

LITHUANIA  
Vilnius Heat Demand Management GEF Project

**GEF Project Document**

Europe and Central Asia Region  
ECSIE

<b>Date:</b> May 5, 2003 <b>Sector Manager:</b> Henk Busz <b>Country Director:</b> Roger W. Grawe <b>Project ID:</b> P073242 <b>Focal Area:</b> G	<b>Team Leader:</b> Victor B. Loksha <b>Sector(s):</b> District heating and energy efficiency services (100%) <b>Theme(s):</b> Climate change (P), Municipal governance and institution building (S), Corporate governance (S)							
<b>Project Financing Data</b>								
<input type="checkbox"/> Loan <input type="checkbox"/> Credit <input checked="" type="checkbox"/> Grant <input type="checkbox"/> Guarantee <input type="checkbox"/> Other:								
<b>For Loans/Credits/Others:</b>								
<b>Amount (US\$m):</b>								
<b>Financing Plan (US\$m):</b>	<b>Source</b>							
<b>Local</b>	<b>Foreign</b>	<b>Total</b>						
BORROWER/RECIPIENT		33.60	0.00	33.60				
GLOBAL ENVIRONMENT FACILITY		0.00	6.50	6.50				
<b>Total:</b>		33.60	6.50	40.10				
<b>Borrower/Recipient:</b> VILNIAUS ENERGIJA, VILNIUS MUNICIPALITY <b>Responsible agency:</b> VILNIAUS ENERGIJA, VILNIUS MUNICIPALITY <b>Address:</b> Smolensko 12, LT-2600 Vilnius, Lithuania <b>Contact Person:</b> Mr. Jean Sacreste <b>Tel:</b> (+370 5) 213-1388 <b>Fax:</b> (+370 5) 213-0702 <b>Email:</b> info@dalkia.lt <b>Other Agency(ies):</b> VILNIUS CITY MUNICIPALITY <b>Address:</b> Gedimino av. 9, LT-2600, Vilnius, Lithuania <b>Contact Person:</b> Mr. Vygintas Jakas <b>Tel:</b> (+370 5) 212 73 66 <b>Fax:</b> (+370 5) 212 61 23 <b>Email:</b> savivaldybe@vilnius.lt								
<b>Estimated Disbursements ( Bank FY/US\$m):</b>								
<b>FY</b>	2003	2004	2005	2006	2007			
<b>Annual</b>	0.30	0.50	1.20	2.00	2.50			
<b>Cumulative</b>	0.30	0.80	2.00	4.00	6.50			
<b>Project implementation period:</b> 2003-2007 <b>Expected effectiveness date:</b> 10/01/2003 <b>Expected closing date:</b> 06/30/2008								

## A. Project Development Objective

### 1. Project development objective: (see Annex 1)

**Vilniaus Energija (VE)**, the new management of the Vilnius District Heating Company, took charge of district heat supply to Vilnius on April 1, 2002. VE is undertaking a long-term and capital-intensive investment program aimed at modernizing the district heating system through a fundamental design change to the district heating network and introduction of new equipment. VE's investments will be made, first and foremost, in substation network decentralization designed to reduce losses and improve the quality of district heat supply. Moreover, VE would like to become part of the emerging energy efficiency market by launching a new activity directly at the customer's level - an apartment-level demand-side management (AL DSM) program. This includes the introduction of: (a) thermostatically controlled radiator valves enabling automatic and consumer-controlled use of heat, and (b) electronic heat cost allocators on room radiators enabling consumption-based billing of apartments for heat.

**The Vilnius City Municipality (VCM)** has expressed a strong interest in implementing building-envelope improvements of the residential housing stock of the City. In combination with VE's energy efficiency program for the heating system, VCM's initiative allows to implement a comprehensive heat demand management program in the City of Vilnius.

**The GEF Heat Demand Management Project** would support and supplement the programs pursued by both VE and VCM. Under the Project, the GEF would contribute US\$ 6.5 million to the establishment of a broader and more sustainable ***Energy Conservation Program (ECP)*** for the City to support demand-side energy efficiency in residential buildings connected to the district heating system and engage VE and VCM in the development of an energy efficiency market.

**The objective of the Project** is to reduce the emissions of greenhouse gases from the Vilnius District Heating System through reducing the barriers to, and implementing, financially sustainable and replicable energy efficiency investments in the residential sector of the Vilnius City.

This would be achieved by:

- co-financing VE's demand management program which would demonstrate the benefits of automatic and consumer-controlled use of heat in homes and consumption-based billing at the apartment level; limited grant (or capital subsidy) financing from the GEF would cover the cost of the downpayments (connection fees) for AL DSM equipment - particularly, for low-income customers.
- creating a commercially sustainable (revolving) financial facility - ECP Commercial Fund - to support the implementation of investments aimed at reducing heat losses from the City's housing stock; the facility would provide both financing and technical assistance for such investments, mobilizing additional financing from commercial sources as appropriate.
- implementing monitoring, evaluation, and information dissemination activities aimed at facilitating the replication of the Project's experience.

It is expected that the Project would enable VE to compete more effectively in the heating market, supporting the development of heat supply at least cost while improving customer satisfaction. At the same time, the Project would promote broader and deeper penetration of energy efficiency markets, address the barriers to sustainability in energy conservation and test the possibilities for achieving the benefits of energy conservation in the residential sector on a financially sustainable basis.

## 2. Key performance indicators: (see Annex 1)

The performance monitoring indicators for the Project need to serve the purpose of quantifying the energy savings and associated GHG savings. However, due to the methodological complexity of direct monitoring of these outcomes, certain auxiliary indicators would have to be relied upon such as heat consumption per square meter of residential floor area, and the level of penetration of energy saving technology (building-level substations, AL DSM devices such as heat meters and valves, etc.) over time. The following specific indicators will be included in the quarterly progress reports:

### VE-implemented components

- Number of buildings with modern building-level substations installed by VE.
- Number of buildings (and apartments) and residential floor area with AL DSM equipment installed, with the same indicators specifically for low-income families' apartments.
- Heat consumption in GJ/year in buildings with AL DSM equipment installed – in comparison with baseline consumption.
- Cost of AL DSM equipment – per unit of equipment or per m2 of apartment floor area.
- The co-financing ratio (in US\$ per dollar of GEF funds utilized).

### VCM-implemented components

- Number of buildings (and apartments) having received financing from ECP Commercial Fund with a breakdown by type of DSM measure.
- Volume of ECP Commercial Fund investment (value of contracts concluded with homeowners)
- Repayments received from homeowners (actual versus planned based on the set amortization schedule) and default rate.
- The co-financing ratio (in US\$ per dollar of GEF funds utilized).
- Heat consumption in GJ/year in buildings which received support from ECP Commercial Fund - in comparison with baseline consumption (net of saving due to VE-implemented investments).

Fuel consumption by the district heating system (in absolute terms and per GJ of heat delivered to the end-users) will be monitored on an annual basis as a broad indicator of evolving trends in energy efficiency of the Vilnius district heating system, part of which should be attributable to the Project.

The performance of the VCM-implemented Commercial Fund component would be measured primarily on the basis of the volume of energy efficiency investments, rates of return on the investments made, and sustainability of the fund's operation in light of the emerging repayment patterns. The co-financing ratio for GEF funds utilized would measure the success in attracting co-financing.

To gauge the extent of the market transformation impact, the trends in the supply and prices of DSM equipment and services in Vilnius would be monitored. The success of the demonstration, public outreach, and information dissemination efforts would be assessed based on the information about similar projects emerging elsewhere in Lithuania as well as in other countries of the ECA Region.

## B. Strategic Context

### 1. Sector-related Country Assistance Strategy (CAS) goal supported by the project: (see Annex 1)

**Document number:** R99-64

**Date of latest CAS discussion:** 05/11/1999

The Bank's Country Assistance Strategy for Lithuania is designed to deepen the reforms with a view to EU Accession, to build capacity in municipal and local institutions and to support the social areas which are not a part of the immediate requirements for accession. This Project largely focuses on capacity building at the local level through commercialization of the district heating functions in Vilnius. Improving the financial viability and decreasing the cost of heat supply will help residents in Vilnius by decreasing the fiscal burden and will reduce the impact of heat supply costs on the budget. The Project

will also help reduce the current account deficit by reducing fuel consumption. The project will provide support regarding EU Accession issues by decreasing the impact of the district heating system on the environment.

### **1a. Global Operational strategy/Program objective addressed by the project:**

The project is consistent with the objectives of GEF Operational Program 5 - Removal of Barriers to Energy Efficiency and Energy Conservation. Section 5.7 of OP-5 includes support for activities that lead to sustainable results that demonstrate local, national, and global benefits through removal of barriers.

Despite potentially high economic returns, measures to improve energy efficiency in the district heating system and in the housing sector are facing substantial challenges. Lithuania's National Communications (NCs) on Climate Change characterize the district heating sector as an area of focus with respect to increasing energy efficiency and bringing down emissions of greenhouse gases (GHG). The NCs indicate that it takes twice as much energy to heat one square meter of residential space in Lithuania as in Denmark. The main reason is poor insulation and heat losses in the network, as well as lack of possibility for consumers to control heating. The second NC estimates that it would be possible to save up to 45% of energy used for building heating if buildings were properly insulated and modern heating systems were installed.

The issues to be addressed through this GEF-supported Project are the **barriers** that stand in the way of deeper and broader market penetration of modern energy efficient technology (see Section B-3).

**The market transformation agenda.** Both the VE and VCM components will have their role in transforming the Lithuanian market into a more energy efficient one. VE's heat management program will provide an essential push to the development of energy efficiency market in Lithuania's residential sector through creating more buyers and suppliers of AL DSM equipment. At present, the limited size of the market is a barrier that contributes to high costs of the equipment. In addition, a powerful *demonstration effect* is expected from the implementation of the concept of a demand-side management program in the district heating sector, with the heat supplier itself playing an active part in supporting the demand-side conservation measures.

The ECP Commercial Fund would operate on a commercial basis (although the need for targeted government support to the poor households may remain). Achieving commercial viability of ECP Commercial Fund would demonstrate its replicability, sending an important signal to the market. To the extent that the Fund will leverage co-financing from commercial sources, the private sector financiers will become increasingly active participants in the energy efficiency market.

### **2. Main sector issues and Government strategy:**

The strategic development of the energy sector is largely driven by Lithuania's desire to accelerate its EU Accession program, requiring a liberalization of the gas and electricity markets. Government energy policy in the energy sector emphasizes economic pricing, the fostering of competitive markets and the commercialization of energy companies, in order to achieve both reliable supply and economy in the use of energy resources. Within this policy envelope, the district heating sub-sector has long been a source of concern since meeting district heating losses has been the single largest element of fiscal support to the energy sector. Heat prices, until recently, have not been cost-based. At the same time, the costs of supply have been unnecessarily high due to losses. In Vilnius, as much as 28% of heat produced by the district heating company is lost in the heat distribution network. Profit taxes have been usually negligible because of the low profitability of the DH companies. Finally, the Government has to bear the costs of supporting low-income households who receive utility subsidies if district heating and hot water bills

exceed 25% and 5%, respectively, of household income.

### **Box 1: Background of the District Heating Service in Vilnius**

Vilnius, which is Lithuania's capital and largest city, has a population of 579,000, and a residential housing stock of 5,700 buildings, of which 85% are supplied with heat by the district heating system. The average year-round outdoor temperature is 6.4 degrees Celsius, making heat supply an essential service. Energy consumption for heating purposes is higher than that of western countries with similar climates due to the relatively poor condition of the housing stock.

The construction of the district heating network in Vilnius started in the mid-1950s, with most of the system expansion taking place in the 1965-1988 period. Because of the general economic circumstances, expansion was halted in 1989 and maintenance has been limited. There are about 460 km of pipeline in the existing system, most of which is between 20 and 35 years old, but is reasonably well maintained. Corrosion is relatively low due to good water quality. The failure rate per km of pipeline is high by Western European standards, largely due to the age of the network.

