the sewerage companies, other enterprises, primarily in the services sector, may in future be privatised. In addition, the RCC has entered into a number of joint ventures with private entrepreneurs; however, it is the intention to dispose of these share holdings in future.

C. The Budget

6. The City's budget is prepared by its finance department, in close co-operation with the Ministry of Finance, and is submitted to the Dome for approval, normally in November for the following year's budget. At the end of 1996, however, the draft budget for 1997 had not yet been prepared. Municipalities report monthly to the Ministry of Finance on the execution of their budgets, followed by a detailed annual report; this allows for close supervision by the Ministry of Finance. These and other reporting requirements of the municipalities are regulated by law (On Local Government Budgets and On Budget and Financial Management).

7. The normal budget for 1996 shows gross revenues of Ls 89.7 m and net revenues of Ls 68.5m after deduction of Riga's contribution to the Tax Equalisation Fund. Expenditures are budgeted at Ls 59.0m, plus debt service of Ls 9.5m; this leaves the budget balanced, However, it appears that tax collection is running below budget and expenditures will have to be adjusted accordingly.

8. In addition to the normal budget, each City Department prepares a Special Budget, which consists of minor, department-related income and expenditures. These budgets are not part of the normal budget exercise and for this reason the Special Budget does not appear in the table; the total amount of this Special Budget is estimated at Ls 3.5m for 1996.

D. Revenues

9. Local government finance is based on the concept of local autonomy linked to local accountability. To reinforce this link, collection of tax revenue from personal income - but not the setting of rates - has been delegated to the municipal level. Riga city, which has above average levels of wages and employment, contributes a share of its revenues from income taxes to an Equalisation Fund, which benefits poorer municipalities. In 1996 the City's contribution was 28.7%, while a figure of 30% appears likely for 1997 and beyond. For 1996 net income tax revenues represented 77.8% of budgeted overall revenues. There appears to be room for increasing the tax base through more stringent tax collection, in particular of the independently employed, and this source is therefor likely to remain the dominant income item for the foreseeable future.

10. Land and property taxes accounted for 17.4% in the 1996 budget; these are set and collected by the State and redistributed to the municipalities and districts. There is scope for increasing these revenues, as properties are being revalued from previous very low levels as part of privatisation; restoration would also increase these real estate values. Government contributes

directly to the City's revenues, with Ls 2.4m or 3.5% of 1996 revenues, while remaining tax categories added 1.3% to budgeted revenues for 1996.

E. Expenditures

11. Among the principal expenditure items for 1996 are health care (29.4%); education (25.6%); housing and sanitation (13.4%); and welfare (9.4%). Capital expenditures, estimated at less that LS 3m in 1996, are included with recurrent expenditures in the budget.

12. There is also a capital budget, but this does not form part of the main budget. It is primarily a shopping list of investments likely to be realised only as funds become available.

F. Budget

13. In the absence of any forecast prepared by the City, the mission has made a budget projection for the period 1997 to 2005. This exercise is primarily intended to assess the ability of the City to contribute to the Solid Waste Management Project as currently foreseen (almost 23% of investments or USD 6.0m), in addition to its other engagements under the Water Supply and Municipal Services projects[1]. Furthermore, the City would be the borrower of IBRD's proposed USD 9.0m contribution to the Solid Waste Management Project. These funds would be onlent, and hence repaid, by the final beneficiary, Riga District Waste Processing Company Ltd., but Riga would be the guarantor for repayment in the event the company would not be able to do so.

14. The attached 2-page table shows the 1995 actual figures, the 1996 budget, as well as the projections for 1997-2005 using assumptions detailed below.

G. Revenues

Personal Income Tax

15. There appears to be scope to enlarge the tax base through more stringent tax collection and inclusion of independently employed not now covered by this tax[2]. Also, wages and salaries are likely to go up with inflation, even though lagged and perhaps not to the full extent. A negative factor is the slow decrease of the City's population. All in all it has been assumed that revenues would go up

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[1] It has been assumed that the EIB and IBRD loans taken on by Riga city for respectively the Water Supply and Municipal Services projects will be onlent, and hence repaid, to the respective enterprises. Riga city would therefore only be the guarantor of these loans and for this reason their repayment has been excluded from the projections.

[2] Progressive inclusion of the "shadow economy", estimated at between 10% and 15% of GDP, would also increase receipts from personal income tax.

by 11% in 1997 (the RCC forecast), and by 10% in 1998; the increase would then taper of to 5% by 2003.

16. These revenues are gross, that is, the City's contribution to the Tax Equalisation Fund needs to be subtracted. The % contribution in 1996 was fixed at 28.7%, while the prognosis for 1997 is 30%; this figure has been used throughout the projection.

Property and Land Taxes

17. There is good potential for a strong increase in these taxes, which are to be combined in a single real estate tax. The reason is the current low historical value of properties, which would be increased to more realistic levels with privatisation and restoration. It has been assumed that after the 11% increase budgeted for 1997 these tax revenues would go up by 15% in 1997, 20% in 1998 and to decrease thereafter to 5% by 2005.

Other Taxes and Intergovernmental Revenues

18. To these revenue categories the WB GDP deflator forecast for 1997-2001 has been applied, for want of another indicator; it has been assumed that inflation would decrease to 5% thereafter. These revenues would thus be fixed in real terms.

Expenditures

19. The assumption is a simple one: constant growth of 3.5% pa real terms. This implies that the WB's GDP deflator forecast has been used up to 2001, with an inflation of 5% thereafter, plus a 3.5% increase.

H. Conclusion

20. The figures appear to indicate that the City would be able to generate surpluses going from Ls 8.1m in 1997 to Ls 18.6m in 2000, decreasing thereafter to LS 9.5m by 2005. After taking account of Riga's earlier mentioned commitments under already signed projects (Water Supply and Municipal Services), as well as the Solid Waste project, the forecast confirms its ability to assume repayment of loans for which it is the guarantor, in the event of default of the final beneficiaries.