Heat demand of the city was 2,471 GWh in 1999, with a peak demand of 1,130 MW. This demand was met by a combination of Combined Heat and Power Plants (CHPs) and Heat only Boilers (HOBs) operating predominantly on natural gas. The city has two combined heat and power plants, CHP-2 and CHP-3. CHP-2 was built in the 1950s with an electric capacity of 24 MW and a thermal capacity of 960 MW. CHP-3 was built in the mid-1980s and has an electric capacity of 360 MW and thermal capacity of 570 MW. During the heating season, CHP-3 is the least-cost source of energy as it supplies electricity to the grid and heat to the district heating network. Five HOBs are currently in operation in Vilnius. Two of these HOBs service isolated loads in the outskirts of Vilnius. The remaining three HOBs have a thermal supply capacity of 624 MW.

There are two types of consumer connections to district heating: block (or group) substations and building-level substations, of which there are 161 and 2,311, respectively. The block substations, in turn, supply 2,513 building substations, for a total of 4,824. Block substations provide heat to roughly 60% of district heat consumers. The other 40% are using heat from substations in their buildings; these substations have an average age of 22 years. The control valves in these substations are manually operated. One of the legacies of the supply-oriented system of the past is the production-controlled operation based on constant flow of water through the pipes, with the supplier changing the water temperature in response to weather conditions. This design means that the district heating system can not directly respond to the demands of the customer. Replacing most of the group substations with building-level substations with demand-side temperature control and converting the system from constant to variable flow is considered the best solution to this problem.

In recent years, the former management of the Vilnius District Heating Company (VDHC) sought support from the Municipality for the replacement of block substations with building-level substations (BLS). Under a recent VDHC initiative, the Municipality approved a raise in the fixed cost component of the heat tariff to cover VDHC's losses in the domestic hot water network. This increase resulted in a net increase in the heating bill for about 60% of the DH customers (i.e., all customers currently served from block substations). With the introduction of BLS, the heat bill will be based on the full cost of heat supply incorporating the metered amount of heat used for domestic hot water preparation. Thus, the majority of customers risk facing higher utility bills, unless energy efficiency measures (including in the apartments) are implemented.

Heat meters at the building level have been installed in virtually all residential buildings by 1999, which has allowed VDHC to switch to billing for heat based on metered data at the building level. Homeowners' Associations (HOAs) are the only group of heat consumers that are allowed to self-manage the heat supply to their buildings, however, the current technology seldom allows for customer-controlled operation. For the rest of the customers, the company has maintained heat supply contracts on an apartment-by-apartment basis. At the apartment level, heat meters are typically not available, and the billing for heat is based on the metered heat consumption of the building allocated to each apartment in proportion to its floor area.

The poor financial condition of the district heating companies during the 1990s resulted in a worsening of the quality of service provided. Consumers, dissatisfied with the service provided by district heating utilities, have been turning to alternative forms of heat which are in many cases less desirable from the point of view of the national economy and the environment. The current situation in Vilnius is typical of this post-Soviet environment.

During the late 1990s - early 2000s, the Vilnius District Heating Company (VDHC) was losing about 3% of its customer base per year, as consumers were driven to alternative sources of supply by the problems outlined above. This not only caused the revenue base to contract, but also damaged the competitiveness of district heating which relies on dense heating loads to be cost-effective. Furthermore, the corporate culture tended to be more supply than customer focused.

The economic and environmental gains to be achieved through network modernization and introduction of building-level substations are massive. The outdated housing stock of Vilnius provides opportunities for similar gains through measures such as better insulation, introduction of thermostatic valves and heat meters in apartments. The potentially high economic benefits, however, do not guarantee that these measures would be delivered due to a number of barriers (see Section B-3). To achieve the full set of desired improvements requires active promotion, attractive financing, and direct incentives to some customers.

In 2001, the Vilnius City Municipality (VCM) conducted a tender for a 15-year lease of VDHC to a private operator, in an effort to bring the company to profitable operation. In November 2001, the French company Dalkia won the tender for the lease. The new management of VDHC, Vilniaus Energija (VE), owned by Dalkia, officially took charge of VDHC's operations on April 1, 2002. Under the lease agreement with the Municipality, most of the VDHC staff has been transferred to VE. VDHC continues to own the assets.

### **VE's overall investment program**

The main components of VE's long-term investment program are:

- Substation modernization including the replacement of all block substations with building-level substations in residential buildings;
- New connections and network development;
- Replacement of part of the network;
- Rehabilitation of the HOBs;
- Construction of a gas pipe interconnecting CHP-2 and CHP-3;
- The rehabilitation of CHP-3 and the district heating pumping station at CHP-2.

Moreover, as already noted, VE would like to become part of the emerging energy efficiency market by launching a new activity directly at the customer's level - an Energy Efficiency Program which would consist of apartment-level demand-side management (AL DSM) measures. To facilitate the implementation of the program, VE has created an Energy Efficiency Fund (EEF) under the lease agreement with the Municipality and is prepared to contribute LTL 20 million (about US \$6 million) into a GEF-supported energy efficiency program and to pursue a further expansion of the program if the initial phase proves successful.

### **Implementation of the United Nations Climate Change Convention**

Lithuania ratified the UNFCCC on March 24, 1995, signed the Kyoto Protocol of the UNFCCC on 21 September 1998 and ratified it on January 3, 2003. Under the Kyoto Protocol, the three Baltic states are obliged to reduce their GHG emissions by 8% from the 1990 level. Lithuania has been assisted by international experts in developing a National Implementation Strategy for the Climate Change Convention. Among other multilateral agencies, UNDP is actively promoting sustainable development in Lithuania and has a US\$ 264,600 renewable (wind) energy project for the Baltic region. However, UNDP is much less involved in the area of energy efficiency.

Lithuania is one of the five countries participating in the GEF-supported regional project entitled Commercializing Energy Efficiency Finance (CEEFF), which is implemented by the IFC. CEEFF provides partial risk guarantees for financial intermediaries (FIs) financing energy efficiency investments in several sectors. Eligible transactions are investments in projects and equipment aimed at improving efficiency of energy use in buildings, industrial processes, municipal facilities and other energy end-use applications (e.g., lighting, boiler and cogeneration systems, energy management control systems, efficient and variable speed drive motors, power factor correction, waste heat recovery, etc).

The Lithuanian residential sector is presently problematic for CEEFF due to unfavorable regulatory framework and lack of guidelines which would facilitate rapid decision-making by cooperative owners as well as provide clear collateral security to enable borrowing. Thus, CEEFF is not anticipating commercial loans to homeowners to emerge in the Lithuanian market until: 1) procedural law enables homeowners' associations (HOAs) to make decisions with a workable majority of flat owners, and 2) the associations are empowered to commit common property and establish obligations for the association as a whole as security in loan agreements.

These regulatory issues are being addressed by the Bank through policy dialogue with the Government - particularly, through the Housing Strategy (National Strategy for Sustainable Housing), which is currently under discussion between the Lithuanian Government and the World Bank.

### **3. Sector issues to be addressed by the project and strategic choices:**

#### **Increasing Energy Efficiency of District Heating**

Lithuania has virtually no primary energy resources, apart from wood, and thus relies heavily on imports of oil and gas from Russia for its energy needs. Although commercial energy use has decreased nearly 50% during the 1990s, the GDP (based on PPP) per unit of energy use in the Lithuanian economy remains low at \$2.6/kgoe, which is 40% of the average for EU countries and 60% of the average for Scandinavian countries. Part of this problem will be addressed as structural changes continue to take place in the economy as well as sustained economic growth. However, a more immediate impact can be established by focused energy efficiency measures. A clear candidate for this approach is finding ways to reduce the energy required to heat buildings, including the introduction of building-level substations (BLS), thermostatically controlled valves (TCV) and metering devices such as heat cost allocators (HCA) in the apartments, as well as building envelope improvements (replacement and retrofitting of windows, better insulation of walls and roofs, etc.).

District heating systems, when well designed and run efficiently, can be very energy-efficient. Power plants have efficiencies of about 40% when used just for electricity, but can be up to 90% efficient when run as combined heat and power (CHP) plants in district heating systems. District heating, when provided from such plants, is economically attractive in locations with a high heat load density. Typically, larger cities in colder climates, like Vilnius, are ideally suited for district heating. However,

the Vilnius DH system has been losing its customers to suppliers of other forms of heat such as building-level gas boilers because the service has been so poor in the past.

The GEF-supported Energy Conservation Program will help the district heat supplier to regain and consolidate its customer base and will support fundamental design changes including the installation of building-level substations and AL DSM equipment, increase consumers' control over their consumption of energy and make them more aware of options to reduce the cost of heat consumed.

## Demand-Side Barriers

The issues to be addressed through this GEF-supported Project are, essentially, the **barriers** that stand in the way of deeper and broader market penetration of modern energy efficient technology for district heat consumers.

Barrier	Removal/Mitigation Measure
<ul style="list-style-type: none"> <li>Limited technical possibilities and lack of incentives for economical use of heat in multi-apartment buildings.</li> </ul>	<ul style="list-style-type: none"> <li>Introduction of TCVs to allow apartment-level control of heat and HCAs to allow consumption-based billing of apartments.</li> </ul>
<ul style="list-style-type: none"> <li>Historical distrust by homeowners of the DH quality of service leading some of them to seek other forms of heating.</li> </ul>	<ul style="list-style-type: none"> <li>Joint public outreach efforts by VE and VCM, including political and administrative support of the substation replacement and AL DSM program by VCM.</li> </ul>
<ul style="list-style-type: none"> <li>Lack of acceptance of the VE-implemented substation replacement program by the homeowners (due to the associated increase in the utility bills).</li> </ul>	<ul style="list-style-type: none"> <li>Education of the customers about the opportunities to control heat (using substations at the building level and TCVs at the apartment level).</li> </ul>
<ul style="list-style-type: none"> <li>Inability of low-income consumers to pay the downpayment ("connection fee") for apartment-level DSM.</li> </ul>	<ul style="list-style-type: none"> <li>Limited and targeted grant (subsidy) to buy down the cost of the connection fee.</li> </ul>
<ul style="list-style-type: none"> <li>Limited size of the market for AL DSM equipment leads to high costs of equipment.</li> </ul>	<ul style="list-style-type: none"> <li>AL DSM program implemented by VE will expand the market considerably (by \$10m during 2003-2007 with a view to further scaling up).</li> </ul>
<ul style="list-style-type: none"> <li>Lack of commercial credit for energy efficiency in the residential sector.</li> </ul>	<ul style="list-style-type: none"> <li>Creating a dedicated ECP Commercial Fund (operated by an ESCO-type entity with fund management expertise) to support energy efficiency improvements in buildings.</li> </ul>
<ul style="list-style-type: none"> <li>Lack of successful examples of heat demand management by district heating utilities in the Baltic States and the CIS.</li> </ul>	<ul style="list-style-type: none"> <li>Implementation of substation replacement and AL DSM program by VE and dissemination of results (to be documented under the M&amp;E Component).</li> </ul>
<ul style="list-style-type: none"> <li>Lack of successful examples of commercially viable energy efficiency investment operations in the residential housing sector.</li> </ul>	<ul style="list-style-type: none"> <li>Implementation of the ECP Commercial Fund component and dissemination of results (to be documented under the M&amp;E Component).</li> </ul>

By providing the homeowners with apartment-level DSM equipment and associated services, VE is consolidating its customer base and, first and foremost, keeping its customers from disconnecting by making the DH option more attractive. Simultaneously, VE is reducing potential resistance of the



customers to the implementation of its substation replacement program. This resistance, as well as the decentralized structure of ownership and decision-making, lead to high transaction costs of obtaining the agreement to implement the needed investments. The Project addresses these barriers through creating a collaborative engagement of public authorities from the Municipality and private participants in the market working together to promote the heat demand management program. By utilizing the means of the subsidy fund of the ECP, the Project enables all customers to afford the "first-cost" associated with the introduction of TCVs and HCAs. Otherwise, many low-income consumers will not be able to pay this initial cost of equipment that can make the whole system operate more efficiently.

By setting up a financial facility to support building-envelope improvements and other DSM investments by the homeowners, the Municipality addresses such a barrier as lack of commercial credit for energy efficiency in the residential sector. The lack of commercial credit to the sector is in part due to lack of collateral against the risk of default. The Commercial Fund Manager selected by the Municipality will be asked to operate with limited collateral requirements.

## C. Project Description Summary

**1. Project components** (see Annex 2 for a detailed description and Annex 3 for a detailed cost breakdown):

### The Substation Modernization Component

**Substation Modernization (Component A) - US\$ 26.1 million.** This component of VE's investment program consists of substation modernization including the replacement of all block substations with building-level substations in residential buildings. VE plans to install 2,286 building-level substations (most of them over the next four or five years) in buildings currently served from block substations. The implementation of this component is of utmost importance to the transformation of the Vilnius DH system into a modern, customer friendly, and energy efficient system. This is also an essential technical prerequisite for the demand-side management measures at the apartment and building level and thus ties in most closely with the GEF-supported components.

The rest of the components of VE's investment program (such as rehabilitation of heat generation facilities and supply network), though also important for the success of the Project, are not shown in the following table which lists only those components focusing on heat demand management.

Component	Indicative Costs (US\$M)	% of Total	Bank financing (US\$M)	% of Bank financing	GEF financing (US\$M)	% of GEF financing
A. Substation Modernization	26.10	65.1	0.00	0.0	0.00	0.0
B. Apartment-level DSM (Subsidy Fund)	10.00	24.9	0.00	0.0	2.50	38.5
C. ECP Commercial Fund	3.00	7.5	0.00	0.0	3.00	46.2
D. ECP Commercial Fund Management Contract	0.50	1.2	0.00	0.0	0.50	7.7
E. Administration of ECP by the Municipality	0.30	0.7	0.00	0.0	0.30	4.6
F. Monitoring and Evaluation of Global Benefits	0.20	0.5	0.00	0.0	0.20	3.1
<b>Total Project Costs</b>	40.10	100.0	0.00	0.0	6.50	100.0
<b>Front-end fee</b>	0.00	0.0	0.00	0.0	0.00	0.0
<b>Total Financing Required</b>	40.10	100.0	0.00	0.0	6.50	100.0

In this table, Components A and B are implemented by VE, while Components C-F are implemented by the Vilnius City Municipality. Components B-F constitute the GEF-supported Energy Conservation Program (ECP). The investments shown in the table correspond to the period **2003-2007**.

## **Energy Conservation Program**

**Apartment-Level Demand-Side Management (AL DSM) component - US\$ 10 million** (Component B) would be a 5-year program covering some 500-600 apartment buildings in Vilnius, with the possibility of expanding the program to another similar number of buildings in the following years. The AL DSM investments would include the supply and installation services for thermostatically controlled valves (TCV) and heat cost allocators (HCA) on room radiators, remote readers for hot water meters, and works for balancing the heat flow in the risers connecting the substation to the radiators. These measures will allow VE to introduce billing based on the actual heat consumption by apartment. Thus, the incentives for the residents to conserve heat would be substantially enhanced. However, the potential level of acceptance of the AL DSM installation program by the Vilnius residents is uncertain. To increase the chances of successful market penetration, the GEF will participate in this component by financing a \$2.5 million "subsidy fund" (to be disbursed in two tranches of \$1.25 million each, the second tranche being contingent on the provision of co-financing for the expansion of the program by VE). The subsidy fund will allow VE to forgive the low-income inhabitants of the 500-600 buildings all or most of the cost of the downpayment (connection fee) on the AL DSM equipment, thus addressing the barrier of up-front cost affordability. During the years of the GEF project duration (2003-2007), the co-financing by VE is expected to equal at least LTL 20 million (roughly \$6 million), with the homeowners contributing about \$2.5 million through connection fees.

**ECP Commercial Fund - US\$ 3 million** (Component C). This component would capitalize a revolving fund (run by a firm contracted by the Municipality - see Component D) through \$3 million worth of demand-side management investments in 2003-2007. The fund would operate on a financially sustainable basis and would be used for energy efficiency investments as long as demand exists. The Municipality envisages that most of the investments will be made in the building-envelope improvements (including window replacement). However, the final decision on the type of the investments made by the Commercial Fund will be made upon the completion of the tender for the operation of the fund under the ECP Management Contract. The intent is to solicit the most effective and innovative proposals (business plans) from the firms competing for the Contract.

**The ECP Management Contract - \$0.5 million** (Component D) - would create an institutional and operational basis for the energy efficiency investment program pursued by the Municipality. A commercial firm – preferably, with credentials of an ESCO – would be selected by the Vilnius Municipality through a competitive tender. The firm would implement the business plan that it will have developed for the tender, including the operation of the ECP Commercial Fund in a financially sustainable manner through profitable investments in energy efficiency in the residential sector. Annex 13 contains a draft TOR for the ECP Management Contractor (to be agreed upon with VCM by the time of presentation of the project to the Board).

**Administration of ECP by the Municipality - up to \$ 0.3 million** - would cover some of the costs to Vilnius Municipality associated with the management of ECP during the five years of GEF project implementation. This allocation would cover Incremental Operating Costs (US\$ 100,000) helping VCM to meet the expenditures for contractual staff, office supplies, transportation, advertising, marketing, public relations and other public outreach efforts, as well as training for financial staff. In addition, the costs of financial audits of the GEF project accounts will be covered by a consultant services allocation of \$100,000, and an allowance of \$100,000 for individual consultants will be made.

**Monitoring & Evaluation of Global Environmental Benefits and Information Dissemination for Replication - \$0.2 million.** The monitoring and evaluation of the achievement of the global

environmental objective would focus on quantifying the GHG savings associated with energy savings and the performance of ECP. The M&E would include a mid-term review (planned for June 2006), which would place a special emphasis on the performance of the ECP from the perspective of GHG reduction impact as well as market penetration and financial sustainability of the Commercial Fund.

In addition to the M&E of GHG reductions and the ECP performance, this component would include **information dissemination** activities aimed to realize the Project's replication potential to the maximum (see Annex 2 for some more details).

## **2. Key policy and institutional reforms supported by the project:**

This project is designed to support many of the Government's national objectives in the energy field at the local level, using Vilnius to set the example as it is the largest city and has the requisite implementation capacity. The project will assist the Vilnius district heating utility to make the transition from being part of a centrally-directed monopoly to being a commercial provider of heat in a competitive marketplace. VE is expected to reduce the dependence of the heating sector on subsidies and become a profitable operation under municipal, mixed or private ownership. It will improve energy efficiency, provide the appropriate economic incentives for the consumers to limit heat consumption, and reduce costs.

To achieve these goals, the project would build on the existing pricing policy framework and introduce new incentives for energy conservation. This includes ensuring full cost recovery of heating and hot water services, and removing remaining barriers to billing for heat and hot water based on metered data. The project will seek to demonstrate to the Government (as well as to the consumers) the effectiveness of AL DSM and consumption-based billing at the apartment level. One of the demonstrated impacts would be a reduced need for subsidies to low-income people to afford district heating. While the need for support to low-income households would probably remain, the Municipality will be advised to focus on the provision of incentives for energy saving, eventually increasing the efficiency of the district heating system, and benefiting both the consumer and the municipal budget. This strategic emphasis is consistent with the subsidy restructuring proposals developed by the Bank in the context of the Lithuanian Housing Strategy (currently under discussion with the Government).

The initial phase of implementation of the AL DSM component by VE and its impact on the energy bills would help the Municipality develop a further plan of action. The Municipality may find broader introduction of TCV, HCA and apartment-based billing preferable to the continuation of the existing policy of compensating households for the recurring and often unnecessarily high costs of heat consumption. The Municipality might then decide to introduce a targeted capital subsidy for TCV and HCA (thus taking over the limited contribution by the GEF Subsidy Fund), or perhaps mandate the introduction of TCV, HCA, and consumption-based billing at the apartment level for the whole City (following the example of Bulgaria).

## **3. Benefits and target population:**

The primary project benefits will be through the reduction of the cost of supply, reduced environmental impact and improved quality of supply. An improvement in the financial viability of the district heating company will benefit both the Municipality (as the shareholder of the company and the immediate provider of the heat subsidies) and the national Government (as the beneficiary of increased profit tax revenues and the ultimate provider of funds for the heat subsidies). The building-level substations and apartment-level DSM measures will support a decrease in energy consumption and improve the quality of supply through improved temperature control in people's homes.

Decreasing heat supply costs will have a larger impact on the poor than on other segments of the population as heat costs represent a disproportionately large component of their income (based on a Social Assessment undertaken during project design). In addition, the poor have less disposable income available to improve the energy efficiency of their apartments, resulting in disproportionately high heat consumption. Income limitations also restrict their ability to switch to other sources of heat supply as the investment costs of new equipment are prohibitive. The GEF-financed components will address the demand-side management measures and expand the benefits of energy conservation into low-income families, where ability to pay for such equipment is an issue despite attractive economic returns.

The GHG emission reduction from the Vilnius district heating system is a direct global environmental benefit from the project. It is estimated that this can reach about 1.5 million tons of CO<sub>2</sub> over the 20-year life cycle of the investments made under the project. Further indirect/downstream GHG emission reductions would be expected due to the demonstration and replication effect of the project, as well as its impact on the market prices for DSM equipment and related services.

#### **4. Institutional and implementation arrangements:**

The implementation responsibility for each component is specified in Section C-1. Two separate GEF Grant Agreements will govern the VE-implemented and VCM-implemented parts of the Project, respectively. The management responsibility for the VE-implemented components will be mainly with the existing staff of VE. The VE department of Marketing and Business Development will play a key role. The Municipality, on the other hand, will use the assistance of a specially selected ECP Management Contractor (Fund Manager) to operate the Commercial Fund and some consulting services to implement the analytical and supervisory components of the ECP. The institutional/technical assistance components would have a total budget of \$1.0 million. The remaining \$5.5 million, earmarked for energy conservation investments, will be split between a \$3 million commercial fund and a \$2.5 million subsidy fund, managed by VCM and VE, respectively.

The commercial fund – a revolving facility supported by repayments from customers for energy efficiency investments (the specific operational modalities of the facility would be defined in the business plan of the ECP Management Contractor) – would be supported through the purchase and installation of a \$3 million worth of energy efficiency equipment and would be used for subsequent energy efficiency investments.

The \$2.5 million subsidy fund would be used as an incremental grant from the GEF to stimulate the introduction of AL DSM and consumption-based billing at the apartment level. One-half of the subsidy fund would be used as a contingent grant, released only if conditions for the expansion of the program are met by VE.

The public oversight and decision making process with regard to the Commercial Fund's operations would be conducted through a Management Board (or "ECP Coordination Committee"). The Board would include representatives of the Vilnius City Municipality (Chair), VE, and other reputable representatives of the energy efficiency business as appropriate. The Board would hire, under a performance contract, a professional Fund Manager (ECP Management Contractor) who would be in charge of administering daily activity of the ECP Commercial Fund and identifying, evaluating, developing and financially structuring energy efficiency projects to be submitted to the Board. The Fund Manager would assure a sound project portfolio for the ECP Commercial Fund in terms of risks and returns. The qualified Manager would be selected competitively. More details on the implementation arrangements for both the VCM-implemented part and the VE-implemented part are available in Annex 2.

## **Financing Plan**

The total project cost is estimated at \$40.1 million - including the substation modernization component but excluding the repayments from the homeowners for the investments financed from the ECP Commercial Fund. VE is expected to fund about \$33.6 million of project costs from its internal resources, commercial bank borrowings, and cost sharing contributions from the homeowners. The GEF is requested to provide \$6.5 million. Of this, \$5.5 million would finance heat demand management investments through the Energy Conservation Program. The remaining \$1.0 million would finance the institutional components including M&E of global environmental benefits, information dissemination directed at replication, the ECP Management Contract, and incremental operating costs of ECP administration by the Municipality.