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RIGA City Council Financial forecasts (in '000 LVL)	1995 actual	1996 budget	1997 projections	1998 >>>>>>	1999 >>>>>	2000 >>>	2001 >>	2002 >	2003 >	2004 >	2005 >	Assumptions
REVENUES												
Growth assumption Personal Income Tax (%)	na	32%	11%	10%	9%	8%	7%	6%	5%	5%	5%	improved collection; growth of incomes; declining population
Idem - Property and Land Taxes (%)	na	11%	15%	20%	20%	15%	10%	8%	7%	6%	5%	revaluation of property
Idem - All other taxes/revenues (%)	na	18%	10%	8%	7%	6%	6%	5%	5%	5%	5%	follow WB GDP deflator rates
Personal income tax	56666	74741	82963	91259	99472	107430	114950	121847	127939	134336	141053	apply growth assumption above
Property and land taxes	10415	11928	13717	16461	19753	22716	24987	26986	28875	30608	32138	apply growth assumption above
Other taxes	407	431	474	512	548	581	616	646	679	713	748	apply WB inflation assumption
Intergovernmental revenues	1760	2400	2640	2851	3051	3234	3428	3599	3779	3968	4167	apply WB inflation assumption
Miscellaneous	452	223	200	200	200	200	200	200	200	200	200	PM item
sub-totals	69700	89723	99994	111263	123023	134160	144181	153279	161472	169825	178306	
Deduct: Tax Equalisation Fund	9265	21243	24889	27378	29842	32229	34485	36554	38382	40301	42316	
(% of personal income tax)	16.40%	28.69%	30.00%	30.00%	30.00%	30.00%	30.00%	30.00%	30.00%	30.00%	30.00%	
Total net revenue	60435	68480	75105	83905	93182	101931	109696	116725	123091	129524	135990	
(increase over previous year)	n.a.	13.31%	9.67%	11.72%	11.06%	9.39%	7.62%	6.41%	5.45%	5.23%	4.99%	
EXPENDITURES (recurrent and capital (1))												
Apply WB GDP deflator rates (%)			10.00%	9.00%	7.00%	6.00%	6.00%	5.00%	5.00%	5.00%	5.00%	WB GDP deflator forecast
Add 1% real growth of expenditures			3.50%	3.50%	3.50%	3.50%	3.50%	3.50%	3.50%	3.50%	3.50%	real growth rate
total % growth of expenditures			13.50%	12.50%	10.50%	9.50%	9.50%	8.50%	8.50%	8.50%	8.50%	total increase of expenditures
General government (RCC)	3838	4835										
Health care	17706	17354										
Education	14304	15116										
Housing and sanitation	9575	7899										
Welfare	5223	5531										
Culture	2507	2407										
Transportation	2151	1508										
Public safety	1337	1381										
Environmental Protection	1016	707										
Other expenditure	1191	2272										
Total Expenditure	58848	59010	66976	75348	76140	83373	91293	99053	107473	116608	126520	apply WB GDP deflator; 3,5% real growth in expenditures
Surplus Current Budget	**1587**	**9470**	**8129**	**8557**	**17042**	**18558**	**18402**	**17672**	**15618**	**12916**	**9471**	**Current surplus**
as % of revenues	2.63%	13.83%	10.82%	10.20%	18.29%	18.21%	16.78%	15.14%	12.69%	9.97%	6.96%	
Financial commitments												
a) Debt repayment past loans	0	9462	0	0	0	0	0	0	0	0	0	
b) Water Supply Project												
RCC contribution, LVL 10.5m over 5 yrs	0	0	1500	2500	3500	2000	1000	0	-1050	-1050	-1050	negative figure denotes repayment to RCC
c) Municipal Services Development												
RCC contribution (USD 1.9m=LVL 1.05m)	0	50	250	350	300	100	0	-105	-105	-105	-105	idem
d) Solid Waste Management Project												
RCC contribution (30% of LVL 10.7m=3.2m)	0	0	0	1000	1500	700	0	-300	-300	-300	-300	idem
Total Capital Contribution RCC	0	9512	1750	3850	5300	2800	1000	-405	-1455	-1455	-1455	idem
SURPLUS after capital contributions (2)	**1587**	**-42**	**6379**	**4707**	**11742**	**15758**	**17402**	**18077**	**17073**	**14371**	**10926**	**surplus after capital contributions**
Accumulated surplus	**1587**	**1545**	**7924**	**12630**	**24373**	**40131**	**57533**	**75610**	**92683**	**107054**	**117980**	**cumulative surplus**

Footnote 1: capital expenditures included in the budget amounted to less than LVL 3m in 1996.
Footnote 2: surplusses or deficits are accounted for in a reserve fund

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MUNICIPAL SOLID WASTE MANAGEMENT PROJECT

ANNEX 11

BUDGET INFORMATION FOR STOPINU PAGAST

Stopinu Pagasts Municipality -
(in '000 LVL)

REVENUES	1995 actual	1996 budget
Individual income tax	376.0	445.3
Natural resource tax	110.1	156.5
Tax Equalisation Fund (1)	52.0	-125.9
Property & Land taxes	45.6	113.0
Other duties and revenues	10.9	73.8
sub-total	594.6	662.7
Balance at start of year	51.3	15.2
Total Resources	645.9	677.9
EXPENDITURES		
Housing and Utilities (2)	292.4	299.1
Social, Education, Cultural	256.8	214.0
Public administration	74.1	105.0
Other miscellaneous	7.4	17.9
Total expenditures	630.7	636.0
Balance end of year	15.2	41.9

(1)In 1995 SP received a subsidy
to this fund, reflecting the large
(2) Under Housing & Utilities are
drainage ditches -- which have

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MUNICIPAL SOLID WASTE MANAGEMENT PROJECT

ANNEX 12

EXPENDITURE ACCOUNTS FOR OPTIMAL INVESTMENTS

Latvia
Riga Solid Waste Management Project
Expenditure Accounts by Years -- Totals Including Contingencies
Economic Costs (US$ '000)

Option 1: Remediation	Economic Costs					
	1998	**1999**	**2000**	**2001**	**2002**	**Total**
I. Investment Costs						
A. Civil works						
Earth works	-	483	-	-	-	483
Construction	-	211	-	-	-	211
Design and Supervision	138	-	-	-	-	138
Subtotal Civil works	138	694	-	-	-	832
B. Equipment	-	531	38	-	-	569
C. Covering Material	-	1,188	-	-	-	1,188
Total Investment Costs	138	2,412	38	-	-	2,588
II. Recurrent Costs						
A. Salaries	-	8	8	8	8	33
B. Operation and Maintenance						
civil works	-	23	37	40	42	142
equipment	-	-	146	149	149	444
Total Recurrent Costs	-	31	191	197	199	619
Total PROJECT COSTS	138	2,444	229	197	199	3,207

Latvia
Riga Solid Waste Management Project
Expenditure Accounts by Years -- Totals Including Contingencies
Economic Costs (US$ '000)

Option 2 Sanitary Landfill	**Economic Costs**					
	1998	**1999**	**2000**	**2001**	**2002**	**Total**
I. Investment Costs						
A. Civil works						
Earth works	-	1,378	388	189	322	2,277
Construction	-	1,042	402	-	4	1,449
Design and Supervision	471	-	-	-	-	471
Subtotal Civil works	471	2,420	790	189	326	4,197
B. Equipment	76	2,427	737	25	25	3,290
C. Covering Material	-	1,188	-	-	-	1,188
D. Specialist Services						
International Consultants	75	200	125	50	50	500
National Consultants	29	45	48	51	54	228
Subtotal Specialist Services	104	245	173	101	104	728
Total Investment Costs	651	6,280	1,700	315	455	9,402
II. Recurrent Costs						
A. Salaries	-	21	29	29	29	107
B. Operation and Maintenance						
civil works	-	23	55	58	60	196
equipment	-	179	497	500	500	1,675
Total Recurrent Costs	-	222	580	587	589	1,978
Total PROJECT COSTS	651	6,502	2,281	902	1,044	11,380

Latvia
Riga Solid Waste Management Project
Expenditure Accounts by Years -- Totals Including Contingencies
Economic Costs (US$ '000)

Option 3
Gas for Electricity

	Economic Costs					
	1998	1999	2000	2001	2002	Total
I. Investment Costs						
A. Civil works						
Earth works	-	1,486	550	350	483	2,869
Construction	-	1,380	608	206	210	2,403
Design and Supervision	625	-	-	-	-	625
Subtotal Civil works	625	2,866	1,157	556	693	5,897
B. Equipment	76	3,619	1,066	25	118	4,903
C. Covering Material	-	1,188	-	-	-	1,188
D. Specialist Services						
International Consultants	75	250	175	100	100	700
National Consultants	29	45	48	51	54	228
Subtotal Specialist Services	104	295	223	151	154	928
Total Investment Costs	805	7,968	2,446	732	964	12,916
II. Recurrent Costs						
A. Salaries	-	33	50	50	50	182
B. Operation and Maintenance						
civil works	-	23	61	67	71	222
equipment	-	357	889	893	893	3,031
Total Recurrent Costs	-	413	1,000	1,009	1,013	3,435
Total PROJECT COSTS	805	8,381	3,446	1,741	1,977	16,351

Latvia
Riga Solid Waste Management Project
Expenditure Accounts by Years -- Totals Including Contingencies
Economic Costs (US$ '000)

Option 4 Gas for Electricity	Economic Costs					
	1998	**1999**	**2000**	**2001**	**2002**	**Total**
I. Investment Costs						
A. Civil works						
Earth works	-	1,486	550	350	483	2,869
Construction	-	1,380	608	206	210	2,403
Design and Supervision	625	-	-	-	-	625
Subtotal Civil works	625	2,866	1,157	556	693	5,897
B. Equipment	76	4,506	1,836	625	718	7,760
C. Covering Material	-	1,188	-	-	-	1,188
D. Specialist Services						
International Consultants	75	250	175	100	100	700
National Consultants	29	45	48	51	54	228
Subtotal Specialist Services	104	295	223	151	154	928
Total Investment Costs	805	8,855	3,216	1,332	1,564	15,773
II. Recurrent Costs						
A. Salaries	-	33	50	50	50	182
B. Operation and Maintenance						
civil works	-	23	61	67	71	222
equipment	-	357	979	1,032	1,083	3,450
Total Recurrent Costs	-	413	1,089	1,148	1,203	3,854
Total PROJECT COSTS	805	9,268	4,306	2,481	2,767	19,627

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MUNICIPAL SOLID WASTE MANAGEMENT PROJECT

ANNEX 13

ECONOMIC COSTS AND BENEFITS FOR OPTIMAL INVESTMENTS

Latvia
Riga Solid Waste Management Project
Option 1: Remediation only
Economic Costs and Benefits

(US$ '000)	Economic Costs												
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
I. Investment Costs	138	2412	38	0	0								
II. Recurrent Costs													
A. Salaries	0	8	8	8	8	8	8	8	8	8	8	8	8
B. Operation and Maintenance													
civil works	0	23	37	40	42	42	42	42	42	42	42	42	42
equipment	0	0	146	149	149	149	149	149	149	149	149	149	149
Total Recurrent Costs	0	31	191	197	199	199	199	199	199	199	199	199	199
TOTAL ECONOMIC COSTS	138	2444	229	197	199	199	199	199	199	199	199	199	199

Economic Benefits (US$ '000)	Economic Benefits												
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2009
I. Electricity													
II. Heating													
III. Recycling													
IV. Environmental Benefits (Global)													
TOTAL ECONOMIC BENEFITS													
NET BENEFITS	-138	-2444	-229	-197	-199	-199	-199	-199	-199	-199	-199	-199	-199
Discounted Benefits	-125	-2020	-172	-135	-124	-112	-102	-93	-84	-77	-70	-63	-58
necessary annual env. benefits starting 1999 for 0 NPV	495												

Parameters

Natural Gas (mio. cub. metres)
Electricity Revenue
Heating Revenue
Recycling Revenue
Environmental Benefit (Methane not emitted)
in US$ per 1000 m3

Conversion		
Energy Content	GJ/1000 m3	MWh/1000m3
Natural Gas	34	9.4452
Landfill Gas (Methane 50%)	17	4.7226
Efficiency Factors		
Boiler House (Heating)	90%	
Gas Engine (Electricity)	35%	
Market Prices		
Natural Gas ($/1000m3)	94.73	
Electricity ($/kWh)	0.034	

2011	2012	2013	2014	2015	2015	2016	2017	2018	2019	2020	2021
8	8	8	8	8	8	8	8	8	8	8	8
42	42	42	42	42	42	42	42	42	42	42	42
149	149	149	149	149	149	149	149	149	149	149	149
199	199	199	199	199	199	199	199	199	199	199	199
199	199	199	199	199	199	199	199	199	199	199	199

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
-199	-199	-199	-199	-199	-199	-199	-199	-199	-199	-199	-199
-52	-48	-43	-39	-36	-33	-30	-27	-24	-22	-20	-18