## **Lending Arrangements**

**The structure of the Energy Conservation Program.** The proposed ECP would be funded by a \$6.5 million GEF grant, portions of which (\$2.5 million and \$4.0 million, respectively) would be extended to VE and VCM. A \$3 million *Commercial Fund* and a \$2.5 million Subsidy Fund would finance energy efficiency investment operations. The GEF would capitalize the Commercial Fund initially (by financing the energy efficiency investments under the VCM-implemented part of the project), but the long-term goal of the fund would be to demonstrate a sufficient rate of return. VCM will be responsible for transferring GEF funds to the appointed Fund Manager. The cash balance at any time should be kept in a separate bank account and identified as the property of the municipally-owned Energy Conservation Program (ECP) Revolving Fund. The *Subsidy Fund* (or grant fund) would also be capitalized initially by GEF - through partial grant-financing of AL DSM equipment - to help VE demonstrate to the customers and to the Government the effectiveness of AL DSM and consumption-based billing at the apartment level (see Section C-2 above for the policy rationale).

The disbursement modality of the two funds would include disbursement categories in the two GEF Grant Agreements, from which energy efficiency investments would be financed on commercial terms and on grant terms, respectively.

## **Supervision, Monitoring and Reporting**

The assessment carried out by the Bank indicates that VE is a company capable of implementing its component of the proposed project. The Vilnius City Municipality is also capable of implementing its components with the support of foreign and local consultants. Still, a significant supervision effort will be required, particularly during the first two years when procurement, disbursement and financial management practices are established. It is expected that about 20 staff-weeks of effort each year for the first two years and about 15 staff-weeks each year thereafter would be required for supervision by the Bank.

Project monitoring would rely largely on the standard financial monitoring reports (FMRs) designed mostly to reflect the key financial information on the project under implementation, but also including physical output and procurement monitoring modules.

**The Bank would carry out a mid-term review of the project planned for June, 2006.** In addition to the topics covered under the financial monitoring reports (FMRs), the mid-term review would include an

in-depth review of the economic viability of the project components, based on actual costs and benefits achieved to date, and of the overall institutional and financial viability of the Project. The mid-term review would place a special emphasis on the performance of the ECP from the perspective of market penetration and financial sustainability and would evaluate: (i) fund performance; (ii) subsidy trends/needs; and (iii) market development trends/needs. Based on the outcome of the mid-term review, measures would be taken to ensure the efficient completion of the project.

## **Procurement**

All procurement financed by the GEF grant would be conducted in accordance with the World Bank Guidelines for Procurement under IBRD loans and IDA Credits, January 1995, revised January and August 1996, September 1997 and January 1999, and using the Bank's Standard Bidding Documents. Consulting services would be procured in accordance with the Guidelines for Selection and Employment of Consultants by World Bank Borrowers, January 1997, revised September 1997, January 1999, and May 2002. A General Procurement Notice containing information about bidding opportunities was published in the October 2001 issue of Development Business (No. 569) in accordance with paras 2.7 and 2.8 of IBRD Guidelines and will be updated. Specific Procurement Notices will also be published, as appropriate, in Lithuanian newspapers of national circulation.

### **The AL DSM Component (VE-implemented)**

The procurement under VE-implemented component is represented by supply and installation of equipment for demand-side energy efficiency measures in the apartments. The measures cover installing thermostatic valves and cost allocators on room radiators, remote readers for hot water meters, and water flow balancing of the risers connecting the substation to the radiators. The procurement would be done by VE in two supply and installation packages (\$5 million each). The GEF contribution would be not more than \$2.5 million (of which \$1.25 million would be released only after a satisfactory mid-term review).

### **The VCM-implemented Components**

***The ECP Commercial Fund*** (US\$ 3 million) would require procurement of goods, works, and installation services for the energy efficiency improvements in buildings. These investments would capitalize the revolving fund owned by the Municipality and operated by the ECP Management Contractor (see below).

#### ***Consultants Services***

The following consulting services will be procured on the basis of Quality- and Cost-based Selection (QCBS).

***The ECP Management Contract*** (US\$ 500,000) is needed to assist the Municipality in the operation of the Commercial Fund. The Management Contractor (MC) would be selected according to QCBS and would have procurement specialists familiar with the Bank's procurement guidelines. Preferably, an energy service company (ESCO) would be hired to work as the Management Contractor.

***Monitoring and Evaluation of Global Environmental Benefits*** (US\$ 200,000) would be carried out under the Municipality's oversight to focus on quantifying the energy savings and associated GHG savings and the performance of the ECP. Information dissemination for barrier removal would be an

integral element of this component.

**Administration of ECP by the Municipality** (US\$ 300,000). This allocation would cover Incremental Operating Costs (US\$ 100,000) helping VCM to meet the expenditures for contractual staff, office supplies, transportation, advertising, marketing, public relations and other public outreach effort, as well as training for financial staff. In addition, the costs of financial audits of the GEF project accounts will be covered by a consultant services allocation of \$100,000, and an allowance of \$100,000 for individual consultants will be made.

### **Financial Management Arrangements**

**Implementing entities.** VE started preparation for the project in 2002 and therefore is more advanced than VCM which was invited to take part in the project in March 2003. VE will utilize existing staff and accounting system for the project purposes. VCM will also use the existing capacity for project implementation however will also hire Fund Manager (ECP Management Contractor - see above) to implement the ECP Commercial Fund component. Since the Fund Manager has not been selected, VCM will have to make sure that applicable criteria included in OP 8.30 on financial intermediaries are met by selected Fund Manager and shall seek no objection from the Bank. Disbursement for VCM's capital investments components under the ECP Commercial Fund will be contingent upon the selection of a Fund Manager acceptable to the Bank. The agreed action plans to be completed before the Board Presentation both for VE and VCM are presented in Section G.

### **Flow of Funds**

**For VE,** the flow of funds will be simple. VE will not need a special account but will be directly reimbursed for expenses incurred in paying contractors for the supply and installation of equipment. Disbursements of GEF grant proceeds will be done based on the invoices paid by VE to the contractors selected through the tenders as described above, at a disbursement percentage rate of 25% applied to invoice amount net of VAT. The counterpart funds will be provided from VE's Energy Efficiency Fund and from the homeowners through connection fees.

**For VCM,** the GEF funds will flow from the Bank, either via a single Special Account which will be replenished on the basis of SOEs or by direct payment to contractors on the basis of direct payment withdrawal applications. The GEF funds for the ECP Commercial Fund will be transferred from the Special Account to the special purpose account held in a reputable bank in the name of VCM on the basis of invoices for eligible expenditures for energy saving investments (such as window replacement, insulation and repair works) implemented in homes. The Fund Manager will receive delegation for paying to the contractors on VCM's behalf. Then the Fund Manager will collect the repayments from the homeowners, accumulating them in a separate account of the ECP Commercial Fund, to be used for further energy efficiency investments on a revolving basis. The counterpart funds will be provided by VCM, final beneficiaries, commercial banks, international donors, etc.

### **Disbursement**

The Project will utilize the Bank's traditional disbursement methods based on evidence of expenditure. The so-called report-based disbursement (or disbursement based on expenditure forecasts) will not be utilized mainly due to the difficulties in ensuring reliable forecasting as the expenditures under the Project will be demand-driven.

### **Disbursement percentages**

Since VE is a commercial entity, the project costs in FMR will be shown in net value without VAT. VAT is anyway refundable to VE and therefore it does not constitute a real cost for VE. For VCM, the disbursement percentages will be calculated on the gross value VAT inclusive.

## **D. Project Rationale**

### **1. Project alternatives considered and reasons for rejection:**

**The project implementation structure consisting of two Implementing Agencies (VE and VCM),** is considered optimal since it allows to implement a more comprehensive energy efficiency program for the City. E.g., VE alone would not be in a position to provide the residents with new energy-efficient windows as well as better thermal insulation for walls ("building envelope" improvements). The scope of in-building (apartment-level) heating system improvements as currently proposed (see Section E-3), in combination with the new BLS, is considered a reasonable scope of investments to be implemented by a district heating company, while the building-level improvements should be addressed by the Municipality. The proposed arrangement also gains strength from both public and private sector participation in one program beneficial for the city.

**The rationale for co-financing the AL DSM program with limited GEF grant support** is the following. The provision of capital grant support to the consumers is potentially replicable without resort to GEF once it is demonstrated that demand-side improvements can eventually benefit not only the consumers, who will be increasingly willing to pay for these improvements, but the DH companies themselves. This is due not only to the consolidating impact on the customer base, but also due to reduced losses and costs of supply – especially, during periods of peak demand. Already at present, there are clear signs that the district heating system operator (VE) appreciates the benefits of heat demand management despite the potential reduction in heat sales. With modest GEF co-financing, VE is willing to finance a sizable heat demand management program. The limited capital subsidy for connection fees for low-income people is a temporary measure aiming to enhance penetration during the crucial first phase of the AL DSM program.

**The rationale for setting up a Commercial Fund,** rather than a credit guarantee facility to underwrite commercial bank loans, is as follows. In the residential sector, private sector financing is still too scarce, even if the financial sector is robust, and even if there are potential profits to be made on household energy savings. In the current circumstances, an energy efficiency fund dedicated to the sector is an appropriate response. The fund would help fill the financing gap and help mobilize some commercial co-financing for the sector. A guarantee facility could be more appropriate in a project focusing on investments in such sectors as industry, where commercial borrowing and lending is already quite active. Over time, one of the intended impacts of ECP is to make the residential sector a more familiar territory for commercial banks so that instruments like credit guarantees can be effectively applied here as well.

**The rationale for separating the Commercial Fund from the Subsidy Fund of the ECP** is based mostly on considerations of replicability and demonstration. The replication potential of both funds would depend on their demonstrated performance according to relevant criteria. If both funds prove successful, the replication potential is large. The demonstration of the long-term financial viability of the Commercial Fund could be a powerful lesson for replicating the same type of investments elsewhere.

The possibility of using the LTL 20 million contribution from Dalkia to increase the size of the GEF-supported Commercial Fund was considered. However, the lease agreement between the VE and the Municipality makes it explicit that this money will be provided on a grant basis (although co-financing by homeowners is acceptable). This reflects the Municipality's preference for making the



energy efficiency investments more affordable for the residents, as well as Dalkia/VE's appreciation of the fact that the provision of these funds to the homeowners on a grant basis can well be considered an investment in its customer base. The pay-off on this investment will be through VE's improved competitive position vis-a-vis other forms of heat supply such as autonomous gas boilers and through faster implementation of VE's substation decentralization program.

It should be noted that GEF resources will not be used to cover the costs of substation replacements. Instead, the GEF contribution to the AL DSM component would facilitate the introduction of consumption-based billing at the apartment level and thus facilitate VE's program of substation replacements. In this context, the introduction of AL DSM is seen a measure to reduce a key barrier to broader introduction of BLS such as passive resistance by the homeowners to VE's substation replacement program (see Annex 11 for details).

**The rationale for publicizing the project's results outside Lithuania** is that the project would aim at creating a replicable model demonstrating how government agencies, private sector, and other stakeholders can successfully work together to implement energy efficiency investments and save taxpayer money by lowering energy use.

Ultimately, awareness of the potential for reducing heat losses in the networks and in the buildings is expected to replace calls for new generating capacity. This has particular relevance for Lithuania given international discussions with the Government on direct and indirect costs associated with the Ignalina nuclear plant closure, but also for other ECA countries where the replacement of the outdated energy stock is imminent.

## 2. Major related projects financed by the Bank and/or other development agencies (completed, ongoing and planned).

Sector Issue	Project	Latest Supervision (PSR) Ratings (Bank-financed projects only)	
		Implementation Progress (IP)	Development Objective (DO)
<b>Bank-financed</b>			
Energy Efficiency	Lithuania: Energy Efficiency/Housing Pilot Project	S	S
Improve Efficiency and Safety	Power Rehabilitation Project	S	S
Cost of supply and demand-side investments	Estonia District Heating Project	S	S
Efficiency and Cost of Supply	Poland - District Heating Restructuring and Energy Conservation Project (Gdansk, Gdynia, Krakow, Warsaw)	HS	HS
Efficiency and Costs of Supply	Katowice District Heating Project	S	S
Efficiency of Heat Production and Supply	Ukraine- Kiev District Heating Improvement Project	S	S
Efficiency and Cost of Supply and Demand	Bulgaria - District Heating Project 1 mainly in Sofia and Pernik (Sofia with EBRD)	S	S
<b>Other development agencies</b>			

EBRD	Kaunas District Heating Project		
EBRD	Sofia District Heating Project (with WB)		

IP/DO Ratings: HS (Highly Satisfactory), S (Satisfactory), U (Unsatisfactory), HU (Highly Unsatisfactory)

The Projects in the four cities of Poland and in Tallinn, Estonia are in the completion phase, the projects in Katowice and Kiev are under implementation, and the project in Sofia is appraised and waiting for loan negotiations.