Latvia
Riga Solid Waste Management Project
Option 2: Sanitary Landfill
Economic Costs and Benefits

('000 US Dollars)	Economic Costs												
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2008
I. Investment Costs	651	6280	1700	315	455								
II. Recurrent Costs													
A. Salaries	0	21	29	29	29	29	29	29	29	29	29	29	29
B. Operation and Maintenance													
civil works	0	23	55	58	60	60	60	60	60	60	60	60	60
equipment	0	179	497	500	500	500	500	500	500	500	500	500	500
Total Recurrent Costs	0	222	580	587	589	589	589	589	589	589	589	589	589
TOTAL ECONOMIC COSTS	651	6502	2281	902	1044	589	589	589	589	589	589	589	589

Economic Benefits (US$ '000)	Economic Benefits												
	1997	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
I. Electricity													
II. Heating													
III. Recycling			100	150	200	200	200	200	200	200	200	200	200
IV. Environmental Benefits (Global)													
TOTAL ECONOMIC BENEFITS			100	150	200	200	200	200	200	200	200	200	200
NET BENEFITS	-651	-6502	-2181	-752	-844	-389	-389	-389	-389	-389	-389	-389	-389
Discounted Benefits	-592	-5374	-1638	-514	-524	-219	-199	-181	-165	-150	-136	-124	-113
Discount Rate	10%												
necessary annual env. benefits starting 1999 for 0 NPV	1,450												

Parameters													
Natural Gas (mio. cub. metres)													
Electricity Revenue													
Heating Revenue													
Recycling Revenue			100	150	200	200	200	200	200	200	200	200	200
Environmental Benefit (Methane not emitted) in US$ per 1000 m3													

Conversion		
Energy Content	GJ/1000 m3	MWh/1000m3
Natural Gas	34	9.4452
Landfill Gas (Methane 50%)	17	4.7226
Efficiency Factors		
Boiler House (Heating)	90%	
Gas Engine (Electricity)	35%	
Market Prices		
Natural Gas ($/1000m3)	94.73	
Electricity ($/kWh)	0.034	

2009	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
29	29	29	29	29	29	29	29	29	29	29	29
60	60	60	60	60	60	60	60	60	60	60	60
500	500	500	500	500	500	500	500	500	500	500	500
589	589	589	589	589	589	589	589	589	589	589	589
589	589	589	589	589	589	589	589	589	589	589	589

2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
200	200	200	200	200	200	200	200	200	200	200	200
200	200	200	200	200	200	200	200	200	200	200	200
-389	-389	-389	-389	-389	-389	-389	-389	-389	-389	-389	-389
-102	-93	-85	-77	-70	-64	-58	-53	-48	-43	-39	-36
200	200	200	200	200	200	200	200	200	200	200	200

Latvia
Riga Solid Waste Management Project
Option 3: Gas for Heating
Economic Costs and Benefits

(US$ '000)	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
			Economic Costs									
I. Investment Costs	805	7968	2446	732	964	435	287					
II. Recurrent Costs												
A. Salaries	0	33	50	50	50	50	50	50	50	50	50	50
B. Operation and Maintenance												
civil works	0	23	61	67	71	71	71	71	71	71	71	71
equipment	0	357	889	893	893	893	893	893	893	893	893	893
Total Recurrent Costs	0	413	1000	1009	1013	1013	1013	1013	1013	1013	1013	1013
TOTAL ECONOMIC COSTS	805	8381	3446	1741	1977	1,448	1,300	1,013	1,013	1,013	1,013	1,013

Economic Benefits (US$ '000)	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
			Economic Benefits									
I. Electricity												
II. Heating			995	1,375	1,586	1,705	1,775	1,815	1,759	1,709	1,665	1,627
III. Recycling			100	150	200	200	200	200	200	200	200	200
IV. Environmental Benefits			668	923	1064	1144	1191	1218	1180	1147	1117	1092
TOTAL ECONOMIC BENEFITS			1,763	2,448	2,850	3,049	3,166	3,233	3,139	3,056	2,983	2,919
NET BENEFITS	-805.37	-8381	-1684	707	873	1601	1866	2219	2126	2043	1969	1906
Discounted Benefits	-732.15	-6926	-1265	483	542	904	957	1035	901	788	690	607
Discount Rate	10%											
Parameters												
Landfill Gas replacement of												
Natural Gas (mio. m3, total) min. case			10.44	14.43	16.64	17.89	18.62	19.04	18.45	17.93	17.47	17.07
Natural Gas (mio. m3, total) base case			12.01	16.59	19.14	20.57	21.41	21.90	21.22	20.62	20.09	19.63
Natural Gas (mio. m3, total) max. case			13.57	18.76	21.63	23.26	24.21	24.75	23.99	23.31	22.71	22.19
available for heating (seasonal shutdown)			10.51	14.52	16.74	18.00	18.74	19.16	18.57	18.04	17.58	17.18
(mio. cub. metres, 87.5 % of base case)												
Electricity Revenue	Gas*CFElectricity*efficiency*Price											
Heating Revenue												
Recycling Revenue			100	150	200	200	200	200	200	200	200	200
Env. Benefit (Methane not emitted)	*55.61*											

in US$ per 1000 m3 derived from CO2 value: CO2/ton (USD2.72,-)*Conversion Factor CH4/CO2 (21)*Conversion Factor Cubic Metres

Conversion		
Energy Content	GJ/1000 m3	MWh/1000m3
Natural Gas	34	9.4452
Landfill Gas (Methane 50%)	17	4.7226
Efficiency Factors		
Boiler House (Heating)	90%	
Gas marketable for Heating	88%	
Gas Engine (Electricity)	35%	
Market Prices		
Natural Gas ($/1000m3)*	94.73	
Electricity ($/kWh)**	0.034	

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
50	50	50	50	50	50	50	50	50	50	50	50	50
71	71	71	71	71	71	71	71	71	71	71	71	71
893	893	893	893	893	893	893	893	893	893	893	893	893
1013	1013	1013	1013	1013	1013	1013	1013	1013	1013	1013	1013	1013
1,013	1,013	1,013	1,013	1,013	1,013	1,013	1,013	1,013	1,013	1,013	1,013	1,013