### 3. Lessons learned and reflected in the project design:

The Bank's District Heating Projects in other countries have been, to a large extent, successful. Targets for reductions in energy consumption and system improvements have been achieved, or exceeded, giving confidence in the project design. Experience from Poland shows that conversion of a district heating system from constant to variable flow can be performed with good results, and without major operational problems. Any problems that have arisen were typically associated with instances when the project design has exceeded the implementation capacity of the borrower. The currently pursued self-standing GEF operation has a modest size and can be handled by a small group of VE staff.

Heat demand forecasts have been too high in some of the past projects, many of which were designed at the beginning of the economic transition and making it difficult to anticipate the breadth and depth of market collapse. A social assessment undertaken during project preparation has helped deal with this issue by taking into account the limitations on affordability. As a result, the demand forecast for this project has been lowered and is believed to be realistic.

Another essential lesson is that, by optimizing the district heating cycle from production to consumption, considerable energy savings can be achieved. Data collection from networks and customer plants results in more efficient operation for the producer and better service for the consumer. The application of remote metering integrated with an administrative system for debiting is a powerful comprehensive approach to district heating which represents the state-of-the-art in the industry.

The Bank's Energy Efficiency and Housing Pilot (EEHP) Project in Lithuania was very helpful in guiding the design of the Energy Conservation Program. The EEHP project has demonstrated that homeowners are able and willing to invest in energy retrofitting in their buildings if provided with a support package addressing legal, institutional, technical and financial barriers. However, obtaining a permission from the homeowners is time-consuming when the decisions concern building-level improvements since this must be taken by a formal meeting of homeowners of each building. The EEHP demonstrated that significant educational and advisory support is required to bring homeowners to the decision-making point. VE's energy efficiency program supported through ECP would focus on apartment-level improvements, and the decisions will be made on a consumer-by-consumer basis. The Municipality, which is better equipped to deal with the issues involved in the promotion of HOAs, will be in charge of building-level investments under the ECP Commercial Fund component.

Valuable lessons are also available from the experience of Dalkia, the mother company of Vilniaus Energija. Dalkia is present in 30 countries and has 37,000 employees. Its business is to provide energy management services for industry, commercial customers, and large community facilities. Dalkia operates heating systems and has a long experience with Energy Service Companies (ESCOs). Under long-term contracts, the ESCO introduces efficiency measures to reduce energy costs. The savings are shared between the ESCO and the client. In Poland, Dalkia has taken over DH operations in several towns. After network modernization, the tariff remains the same, and savings are used to pay back the investment. In partnership with EBRD, Dalkia International, a leading multinational energy company, has

made a commitment of €100 million to raise energy efficiency. The investment aims to support Dalkia's work in Hungary, Lithuania, Poland, Romania and the Slovak Republic, and to help it expand to other countries such as Bulgaria, Croatia, Bosnia and Herzegovina, and Russia. Dalkia has already created ESCOs that operate district heating networks for municipalities and reduce energy consumption in buildings or facilities. The EBRD has already invested €50 million in projects developed by Dalkia over the past five years, resulting, for example, in success for the MSW Hospital in Krakow, Poland, which was able to cut its energy bill by 38 percent.

## **Box 2: Energy Efficiency Housing Pilot Project Summary of Lessons Learned**

### **Lessons learned - Energy Efficiency and Energy Savings**

- The main motivations for homeowners when they decide to take the loan are (in order of importance): (i) to improve their own apartment, e.g. improved indoor climate, better windows; (ii) to carry out urgent repairs of the building (leaking roofs, etc.); (iii) to obtain energy savings.

- After project implementation, homeowners become more interested in energy savings and some start planning new projects.

- Once payment for heat is based on building level metering and size of apartments, the actual energy savings – reduced consumption – varies significantly from building to building and can be negative due to increased consumption – from a desire to have warmer room temperatures.

- Metering in individual apartments with thermostatic valves and heat cost allocators have demonstrated high energy savings and satisfaction.

### **Lessons learned – Financial Barriers**

- Homeowners are willing to invest in energy efficiency and renovation if supported with financial incentives, i.e. tax benefits and grant elements. Public outreach alone will not convince homeowners.

- Lack of collateral is a key obstacle to private sector lending to HOAs. Transaction costs associated with administering the subloan as it is currently structured make this product unattractive for commercial banks. Other financial products could be more effective in mobilizing energy efficiency investments.

With respect to individual heat control and metering, Bulgaria offers an instructive example of the role that the government may have in contributing to market transformation. After the Bulgarian Government mandated the introduction of individual billing in buildings connected to district heating, the development of a market for TCVs and HCAs proceeded rapidly and the forces of competition have rapidly reduced the market price of this equipment.

## **4. Indications of borrower and recipient commitment and ownership:**

The Vilnius City administration has expressed a keen interest in the speedy implementation of the project, emphasizing its special role in the improvement of the City's outdated housing stock and the energy efficiency gains to be made in the process. Earlier, the Mayor of Vilnius initiated critical steps toward fundamental re-orientation of the City's district heating utility toward commercial operation, including the long-term lease of its assets to Dalkia/VE. The Mayor has also indicated his willingness to support the privatization of municipal maintenance companies, which would increase competition and open up new opportunities for the commercial operators including the emerging energy service companies.

VE has a strong stake in the implementation of the GEF project as it allows to take its own Energy Efficiency Program to the next level. The start of implementation of VE's Energy Efficiency Program was announced in January 2003, so the company is under considerable time pressure to bring the GEF financing on stream.

The national Government of Lithuania is in the process of phasing out World Bank loans but has expressed a consistent interest in the GEF-supported energy efficiency program.

## 5. Value added of Bank and Global support in this project:

The primary value of the Bank's involvement to date has been to ensure that the project is consistent with the broader economic reform agenda, to help focus the project and to ensure that issues of affordability and financial viability are adequately addressed. The early project preparation effort focused on improving the legal and regulatory (particularly pricing) framework and enabling a fair competitive environment among energy suppliers.

The Bank team has also helped the Municipality to develop a program to make the district heating company financially viable without state support. VE's investment program is largely following the same path with the notable addition of the AL DSM component. Dalkia/VE financial contribution to this new component might not have materialized without the participation of the Bank in the review of VE's lease agreement with the Municipality. In this way, the Bank, as an Implementing Agency of the GEF, has demonstrated that it is well placed to introduce the environmental dimension into the decision making process of a major Lithuanian energy utility.

## E. Summary Project Analysis (Detailed assessments are in the project file, see Annex 8)

### 1. Economic (see Annex 4):

- ☐ Cost benefit      NPV=US\$ million; ERR = % (see Annex 4)
- ☐ Cost effectiveness
- ☒ Incremental Cost
- ☐ Other (specify)

The type of economic analysis relevant to this GEF project is mostly the **Incremental Cost Analysis** (Annex 11). Some other elements of economic analysis implemented at the early stages of project preparation are also helpful as a matter of broader context (Annex 4).

The Incremental Cost Analysis is, essentially, a cost-effectiveness analysis based on the calculation of present values of total costs keeping the outputs (such as, in this case, the final demand for heat by the customers using the services of the Vilnius' district heating company Vilniaus Energija) at the same level for all alternatives. Alternatives were compared to the baseline (or "without project" scenario) to assess the incremental cost and reduced carbon emissions. The alternatives considered involved various levels of investments in the modernization of the heat-exchanger substations, various levels of penetration of apartment-level demand-side management equipment such as thermostatically controlled valves and heat cost allocators, and various levels of penetration of investments supported by the ECP Commercial fund (such as window renovations and other measures to reduce energy losses in buildings).

**Baseline.** The baseline scenario was built on the assumption that VE would continue replacing group substations with building-level substations, but the progress of the program would be hampered by the lack of incentives for the homeowners to accept the replacements (as noted before, the heating bill would increase for the majority of the customers currently receiving heat from group substations - i.e., for 60% of the DH customers in Vilnius). This would result in the replacement of about 100 group substations by some 1,500 new building-level substations (in about 60% of the total number of buildings) by 2015. This estimate is somewhat higher than the VDHC's original plan to replace the group substations by 2015 (50%), but lower than the one under the GEF project scenario as the substation replacement program would still be passively resisted by a substantial number of customers. The penetration of

thermostatically controlled valves and heat cost allocators would be limited to 10% of the apartments of the City (most likely, concentrating in the homes of high-income families). Other demand-side energy conservation measures would also be practiced on a limited scale. Broader penetration of these measures would be constrained by the lack of incentives for such measures in the absence of individual billing and customer-controlled heat supply at the apartment level.

**The proposed GEF project** has a (discounted) investment cost of US\$40.6 million and an incremental investment cost of US\$ 26.9 million. The economic benefits from these investments are coming primarily in the form of reduced cost of fuel for the district heating system. The incremental costs savings to be made as a result are estimated at US\$31.4 million. The total incremental benefits exceed the incremental costs, resulting in a negative incremental costs of about -\$2.2 million. This is consistent with the nature of the GEF Operational Program 5, which supports "win-win" energy efficiency projects through barrier removal.

The projected direct impact of the energy efficiency measures in terms of CO<sub>2</sub> emission reductions achieved over the period until 2020 as a result of investments implemented under the project is estimated at about 1.5 million tons of CO<sub>2</sub>.

**The unit abatement costs (UAC)** resulting from the described investments and GHG reductions can be represented in three different ways. The economic value of the unit abatement cost is negative at US\$ -5.24 per ton of carbon equivalent (tCe), which is consistent with the "win-win" nature of the investments supported by the project. On the other hand, the UAC can be calculated as a ratio of GHG reductions to the size of the GEF resources utilized in the project. Then, if the entire US\$ 6.5 million GEF budget for the project is treated as a cost, the UAC equals US\$15.62/tCe. However, it should be kept in mind that less than half of this would be provided on a grant basis to the final beneficiary, with the remainder being extended on a commercial basis with an obligation to repay into the revolving fund. If the commercial part of the GEF contribution is netted out, the UAC for GEF can be calculated as US\$8.41/tCe.

## **2. Financial (see Annex 4 and Annex 5):**

NPV=US\$ million; FRR = % (see Annex 4)

In 1997 the Vilnius district heating system—like district heating systems across Lithuania—was separated from Lithuanian Power Company (LPC) and incorporated as a special purpose stock company owned by Vilnius City Municipality (VCM). As part of the separation arrangements, the new company, VDHC, assumed ownership of the relevant assets as well as a proportion of the long-term debt of LPC. From the outset it suffered from an inadequate tariff as well as cost burdens imposed by its obligation to supply heat (at the same tariff) to a number of smaller, unconnected communities, distant from the city of Vilnius. In addition, the condition of its balance sheet and municipal budget status prevented it from accessing economical sources of long-term finance.

This situation seriously affected the company's ability to provide high-quality customer service and compete effectively with other heat suppliers. It was unable to invest enough in its networks, production facilities and customer-level equipment to ensure reliable supplies of heat and hot water in the manner required by the customer. In multi-storey buildings, residents were increasingly finding it economical and effective to install individual building-level gas boilers and to disconnect (either formally or simply by ceasing to use it) from the district heating system. The erosion of the customer base ate into the company's gross margin. Meanwhile, the tariff did not fully cover costs and debt service requirements were onerous. Net losses, or negligible profits were earned in the years following separation. This was despite a tariff increase (to LTL 0.1088/kWh) in 1998 and the separation from the company in 2000 of the eight unconnected communities where the cost of supply significantly exceeded the tariff. In the

period 1998-2000 the company developed a rehabilitation program to improve its cost base and customer service capacity: it was calculated that in the absence of such a program it would enter a phase of progressive financial decline and the erosion and ultimate destruction of its equity.