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
1,594	1,563	1,537	1,514	1,492	1,473	1,457	1,440	1,427	1,415	1,260	1,260	1,260
200	200	200	200	200	200	200	200	200	200	200	200	200
1069	1049	1031	1016	1001	988	977	966	957	949	845	845	845
2,863	2,812	2,767	2,729	2,693	2,661	2,634	2,607	2,584	2,564	2,306	2,306	2,306
1850	1799	1754	1716	1680	1648	1621	1594	1571	1551	1293	1293	1293
536	474	420	373	332	296	265	237	212	190	144	131	119
16.72	16.4	16.12	15.88	15.65	15.45	15.28	15.11	14.97	14.84	13.22	13.22	13.22
19.23	18.86	18.54	18.26	18.00	17.77	17.57	17.38	17.22	17.07	15.20	15.20	15.20
21.74	21.32	20.96	20.64	20.35	20.09	19.86	19.64	19.46	19.29	17.19	17.19	17.19
16.82	16.50	16.22	15.98	15.75	15.55	15.38	15.20	15.06	14.93	13.30	13.30	13.30
200	200	200	200	200	200	200	200	200	200	200	200	200

Latvia
Riga Solid Waste Management Project
Option 4: Gas for Electricity
Economic Costs and Benefits

(US$ '000)	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
			Economic Costs										
I. Investment Costs	805	8855	3216	1332	1564	435	287						
II. Recurrent Costs													
A. Salaries	0	33	50	50	50	50	50	50	50	50	50	50	50
B. Operation and Maintenance													
civil works	0	23	61	67	71	71	71	71	71	71	71	71	71
equipment	0	357	979	1032	1083	1083	1083	1083	1083	1083	1083	1083	1083
Total Recurrent Costs	0	413	1089	1148	1203	1,203	1,203	1,203	1,203	1,203	1,203	1,203	1,203
TOTAL ECONOMIC COSTS	805	9268	4306	2481	2767	1,638	1,490	1,203	1,203	1,203	1,203	1,203	1,203

Economic Benefits (US$ '000)

Period	1	2	3	4	5	6	7	8	9	10	11	12	13
	1997	1999	2000	2001	2002	2003	2004	3005	2006	2007	2008	2009	2010
I. Electricity			1,349	1,865	2,151	2,312	2,407	2,461	2,385	2,318	2,258	2,206	2,161
II. Heating													
III. Recycling			100	150	200	200	200	200	200	200	200	200	200
IV. Environmental Benefits (Global)			668	923	1064	1144	1191	1218	1180	1147	1117	1092	1069
TOTAL ECONOMIC BENEFITS			2,117	2,938	3,415	3,657	3,798	3,879	3,765	3,664	3,575	3,498	3,430
NET BENEFITS	-805	-9,268	-2,189	457	648	2,018	2,307	2,676	2,562	2,461	2,372	2,295	2,227
Discounted Benefits	-732	-7,659	-1,644	312	402	1,139	1,184	1,248	1,086	949	831	731	645
Discount Rate	10%												

Parameters

Landfill Gas equivalent to													
Natural Gas (mio. m3, total) min.case			10.44	14.43	16.64	17.89	18.62	19.04	18.45	17.93	17.47	17.07	16.72
Natural Gas (mio. m3, total) base case			12.01	16.59	19.14	20.57	21.41	21.90	21.22	20.62	20.09	19.63	19.23
Natural Gas (mio. m3, total) max. case			13.57	18.76	21.63	23.26	24.21	24.75	23.99	23.31	22.71	22.19	21.74
Electricity Revenue	Gas*CFElectricity*efficiency*Price												
Heating Revenue													
Recycling Revenue			100	150	200	200	200	200	200	200	200	200	200
Environmental Benefit (Methane not emitted)	55.61												
in US$ per 1000 m3	CO2/ton (USD2.72,-)*Conversion Factor CH4/CO2 (21)*Conversion Factor Cubic Metres												

Conversion

Energy Content	GJ/1000 m3	MWh/1000m3
Natural Gas	34	9.4452
Landfill Gas (Methane 50%)	17	4.7226
Efficiency Factors		
Boiler House (Heating)	90%	
Gas Engine (Electricity)	35%	
Market Prices		
Natural Gas ($/1000m3)	94.73	
Electricity ($/kWh)	0.034	

2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
50	50	50	50	50	50	50	50	50	50	50	50
71	71	71	71	71	71	71	71	71	71	71	71
1083	1083	1083	1083	1083	1083	1083	1083	1083	1083	1083	1083
1,203	1,203	1,203	1,203	1,203	1,203	1,203	1,203	1,203	1,203	1,203	1,203
1,203	1,203	1,203	1,203	1,203	1,203	1,203	1,203	1,203	1,203	1,203	1,203

14	15	16	17	18	19	20	21	22	23	24	25
2011	2012	2013	2014	2015	2016	2017	2018	2019	202	2021	2022
2,120	2,084	2,053	2,023	1,997	1,975	1,953	1,935	1,918	1,709	1,709	1,709
200	200	200	200	200	200	200	200	200	200	200	200
1049	1031	1016	1001	988	977	966	957	949	845	845	845
3,369	3,315	3,268	3,224	3,185	3,152	3,119	3,092	3,067	2,754	2,754	2,754
2,165	2,111	2,065	2,021	1,982	1,949	1,916	1,889	1,864	1,551	1,551	1,551
570	505	449	400	356	319	285	255	229	173	157	143
16.4	16.12	15.88	15.65	15.45	15.28	15.11	14.97	14.84	13.22	13.22	13.22
18.86	18.54	18.26	18.00	17.77	17.57	17.38	17.22	17.07	15.20	15.20	15.20
21.32	20.96	20.64	20.35	20.09	19.86	19.64	19.46	19.29	17.19	17.19	17.19
200	200	200	200	200	200	200	200	200	200	200	200

LATVIA

MUNICIPAL SOLID WASTE MANAGEMENT PROJECT

ANNEX 14

FINANCIAL RETURNS OF THE PROJECT

ANNEX 14

FINANCIAL RETURNS OF THE PROJECT

A. COSTS

1. Total project costs have been derived from estimates made by SWECO Consultants responsible for the preparation of the Project; they consist of investment costs, capitalised recurrent costs during implementation, as well as the cost of detailed design and managerial improvements, including the twinning arrangement. Costs for a separate Procurement and Disbursement Unit have also been included. Subsequently, physical contingencies have been applied, in consultation with the Engineer, followed by price contingencies, calculated on base costs plus physical contingencies. Price contingencies are projected GDP inflation rates as indicated by the Country Economist.