VDHC's owner, VCM, was not able to assist the company as it was itself very resource-constrained. Like other State and municipal authorities, its revenue base had been hit by the effects of the 1998/99 Russian crisis. It had no borrowing capacity and so little financial leeway that it was itself a major debtor to the district heating company. At the same time, the housing infrastructure in Vilnius was desperately in need of investment (like other elements of infrastructure) and the municipality has important residual responsibilities in this area. While new social housing is part of these responsibilities, the major issue has been the upgrading, modernization and maintenance of privatized dwellings. Improved energy efficiency is a key element of such enhancements, involving both apartment-level (thermostatic valves, cost allocators, new windows) and building-level (new sub-stations, new roofs, improved insulation) investments. Most residents have had insufficient financial capacity to undertake these improvements themselves.

It was in this context that the World Bank, the GEF and other co-financiers proposed a loan and grant package totaling \$43 million to part-fund the rehabilitation of the company's facilities. However, before the loan became effective, VCM concluded a leasing arrangement for the company's assets with Dalkia. The new operator of the facilities, Vilniaus Energija (VE), decided not to take advantage of the World Bank loan but to fund necessary rehabilitation from other sources. However, VE had also created an Energy Efficiency Fund (EEF) and committed itself in the lease agreement with VCM to an expenditure of LTL 20 million on energy-efficiency measures focused on residents and home-owners' associations and wished to supplement its work in this regard with GEF grant financing.

The GEF project now proposes to assist both the very specific energy economy program developed by VE to cater for apartment-level demand-side measures (AL DSMs), and the wider agenda of VCM designed to improve the comfort and energy efficiency of the city's housing stock. This will be achieved by means of a \$6.5 million program with the following components:

	US\$ million
Assistance to VE's AL DSM program	2.5
Assistance to VCM housing program	3.0
<i>Technical assistance</i>	0.5
<i>Management contract fees</i>	0.5
Total	6.5

#### **VE's AL DSM program (the VE-implemented component of ECP)**

VE will initially devote LTL 20 million to this program in the form of an irrevocable grant, supplemented by a grant from the GEF. While GEF will allocate \$2.5 million to the program, the initial funding will be \$1.25 million, equivalent to approximately LTL 4 million.

It is expected that the AL DSM program will modernize the heating controls in apartments in 120 buildings each year for five years. Residents, other than those classified as low-income, will be expected to contribute 25% of the gross cost including VAT. Since this contribution would be provided in advance of the installation of equipment, this will be characterized as a "Downpayment" or "Connection Fee". This fee will be waived or reduced to a nominal level, e.g. 5%, in the case of low-income residents. A matter to be agreed by VE and VCM will be the definition of "low-income" households.



The decision on this will influence the scope of the program. For example, in the illustration below 20% of residents are assumed to be low-income and therefore entitled to completely free installation. If it were decided to increase the number of households entitled to free installation, this would reduce the total funding available and thus the number of apartments covered by the program. An illustration of how the fund might operate is set out below.

#### **Summary of Financial Operation of VE-implemented AL DSM Program**

<b>Key Assumption</b>		
Cost of investments per square meter	Litas	25
Average apartment size	Sq. m.	50
Average cost (net of VAT) per apartment	Litas	1,250
Average cost (incl. VAT) per apartment	Litas	1,475
Target number of buildings	No.	600
Average number of apartments per building	No.	40
Target number of apartments	No.	24,000
of which low-income	No.	4,800
Total cost (net of VAT) of program	LTL '000	30,000
Total cost (including VAT) of program		35,400
VAT rate		18%
Connection fee, low-income residents		0-5%
Connection fee, other residents (excl. VAT)	Litas	312.50
VE financed amount	LTL '000	20,000
GEF financed amount	LTL '000	4,000
Connection fees amount	LTL '000	6,000

While no further contribution to the costs of the program beyond the connection fee would be expected from residents, it is intended that all residents of apartments in which these AL DSM investments have been installed should sign maintenance agreements with VE, at a likely monthly cost of LTL 0.1 per square meter.

It is intended that the second \$1.25 million tranche of GEF financing to VE will be made available at a time to be determined when VE commits further grant or non-grant funding to the extension of the AL DSM program to other buildings in Vilnius. It would be intended to seek approximately the same 5:1 ratio between VE and GEF funding as is inherent to the first tranche.

#### **The VCM-implemented component of ECP**

The remaining US\$3 million of the GEF grant would be made available to Vilnius City Municipality to establish a so-called ECP Commercial Fund to finance further energy-saving investments in the city's housing stock. The fund fits well into VCM's strategy for the refurbishment and upgrading of the quality of residential housing in Vilnius. It will finance building-envelope improvements (such as insulation of walls and roofs) as well as window refurbishments and installation of new windows, focussing initially on the short- to medium payback measures.

As the fund is intended to be self-sustaining, it follows that the revenue from the sale of the equipment and works financed by it should revert to the fund and re-enter the cash float. These "reflows" will consist of down payments and instalment payments by residents, and they will be used to finance the purchase and installation of further energy-saving equipment.

As the commercial nature of the ECP is a critical element of the program, it is not intended to be

prescriptive as to the modalities of its operation, but rather to invite detailed operational proposals from commercial parties interested in becoming the appointed Fund Manager. Such competitive proposals should cover, inter alia, how it is proposed to deal with institutional and legal aspects (buildings where there is or is not a home-owners' association), the prioritization of investment packages, the pricing of packages, the profit margin sought, payment terms, energy efficiency targets, the nature of contractual arrangements, how maintenance will be dealt with, and other areas which will have an impact on the market penetration or acceptability of the program.

VCM will be responsible for transferring GEF funds to the appointed Fund Manager. The cash balance at any time should be kept in a separate bank account and identified as the property of the municipally-owned Energy Conservation Program (ECP) Revolving Fund.

#### **Fiscal Impact:**

In the long run, the project will yield fiscal benefits to the Government by increasing the taxable profits of VE and by reducing the number of households which require the heat and hot water subsidies. Since the commercial viability of the district heating company will be improved, privatization of the VDHC assets may become possible in the future.

#### **3. Technical:**

The project follows a detailed technical feasibility study conducted in 1999-2000 by AF-International AB, Sweden. The recommendations of the study are still largely valid and applicable to the technical modernization program pursued by VE. The technical solutions selected for eliminating group substations and installing building-level substations represent technology that has been successfully used in the neighboring countries of Eastern Europe. The apartment-level DSM component was not envisaged in the original feasibility study. However, the technical expertise available from VE's mother company Dalkia (France) as well as from the VE staff recruited from the Lithuanian ESCO company Litesko allows to expect a very satisfactory treatment of the technical issues involved.

DSM and metering are seen by VE as essential elements of an Integrated Supply and Demand scheme. It is essential that the actual and predicted demand is clearly identified to the generator. Only then can energy efficient generation programs be planned and executed. Data acquisition from the large network of building-level substations envisaged in Vilnius will benefit from the state-of-the-art telemetering technology. The substations installed by VE would be equipped with a GSM feature to collect the metering data from the substation to VE's central offices.

At present, space heating systems in multi-storey apartment buildings in Vilnius are usually operated as inefficiently as elsewhere in the former Soviet Union. The chief "technology" for temperature control is usually an open window or "fortochka", a small window built within the frame of a surrounding larger window. This leads to very high energy losses.

#### **Apartment-Level DSM Improvements**

**Thermostatically controlled valves** (TCVs, or thermostats) on radiators can reduce energy use and increase comfort by automatically regulating heat to provide a constant indoor temperature. These valves control room temperature by modulating the flow of hot water through the radiator. Essentially, it allows the hot water to flow only to the rooms that need heat. Thermostatic radiator valves are available at a unit price of \$30 to \$35 in the international markets. TCVs can help achieve dramatic reduction in energy consumption for a modest outlay. Generally, in the US and Western Europe, they have a payback period of about 3 years.



**Heat cost allocators.** Currently, individual apartments in multi-apartment buildings with central space heating systems are rarely metered. Heat billing is typically based on the distribution of building-level consumption data in proportion to apartment size. Therefore, there is no direct financial incentive for efficient operation (such as using radiator valves rather than windows to control temperature). The introduction of individual apartment metering based on the installation of HCA will provide data from which residents could be charged for their actual consumption, and could be financially rewarded for efficient operation. Studies have shown that energy consumption drops by about 10% after individual unit meters are added.

**Remote readers for hot water meters** allow to more accurately and efficiently monitor the hot water consumption data and to dramatically reduce the incidence of undetected tampering with the hot water meters. Considering that domestic hot water consumption represents a substantial portion of heat demand, these devices can considerably reduce the non-technical losses for the utility.

**Balancing** the radiator circuit risers connecting the radiators to the substation distributes the heat more evenly among the risers and thus among the apartments as well. About 5 to 10 % of a building's heat demand can be saved as a result. This can be achieved either by installing balancing valves (manually set on a fixed value or of a self-actuating type, which keep a preset differential pressure) or by performing periodic adjustment of the circulation regime to achieve optimal balance. VE has opted for the latter measure, saving the option of installing balancing valves for the future.

#### **4. Institutional:**

The VDHC (locally known as SP AB Vilniaus Šilumos Tinklai, or VST) is a special purpose joint-stock company which is wholly owned by the Municipality of Vilnius. In the recent past, the Municipality has shown a strong interest in attracting private sector participation in the provision of heat, learning from the successful examples in similar sectors such as water supply. Therefore, the Municipality has considered a range of options that would increase private sector participation including: (a) divestiture of its ownership stake; (b) concession or leasing arrangements; (c) management contracts; and/or, (d) spin-off of some assets or services.

Eventually, the option of a 15-year lease was chosen. In February 2002, the lease agreement was signed by four parties: VDHC, Vilnius City Municipality, the energy company Dalkia of France, and the new locally registered and 100% Dalkia-owned company UAB Vilniaus Energija (VE). Under the lease agreement, VE undertakes to operate the facilities of VDHC and make investments envisaged in the long-term investment plan with a view to achieving the targets of reduced production costs, improved technical condition of the facilities, and improved responsiveness to the customer. The latter objective is supported, i.e., by the establishment of an Efficient Energy Consumption Fund (Energy Efficiency Fund) of the Vilnius City set up in the amount of LTL 20 million. The lease agreement also requires that VE must support the commercial and financial viability and status of VDHC, retain the existing and attract new customers. Dalkia's role is that of a guarantor of VE's obligations under the lease agreement, which states that, as VE's full owner, Dalkia is jointly liable for VE's discharge of its obligations. VDHC continues to own the assets but the majority of its staff has been transferred to VE.

The institutional arrangements for the implementation of the GEF project are being put in place simultaneously with the reorganization of VDHC under VE's management. This is both a challenge and an opportunity as the previous arrangements did not allow for the creation of a dedicated group of staff dealing with demand-side energy efficiency. Under the lease agreement, this is a necessity for VE since it is obliged to organize the activities of the Energy Efficiency Fund (EEF) including evaluation,

preparation, administering, selection, and implementation of efficient energy consumption projects.

It is envisaged that the ECP co-financed by EEF and GEF will co-operate with the Lithuanian and European public and private funds related to the effective energy consumption projects, programs supporting energy and infrastructure projects in the states of the European Union and other countries. The expectation is that these programs may contribute further financing to support the goals of the ECP in the future.

The residential housing in Vilnius is now mostly (93%) privately owned. Year 2000 legislation provides for the establishment of Homeowners' Associations (HOAs) or, in cases where residents fail to agree on the establishment of such associations, two other arrangements are possible: (b) arrangement of civil-code based joint agreements of owners; and (c) city appointed building administrator.

There are about 176,000 family apartments in Vilnius, of which some 50,000 belong to families organized into HOAs. The exact functioning of these arrangements is being clarified, so that implementation of the project is not held up by doubt or disagreement as to where responsibility for installations and their maintenance lies. The upgrading of the substations, and the move away from block substations, adds urgency to the issue, and discussions between VE and VCM are underway.