2. Recurrent costs have also been calculated by the Consultants ; however, their estimate of labour costs has been reduced, as the actual staffing of the Getlini company already far exceeds normal levels. The details of investments, recurrent costs and contingencies are presented in Annex 4.2 and in Table 2.1 see para 2.19 in the Staff Appraisal Report.

B. REVENUES

3. The Project's revenues consist of the sale of electricity, generated from the recovered landfill gas, and incremental sales of recovered waste materials ; the latter has been entered as a modest amount of US $200,000 at full production, which may well be an underestimate of the true potential. The disposal fee payable to the landfill operator has been excluded from the revenue stream, as it is expected that the volume of waste delivered to the site would not increase over time.

4. Electricity sales have been calculated on the basis of estimated landfill gas production, converted into electricity using standard conversion factors. This production has been valued at the current rate per kWh paid by Latvenergo, the national electricity company; the rate of US $0.048148/kWh is 34.15% above the import price of US $0.035889/kWh..

5. Finally, the residual or salvage value of the investment has been taken at 15% of the investment, including contingencies. This percentage is justified in that substantial provisions for maintenance and replacement for machinery and equipment have been included under the recurrent costs.

6. The attached 3-page table summarises the cost and benefit data, shows net cost-benefit streams and indicates the results of the two rate of return calculations.

C. THE FINANCIAL RATE OF RETURN (FIRR) CALCULATION

7. The FIRR calculation for the Project follows the standard procedure of confronting outflows, consisting of total Project costs and post-implementation recurrent expenditures, with inflows consisting of revenues and, at the end of the Project's life, any residual or salvage value of the investment. The resulting net cost-benefit flows, when discounted to zero, give the interest rate at which outflows equal inflows.

8. The results of the analysis for the base-case scenario show a FIRR of almost 10%, which is quite satisfactorily, considering that this is an environmental protection project and that no increase in tariffs or disposal fees is required to achieve this return.

9. A sensitivity analysis has been carried out to test the robustness of the Project against variations in costs and benefits; the results are summarised in the table below.

Table 1. FIRR Calculation

COSTS	REVENUE		
	Revenues-15%	Base Case	Revenues +15%
Investment +10%	5.61%	8.46%	11.66%
Recurrent costs + 10%	5.88%	9.08%	12.64%
Base Case	6.84%	9.92%	13.38%
Revenues delayed 1 year	5.34%	7.91%	10.73%

10. In the base-case scenario the delay in electricity revenues by one year has the biggest impact on the FIRR, reducing it from 9.92% to 7.91% (-2.01%, equivalent to a drop of 20.3%). The 10% increase in costs, respectively of recurrent costs and investments, has a much smaller impact at respectively -0.84% and -1.46%, equivalent to a reduction relative to the base-case of respectively 8.5% and 14.7 %.

11. The worst scenario, a combination of electricity revenues delayed by one year and a 15% drop in overall electricity sales, results in a reduction of the FIRR to only 5.34%. This may still acceptable for an environmental project of this type, but an increase in disposal rates would then have to be considered, so as to protect the company's cash flow. However, the probability of this event occurring is considered to be low.

12. The best scenario is that of base-case costs and a 15% increase in electricity sales, an event which is considered to have a reasonable probability; the FIRR in this case would be 13.38%.

D. THE NET PRESENT VALUE (NPV)

13. The NPV is the present value of future cash flows from the Project, minus the initial investments. It represents the contribution of an investment to the value of the firm and the NPV is considered the primary decision making tool of financial management in the private sector. For this reason its calculation has been included in the analysis.

14. The cash flows and the investments have to be discounted; for an enterprise this discount rate equals its required rate of return, or the cost of its capital. For development projects the discount rate normally used is the Opportunity Cost of Capital (OCC), which has been estimated at 10% for Latvia.

15. Applying this discounting procedure to the cost-benefit flows presented in the attached tables shows a near break-even situation for the base-case. This indicates that at discount rate of 10% the investment would yield a zero Net Worth (actually the NPV is -81).

16. A sensitivity analysis similar to that carried out for the FIRR has also been applied for the NPV; the results are summarised in the table below.

Table 2. NPV Calculation

COSTS	.....REVENUES.....		
	Revenues-15%	Base Case	Revenues +15%
Investment +10%	-4670	-1691	**1884**
Recurrent costs + 10%	-3878	-899	**2676**
Base Case	-3060	-81	**3494**
Revenues delayed 1 year	-5052	-2372	**448**

17. All the results in bold figures are above the OCC of 10%. These results for the NPV confirm the FIRR findings, in that the scenario of base-case costs, coupled with a 15% increase in electricity sales, would give the best return. The worst scenario would be the one-year delay in electricity revenues, coupled with a 15% drop in electricity sales.

In the base case the NPV is at break-even, which means that the contribution to the company's Net Worth would zero; all other scenarios of cost increases or a delay in electricity sales would result in a negative NPV at the 10% discount. In this case, project implementation would result in a decrease of

the company's Net Worth. A positive contribution to the company's Net Worth would materialise only in the event electricity sales (or the sales price) would increase by 15%. The NPV for these four cases would vary from US $0.45 million to US $3.49 million.

E. CONCLUSION

18. The FIRR and the NPV analyses of the Project indicate both that in the base-case scenario the Project would yield a satisfactory rate of return of 10%, which is good for this type of environmental protection project, but below what could be expected from a normal industrial investment.

19. The sensitivity analysis, incorporating increases in costs and reductions in benefits, indicates that the Project is particularly sensitive to a one-year delay in electricity revenues after the initial investments have been made[1]. During the implementation particular care must therefore be taken to prevent this occurrence from happening.

20. An increase of investment costs by 10% would also have a strong negative impact on the returns from the Project. This assumption is however less likely to be realised, as relatively high physical contingencies have already been incorporated in the cost estimates.

21. The 15% decrease of electricity sales, which would have a large negative impact on the rates of return, is also considered of low probability.

22. All in all, the set of returns calculated in the sensitivity analysis shows a range of results from 13.38% in the best scenario (and a NPV of US $3.49m) to the worst scenario with a FIRR of 5.34% (and a negative NPV of US $5.05m). During the planning and implementation of the Project particular emphasis must be placed on the timely execution of productive investments, so that benefits could be realised without delay.

[1] Of course, a delay in both investment and benefits would have a much smaller impact on the rates of return.

Financial Rate of Return and NPV Calculation (25 years)

(at Latvenergo purchase price for electricity)

A - Capital investments, in '000 USD

YEAR	Environ Remediation base cost	Environ Remediation incl all cont	Tech & Ops Improvements base cost	Tech & Ops Improvements incl all cont	Gas Gen & Energy Prod base cost	Gas Gen & Energy Prod incl all cont	Managerial Improvements base cost	Managerial Improvements incl all cont	TOTAL INVESTMENT base cost	TOTAL INVESTMENT only phys cont	Electricity price assumptions
											a) import price/kWh 0.035889
1998	138	141	333	339	154	157	201	210	826	830	b) Latvenergo price 0.048148
1999	2709	3242	3905	4520	2759	3010	347	373	9720	10290	
2000	231	273	1745	2124	1980	2315	388	442	4344	4577	
2001	193	240	594	766	1555	1901	206	249	2548	2663	
2002	195	253	746	1022	1693	2147	210	266	2844	2981	
Totals	3466	4149	7323	8771	8141	9530	1352	1540	20282	21341	incl 1059 of physical contingencies only
							TOTAL PROJECT COSTS		20282	21341	excl interest during construction

B - Recurrent expenditures, in '000 USD

	o & m	staff	energy cells	totals(2+3+4)	
1998	0	0	0	0	*(recurrent cost*
1999	380	53	0	((433))	*incl. phys cont,*
2000	1040	79	0	((1119))	*capitalised*
2001	1099	79	0	((1178))	*from 1997 to*
2002	1154	79	0	((1233))	*2001)*
2003	1154	79	764	1997	
2004	1154	79	593	1826	
2005	1154	79	220	1453	
2006	1154	79	220	1453	
2007	1154	79	220	1453	
2008	1154	79	220	1453	
2009	1154	79	220	1453	
2010	1154	79	220	1453	
2011	1154	79	220	1453	
2012	1154	79	220	1453	
2013	1154	79	220	1453	
2014	1154	79	220	1453	
2015	1154	79	220	1453	
2016	1154	79	220	1453	
2017	1154	79	220	1453	
2018	1154	79	220	1453	
2019	1154	79	220	1453	
2020	1154	79	220	1453	
2021	1154	79	220	1453	
2022	1154	79	220	1453	

C - Benefits, in '000 USD

	electricity output GWh per year	incremental waste selection	value base - 15%	electricity base case	production base + 15%
1998	0	0	0	0	0
1999	0	0	0	0	0
2000	36.53	100	1759	2023	2339
2001	50.49	150	2431	2796	3233
2002	58.23	200	2804	3224	3729
2003	62.63	200	3015	3468	4010
2004	65.17	200	3138	3608	4173
2005	66.64	200	3209	3690	4267
2006	64.57	200	3109	3575	4135
2007	62.75	200	3021	3474	4018
2008	61.16	200	2945	3386	3916
2009	59.75	200	2877	3308	3826
2010	58.51	200	2817	3240	3747
2011	57.41	200	2764	3179	3677
2012	56.44	200	2717	3125	3614
2013	55.57	200	2675	3077	3558
2014	54.79	200	2638	3034	3508
2015	54.09	200	2604	2995	3464
2016	53.46	200	2574	2960	3424
2017	52.90	200	2547	2929	3388
2018	52.39	200	2522	2901	3355
2019	51.93	200	2500	2875	3325
2020	46.28	200	2228	2563	2964
2021	46.28	200	2228	2563	2964
2022	46.28	200	2228	2563	2964
2022	RESIDUAL VALUE of the ORIGINAL INVESTMENT, assumed at 15% of investment incl. physical contingencies		3201	3201	3201

Financial Rate of Return and NPV Calculation (25 years)

D - Rate of Return Calculation, base case

	TOTAL INVESTMENT base cost	TOTAL INVESTMENT phys cont only		Recurrent Costs		GROSS BENEFITS base - 15%	GROSS BENEFITS base case	GROSS BENEFITS base + 15%	NET COSTS & BENEFITS STREAM base - 15%	NET COSTS & BENEFITS STREAM base case	NET COSTS & BENEFITS STREAM base + 15%
1998	826	830		((0))	*recurrent*	0	0	0	-830	-830	-830
1999	9720	10290		((433))	costs	0	0	0	-10290	-10290	-10290
2000	4344	4577		((1119))	*capitalised*	1859	2123	2439	-2718	-2454	-2138
2001	2548	2663		((1178))	*during years*	2581	2946	3383	-82	283	720
2002	2844	2981	21341	((1233))	*1998-2001*	3004	3424	3929	23	443	948
2003	((20282))	((21341))	((total))	1997		3215	3668	4210	1219	1671	2214
2004				1826		3338	3808	4373	1511	1982	2547
2005				1453		3409	3890	4467	1956	2437	3014
2006				1453		3309	3775	4335	1856	2322	2882
2007				1453		3221	3674	4218	1768	2221	2765
2008				1453		3145	3586	4116	1692	2133	2663
2009				1453		3077	3508	4026	1624	2055	2573
2010				1453		3017	3440	3947	1564	1987	2494
2011				1453		2964	3379	3877	1511	1926	2424
2012				1453		2917	3325	3814	1464	1872	2361
2013				1453		2875	3277	3758	1422	1824	2305
2014				1453		2838	3234	3708	1385	1781	2255
2015				1453		2804	3195	3664	1351	1742	2211
2016				1453		2774	3160	3624	1321	1707	2171
2017				1453		2747	3129	3588	1294	1676	2135
2018				1453		2722	3101	3555	1269	1648	2102
2019				1453		2700	3075	3525	1247	1622	2072
2020				1453		2428	2763	3164	975	1310	1711
2021				1453		2428	2763	3164	975	1310	1711
2022				1453		2428	2763	3164	975	1310	1711
2023	Residual value taken as 15% of the investment, including physical contingencie					3201	3201	3201	3201	3201	3201