Another important institutional issue is the manner in which the municipality exercises its prerogatives as owner of the district heating company. According to the lease agreement, the initial price of heat for Vilnius city residents was set at LTL 0.10332/kWh (VAT excluded), about 5% lower than the price before VE took over. A formula included in the lease agreement states however that this price will be revised to reflect changes in the prices of natural gas, cold water, and average wages in Lithuania. It will be fundamental to the commercial evolution of the district heating company that the municipality does not interfere in the management or decision-making of VE. Specifically, it will be critical to the development of governance structures that the Municipality not involve itself in the pricing policy of the company, in its dealings with the Energy Pricing Commission, in the control of its costs, or in any other commercial area.

#### 4.1 Executing agencies:

The Vilnius City Municipality and VE will be the Implementing Agencies for the proposed project. VE is wholly owned by Dalkia, France, and is registered in Lithuania. The company is a legal entity with full economic, financial, legal and organizational independence. Its activity is regulated by its by-laws, laws of the Republic of Lithuania and Governmental resolutions.

#### 4.2 Project management:

**VE-implemented part.** VE, in the person of its President, will designate its Department of Marketing and Business Development with the responsibility for implementation of the VE-implemented part of the Project, including executing an external communications program, marketing, sales, maintenance of Project accounts, preparation of FMRs, etc. It will be the President's responsibility to ensure the adequate staff and resources to fulfill VE's responsibilities with respect to Project implementation.

**VCM-implemented part.** VCM shall establish and maintain an ECP Management Board - a special working group with the overall responsibility for coordinating, supervising, and monitoring the implementation of the Project. VCM would then conduct a competitive tender for an entity that would act as its agent for the purposes of, inter alia: (i) carrying out technical, financial, and economic appraisals of energy efficiency investment proposals and presenting them to the ECP Management Board for approval; (ii) carrying out energy audits of buildings proposed for such investments; (iii) conducting procurement of goods, installation services, and works necessary to implement these investment proposals on behalf of

VCM; (iv) implementing the proposals approved by the ECP Management Board; (v) monitoring and supervising the implementation of the projects; (vi) executing a marketing program for ECP and its products; (vii) operating the ECP Commercial Fund in a financially prudent and sustainable manner, realizing a sufficient return on the investments to enable the Fund's operation on an ongoing basis (see draft TOR for the Commercial Fund Manager in Annex 13).

#### 4.3 Procurement issues:

VCM will follow the procurement rules of the World Bank to buy goods, works, and services (including the services of the ECP Management Contractor (Fund Manager)). The selection of the Fund Manager is expected to be initiated prior to presentation of the project to the Bank's Board and completed by the time of effectiveness of the GEF grant agreement with VCM. The selection of the Fund Manager will be a condition of disbursement of GEF proceeds for the Commercial Fund Component.

For the works and equipment financed from the Commercial Fund of ECP, the procurement arrangements may proceed under the national competitive bidding (NCB) method with certain modifications to allow for "rate contracts" (i.e., contracts for price without specifying the quantity) followed by additional contracts for supply of specific quantities concluded between the Fund and the suppliers.

VE's preferred approach to procurement is to apply its own procurement rules, which were first presented to the Bank for review in April 2002. During negotiations (April 2003), it was clarified that VE would proceed with the tender for the supply and installation of equipment as soon as possible and to limit the number of tenders to not more than two, totaling an estimated US\$10 million. The methods of procurement agreed between VE and the Bank include: International Competitive Bidding (ICB) in case VE would like to have only one contract, and own procedures of VE for contracts for goods and works in amounts not exceeding US\$5 million, provided that these procedures will ensure a transparent competitive process of seeking bids and evaluation of bids based on pre-disclosed clear bid evaluation criteria for award of contract to the lowest evaluated responsive bidder. The contractors and suppliers selected for award should have adequate financial and technical resources to perform the contract satisfactorily. VE and any of its affiliates and shareholders are not eligible to bid for the contracts. The Bank will review the procurement documents for compliance with these principles.

#### 4.4 Financial management issues:

**Financial Management Assessment.** The assessment was carried out according to OP/BP 10.02 on Financial Management, during appraisal mission in March 3-6, 2003 by the Financial Management Specialist. The summary report is presented in PAD, Annex 6(b). The FMS identified several actions which should be completed before the Board Presentation in order to fulfill the minimum financial management requirements. PAD will be updated accordingly before the Board Presentation. The project will be implemented by VE and VCM. VE is more advanced in the project preparation than VCM; however, both will need to accomplish the action plan before the Board Presentation as presented in Section G.

### Reporting and Auditing Requirements

Both VE and VCM will prepare Project Financial Monitoring Reports (FMR) on quarterly basis, Annual Project Financial Statement for the relevant components including the ECP Commercial Fund. Additionally, VE and Fund Manager will have to provide the Bank with their audited financial statements since their financial viability is vital to project success. The financial management system of the project, including its records and accounts, will be maintained in accordance with International Accounting Standards (IAS) and appropriate Lithuanian regulations.

Audits of Project and Financial Statements of VE and Fund Manager will be performed annually for each fiscal year of the life of the project as well as at the completion of the Project in compliance with the International Standards on Auditing (ISA) as issued by IFAC.

**Selection of auditor.** VE, VCM and Fund Manager are requested to provide the Bank with the short list of auditors in October - prior to the end of each fiscal year for acceptance. The cost of audit will be covered by VE. VCM will finance the audit cost from GEF grant. In case the project starts in the second half of the year, there is a possibility to combine this first period with the next year upon agreement with the Bank.

## **Project Risks and Issues**

**VE** - There are no significant weaknesses of the project financial management system. However, there are some risks connected to the fact that it is a newly created company with a limited track record, inherited staff and procedures, and leased assets. Additionally, VE is implementing organizational changes in management style, internal control procedures, and information systems.

**VCM** - The main risks relate to the selection of Fund Manager responsible for implementation of the core part of the project. Although TOR includes a set of eligibility criteria, at the moment of appraisal Fund Manager was not selected. VCM will have to make sure that these eligibility criteria are met in a way acceptable to the Bank.

**Country risks.** The Country Financial Accountability Assessment (CFAA) for Lithuania has been not issued so far. In 2002, the Bank conducted a ROSC Accounting & Auditing review. The ROSC report on Accounting & Auditing provides description of the overview of standards and practices in Lithuania. Although the use of IAS is required for listed companies, banks and other public joint stock companies, the enforcement and monitoring of compliance with IAS should be strengthened. The audit of the financial statements must be carried out by qualified auditors and in accordance with Lithuanian standards that are based on International Standards on Auditing (ISA). While many audit firms make efforts to carry out the audits in accordance to ISA, there are variations in the quality of audits. Furthermore, the quality of some audits is affected by management attitudes and misconceptions about the role of audits. These risks were taken into account while designing the auditing arrangements for the project and entity. The auditors must be accepted by the Bank.

**The banking sector** in Lithuania has made substantial progress and undergone continued consolidation since the 1995 banking crisis. The tight supervision exercised by the Bank of Lithuania (Central Bank) and tougher regulatory framework proved beneficial. VCM will open a Special Account in a commercial bank acceptable to the Bank and whose financial status and statements are reviewed on an ongoing basis by the Bank. The commercial bank will issue a comfort letter for the Special Account to be opened.

## **5. Environmental:** Environmental Category: B (Partial Assessment)

### **5.1 Summarize the steps undertaken for environmental assessment and EMP preparation (including consultation and disclosure) and the significant issues and their treatment emerging from this analysis.**

The project is not expected to receive any IBRD or GEF financing for investments in the generation, transmission, or distribution facilities of the district heating system. These components, including the replacement of all block substations with building-level substations in residential buildings, have been absorbed by VE's own investment program. The current GEF project deals with investments at the apartment level, including supply and installation services for thermostatic valves and cost allocators on room radiators, and balancing valves for the risers connecting the substation to the radiators. Under the

VCM-implemented Commercial Fund component, energy efficiency improvements such as better insulation of walls, roofs, and replacement of window are envisaged. These improvements will take place inside the residential buildings, and their environmental impact will be negligible. The apartment owners and their associations (where available) will be the main stakeholders.

## Major Environmental Issues

There are no major environmental issues associated with the project. On the contrary, the project will improve air pollution levels by reducing energy consumption and, hence, burning of fuels.

It was calculated that the overall efficiency improvements to be realized by the project will result in reduced fuel use and reduced pollutant emissions over the project life (through 2015) as indicated below:

Pollutant (tons)	Tons of Emission Reduction by Project Component			
	CHP	HoB	Network	Substation
Sulfur Dioxide	60	130	120	460
Nitrogen Oxides	10,900	24	450	1800

Estimates of CO<sub>2</sub> emission reductions resulting from the project are given in Annex 11.

## Other Environmental Issues

Minor environmental issues associated with *construction* activities include dust and noise associated with the movement of men, machines, and materials and with solid waste management. Asbestos insulation is present in some components which are to be replaced under the project. At the CHP facilities, there is a possibility that transformer coolants may be present that contain unacceptable levels of PCB. Preinsulated replacement pipes might be manufactured with CFCs or HCFCs. During *operation*, minor issues include atmospheric emissions of NO<sub>x</sub>, and SO<sub>2</sub>. The efficiencies realized by project implementation will reduce all these emissions (as well as CO<sub>2</sub>) compared to current values.

The project is in full compliance with all environmental requirements of the Government of Lithuania, Vilnius Municipality, World Bank policies and procedures (OP/BP/GP 4.01: Environmental Assessment), appropriate EU Directives concerning the environmental performance of boilers, and the Government of Lithuania's international commitments under the Montreal Protocol concerning Depletion of the Ozone Layer.

### 5.2 What are the main features of the EMP and are they adequate?

Regarding the EMP, see also Section 7.2. The Grant Agreement contains the requirement to implement the EMP. The EMP meets World Bank requirements as specified in OP 4.01 Annex C. As such, it includes: (a) a mitigation plan, (b) a monitoring plan, (c) institutional strengthening, (d) schedule, and (e) institutional arrangements for environmental management. According to the mitigation plan, the construction activities will be conducted during daytime hours and planned in a manner to minimize disruption to existing population activity patterns. Dusty areas will be sprinkled with water. Asbestos will be removed and transported by companies/units duly licensed to perform this work, and disposed of in an appropriate manner at sites officially approved by the Government to receive such material. If transformer oils are present, they will be tested for PCBs and, if contaminated, they will be disposed of in accordance with Lithuanian standards. Preinsulated replacement pipes will have foam insulation prepared with either carbon dioxide or cyclopentane foaming agents. Bid documents will be required to include this specification. Low NO<sub>x</sub> burners and lower sulfur fuel oils will be used to assure that SO<sub>2</sub>/NO<sub>x</sub> emission levels will comply with Lithuanian standards, World Bank Guidelines, and EU



Directives. Proper housekeeping measures will be instituted to minimize occurrence of leaks and subsequent contamination of soil and groundwater.

### 5.3 For Category A and B projects, timeline and status of EA:

Date of receipt of final draft: March 21, 2001

This timetable refers to the completed EA for the original project. The resulting EMP was sent to the InfoShop on March 21, 2001 and disclosed in-country on March 22, 2001. No new EA is required for the current self-standing GEF project.

### 5.4 How have stakeholders been consulted at the stage of (a) environmental screening and (b) draft EA report on the environmental impacts and proposed environment management plan? Describe mechanisms of consultation that were used and which groups were consulted?

A household survey was undertaken in the early stages of project preparation (May 1999) for use in project design. The project design was based on the results of the Social Assessment, taking into account the primary concerns of the consumers (largely cost and reliability of supply). Environmental issues are limited as the project is confined to repairing and upgrading existing assets. The key features of environmental protection and mitigation were taken into account in project design (particularly with regard to decreasing air pollution impact by improving boiler and burner efficiency). After the draft feasibility study was completed a meeting was held on May 25, 2000 with NGOs to present the findings and to address their concerns.

### 5.5 What mechanisms have been established to monitor and evaluate the impact of the project on the environment? Do the indicators reflect the objectives and results of the EMP?