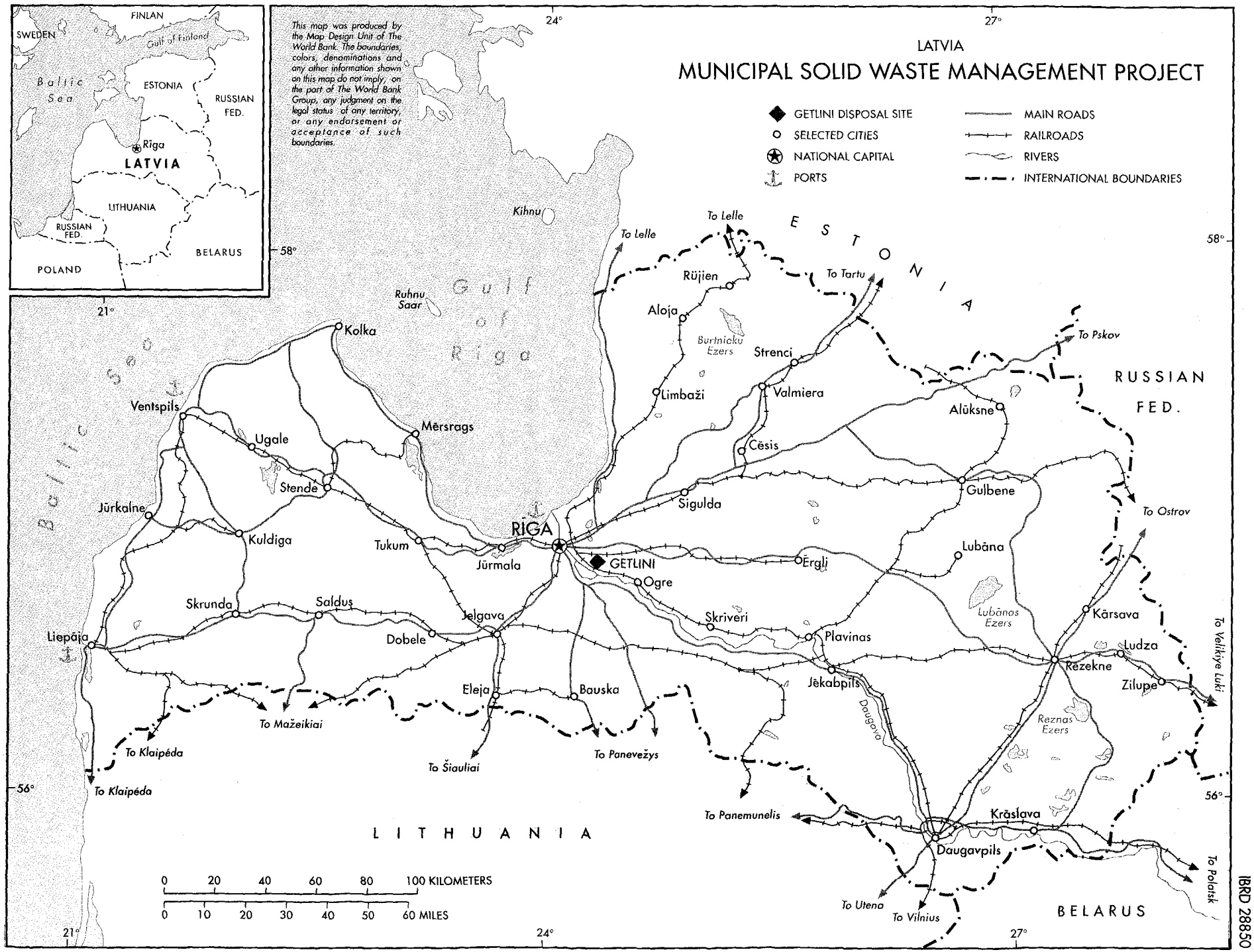
Note: base minus 15% is the 1.00 case calculated by AH

IRR	6.84%	9.92%	13.38%
NPV (10%)	-3060	-81	3494

Financial Rate of Return and NPV Calculation (25 years)

E - Sensitivity Analysis i) all investments 10% higher

	i) Investments plus 10%			ii) Recurrent costs plus 10%			iii) Electricity sales delayed one year			
	Net	Costs	Benefits	Net	Costs	Benefits	Net	Costs	Benefits	
	base - 15%	base case	base + 15%	base - 15%	base case	base + 15%	base - 15%	base case	base + 15%	
1998	-913	-913	-913	-830	-830	-830	-830	-830	-830	
1999	-11319	-11319	-11319	-10290	-10290	-10290	-10290	-10290	-10290	
2000	-3176	-2912	-2595	-2718	-2454	-2138	-4477	-4477	-4477	
2001	-348	16	454	-82	283	720	-754	-490	-754	
2002	-275	145	650	23	443	948	-350	15	452	
2003	1219	1671	2214	1019	1471	2014	1007	1428	1932	
2004	1511	1982	2547	1329	1800	2364	1389	1841	2384	
2005	1956	2437	3014	1810	2292	2869	1885	2355	2920	
2006	1856	2322	2882	1710	2177	2736	1956	2437	3014	
2007	1768	2221	2765	1623	2076	2620	1856	2322	2882	
2008	1692	2133	2663	1546	1988	2518	1768	2221	2765	
2009	1624	2055	2573	1479	1910	2428	1692	2133	2663	
2010	1564	1987	2494	1419	1842	2349	1624	2055	2573	
2011	1511	1926	2424	1366	1781	2278	1564	1987	2494	
2012	1464	1872	2361	1319	1727	2216	1511	1926	2424	
2013	1422	1824	2305	1277	1678	2160	1464	1872	2361	
2014	1385	1781	2255	1240	1635	2110	1422	1824	2305	
2015	1351	1742	2211	1206	1597	2066	1385	1781	2255	
2016	1321	1707	2171	1176	1562	2025	1351	1742	2211	
2017	1294	1676	2135	1149	1531	1989	1321	1707	2171	
2018	1269	1648	2102	1124	1502	1957	1294	1676	2135	
2019	1247	1622	2072	1102	1477	1927	1269	1648	2102	
2020	975	1310	1711	830	1164	1566	1247	1622	2072	
2021	975	1310	1711	830	1164	1566	975	1310	1711	
2022	975	1310	1711	830	1164	1566	975	1310	1711	
2023	3521	3521	3521	3201	3201	3201	3201	3201	3201	Residual value, 15% of investment, *including physical contingencies only.*
IRR	5.61%	8.46%	11.66%	5.88%	9.08%	12.64%	5.34%	7.91%	10.37%	
NPV (10%)	-4670	-1691	1884	-3878	-899	2676	-5052	-2372	448	



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