As part of the EMP, the monitoring plan has been designed in a manner consistent with the mitigation plan. Issues which are to be mitigated during construction include dust, noise, and materials disposal (hazardous and non-hazardous) and issues to be mitigated during operation include emissions of SO<sub>2</sub>, NO<sub>x</sub>, water leaks, and fuel oil spills. The monitoring plan addresses all these issues. During construction, monitoring is the responsibility of the Chief of VE's Construction Department and during operation, it is the responsibility of the Chief of the Technical Production Department. Monitoring results are normally reviewed and analyzed monthly by the Production Department. If the data indicate abnormalities, a report is sent to the Chief of the Technical Department. Any necessary actions are the responsibility of the Technical Director.

## 6. Social:

### 6.1 Summarize key social issues relevant to the project objectives, and specify the project's social development outcomes.

The safety net review was conducted as part of the Bank's Second Structural Adjustment Loan; the Government introduced several improvements in its social assistance mechanisms and appears to be reasonably successful: low-income households are protected from the impact of heat supply costs that exceed 25% of household income through targeted subsidies from the Municipality. Important additional laws in the area of social protection are currently under preparation, including a new Cash Social Assistance Law (submitted to Seimas in November 2002). The project is designed to assist the poor by reducing the cost of heat supply in the longer term and improve the quality of service. The benefits will accrue to a greater extent to the poor as the wealthier segments of the population have been able to afford alternative (more expensive but currently more convenient) forms of heat.

### 6.2 Participatory Approach: How are key stakeholders participating in the project?

For the project originally proposed by VDHC, a survey was undertaken to help design the project based on their customers' views. The project was (and still is) designed to decrease the cost of supply, which will benefit all groups but particularly the poor as heating absorbs a disproportionate component of their household income. VDHC introduced the project to the public through television interviews, newspaper

and magazine articles. VDHC also prepared a brochure describing the energy efficiency component of the project (focusing on the substations) and made it available to the public.

With the introduction of apartment-level DSM into the project design, the homeowners will become even more directly involved in the implementation of the project since they will be purchasing (or co-financing) the DSM equipment. Thus, the new management of the district heating company (VE) will have to undertake a serious marketing effort in order to succeed in this new market. VE's Marketing Department is responsible for: (a) developing and executing an external communications program including promotional material (brochures, letters, etc.), direct mail, advertising and other activities targeted to current or potential customers; (b) coordinating public information campaigns on energy efficiency with the Vilnius City Municipality representatives, in particular when the campaign is targeted to low-income households.

Under the supervision of the Marketing Department, three Client Service Centers have been set up staffed by a total of 117 staff who report to the Commercial Director. The Centers are located at the VE Head Office (39 staff), CHP-2 (34 staff) and RK-8 (Baltupiai – 34 staff), respectively. **Heat Managers** comprise the majority of the Client Service Center staff and act as the point-of-sale contact and primary customer service contact. They are responsible for meeting targets in sales of heat (heat contract) and maintenance services. Under the Project, they promote the implementation of the demand-side management program for the VE customers.

### 6.3 How does the project involve consultations or collaboration with NGOs or other civil society organizations?

A meeting with NGOs took place on May 25, 2000 based on a project description that was circulated to them earlier. Their overwhelming concern was the cost of district heat. In addition they expressed concerns that those who take the risks associated with new substations should also benefit from this through cost reductions. During the discussions with the NGOs, it became clear that the communication program that had already been implemented had not reached a broad enough audience and needed to be refocused. As a result, two efforts have been undertaken: a revised information campaign and a pilot scheme which includes information dissemination as a component.

### 6.4 What institutional arrangements have been provided to ensure the project achieves its social development outcomes?

The primary social objectives that need to be addressed are cost reductions and improved service. Both of these elements are distinct objectives of the project that will be monitored on a quarterly basis.

### 6.5 How will the project monitor performance in terms of social development outcomes?

Monitoring indicators were designed to address the key social assessment concerns. VE will be asked to report on these on a quarterly basis.

## 7. Safeguard Policies:

### 7.1 Are any of the following safeguard policies triggered by the project?

Policy	Triggered
Environmental Assessment (OP 4.01, BP 4.01, GP 4.01)	<input checked="" type="radio"/> Yes <input type="radio"/> No
Natural Habitats (OP 4.04, BP 4.04, GP 4.04)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Forestry (OP 4.36, GP 4.36)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Pest Management (OP 4.09)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Cultural Property (OPN 11.03)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Indigenous Peoples (OD 4.20)	<input type="radio"/> Yes <input checked="" type="radio"/> No

<b>Involuntary Resettlement (OP/BP 4.12)</b>	<input type="radio"/> Yes <input checked="" type="radio"/> No
<b>Safety of Dams (OP 4.37, BP 4.37)</b>	<input type="radio"/> Yes <input checked="" type="radio"/> No
<b>Projects in International Waters (OP 7.50, BP 7.50, GP 7.50)</b>	<input type="radio"/> Yes <input checked="" type="radio"/> No
<b>Projects in Disputed Areas (OP 7.60, BP 7.60, GP 7.60)*</b>	<input type="radio"/> Yes <input checked="" type="radio"/> No

## 7.2 Describe provisions made by the project to ensure compliance with applicable safeguard policies.

An environmental mitigation plan has been developed as part of the EMP. Key elements of this plan (largely the proper disposal of wastes) will be monitored during project supervision. The EMP was developed when rehabilitation of CHPs, HOBs, Substation and Distribution Network was considered an integral part of the project. Therefore, the EMP is much more comprehensive than the scope of the current self-standing GEF project might require. The main features of the EMP address the construction phase of the project. Issues include dust, noise, and proper disposal of non-hazardous wastes. The EMP includes testing for hazardous materials (PCBs) and, if found in levels exceeding standards, appropriate measures for management are to be taken.

## F. Sustainability and Risks

### 1. Sustainability:

The Project supports a fundamental design change in the district heating system, including the installation of building-level substations and AL DSM equipment, which will increase consumers' control over their consumption of energy and make them more aware of options to reduce the cost of heat consumed. In this way the Project addresses the root cause of the past unsustainable operation of the district heating system. The devolution of responsibility for regulating heat supply to the customer and the introduction of billing based on metered consumption simplifies the incentives, increases "ownership" and thus is expected to increase sustainability. This is particularly apparent in the case of the AL DSM program which supports the introduction of billing for heat on an apartment-by-apartment basis.

Further, under the VE-implemented AL DSM component including the introduction of consumption-based billing by apartment, the positive results achieved, combined with public outreach and dissemination efforts, will help VE strengthen the supplier-customer relations and consolidate the customer base. This may, in turn, accelerate the substation modernization program pursued by VE. As the new substations would enable the installation of AL DSM measures, it is expected that more demand for these measures in residential buildings would be generated, thus completing the self-reinforcing loop ("virtuous cycle"). The overall scheme is intended to "push" the market early on and then allow a transition to a commercial market as both the technical possibility and the incentives would be in place for both the homeowners and emerging ESCOs to implement further energy saving investments in buildings equipped with modern building-level substations and consumption-based billing of apartments for heat. Moreover, the project is expected to provide a sufficient impetus to the AL DSM market to bring the costs of the equipment down through creating more buyers and suppliers. Eventually, this will reduce the costs, alleviating the up-front cost barrier for many potential buyers of AL DSM equipment. This impact also has "virtuous cycle" qualities, reinforcing the positive results and making them more sustainable.

The long-term sustainability of the overall Energy Conservation Program (ECP) would be supported through the creation of the ECP Commercial Fund (\$3 million) that would operate on a revolving basis. The sustainability of the Commercial Fund itself would depend on its default rate and terms on which the DSM measures will be offered to the homeowners. The long-term sustainability of the impact made by



the operation of the ECP commercial fund will depend on the effectiveness of the program in producing a leveraging effect in terms of attracting co-financing from the commercial banking sector. One of the goals is to stimulate commercial bank co-financing of energy efficiency investments under ECP and, eventually, make commercial banks and private investors the primary source of financing for such investments.

### 1a. Replicability:

The modernization of the Vilnius District Heating System supported by VE promotes energy efficiency of both the supply and demand sides. The GEF support emphasizes the demand-side measures implemented by both VE and the Municipality on behalf of the Vilnius residents. Only with the inclusion of the demand-side efficiencies into the scope of the project, can its full economic and environmental benefits be achieved utilizing the synergy between the two sides of the process. **This approach is highly replicable** throughout Eastern Europe and the Former Soviet Union where many district heating systems as well as the housing stock are in need of a fundamental modernization to improve energy efficiency, and where investments in energy saving at the customer level have been lacking.

Potentially, heat demand management and energy efficiency is an attractive market opportunity, and demonstrating its commercial viability is one of the objectives of the project. An initial grant injection is appropriate only for a specific application that removes a barrier and promotes a sustainable outcome (such as the introduction of billing for heat based on actual apartment-level consumption). The replication is potentially possible without resort to GEF or other grants once it is established that demand-side improvements can eventually benefit the DH companies and/or other participants in the emerging energy efficiency market. This is due not only to the consolidating impact on the customer base, but also due to reduced losses and costs of supply – especially, during periods of peak demand. The replication potential for the introduction of apartment-level billing based on TCV and HCA technology is particularly large in the CIS countries. While this technology is not new in Eastern Europe, the capital of Lithuania will be first to introduce this technology in the Baltic States and the former Soviet Union. Thus, there is a large untapped market for this technology, which is the most essential pre-requisite for replication of this project.

The replication potential for the ECP Commercial Fund is also large as there are many markets in the ECA countries where potential energy savings are large but commercial financing is not readily available due to a number of institutional, regulatory, and other barriers. While removing such barriers through regulatory reform is probably the best possible solution that will allow the commercial banks and private financiers to enter these markets, the provision of targeted financing can be an appropriate response in many cases. The practical experience of processing the transactions in a way consistent with market principles is an important capacity building exercise for both the "borrowers" and "lenders", which can in turn result in increased mobilization of commercial capital - first, as co-financing, then as the primary source of financing.

### 2. Critical Risks (reflecting the failure of critical assumptions found in the fourth column of Annex 1):

Risk	Risk Rating	Risk Mitigation Measure
<b>From Outputs to Objective</b> The new BLS technology does not allow for customer-controlled heat supply, and/or VE is not willing to give control of the BLS to the homeowners.	N	Sharp competition with alternative forms of heat supply (e.g., gas), gives VE strong incentives to emphasize the new features of its technology in order to keep the customers satisfied.

The fuel savings due to the installation of BLS and AL DSM are insufficient to produce the expected GHG savings.	M	The GHG reductions relative to the baseline are estimated conservatively. GHG savings relative to the status quo will occur without a doubt, as demonstrated by experience from similar projects in the neighboring countries of Eastern Europe.
The customer-controlled operating mode of the new BLS alone provides sufficient incentive for the homeowners to appreciate the substation modernization program (hence no additional BLS penetration is due to AL DSM program).	N	Surveys indicate that the collective decision of homeowners to replace the substation can be reached more easily if apartment-level improvements and apartment-level billing are also offered.
The AL DSM program under ECP makes little or no contribution to consolidation of VE's customer base (keeping existing and connecting new customers).	M	The level of interest to AL DSM apparent from the surveys indicates that these measures do contribute to improved supplier-customer relationships and thus to consolidation of VE's customer base.
ECP model is not effective in removing (or reducing) such barriers to energy efficiency investments as lack of commercial credit for many uncollateralized customers and that of the inability of low-income consumers to pay the full price of the DSM equipment.	M	The competitive selection of the ECP Fund Manager will force the competitors to keep the collateral requirements at a reasonably low level. If the ECP Fund Manager is not a bank, the collateral requirement may not apply. The forgiveness of the downpayment for low-income consumers will address the affordability barrier.
<b>From Components to Outputs</b> Homeowners are not sufficiently informed about the substations and AL DSM and/or are incapable of participating in their energy efficient operation.	M	The incremental operating costs of ECP administration provides, i.e., for advertising, marketing, public relations and other public outreach efforts. In addition, VE has its own incentives to emphasize the advantages of the new technology in order to keep customers satisfied.
Insufficient demand for DSM measures (including apartment-level).	M	A preliminary marketing survey indicates a great degree of customer interest. Further marketing efforts will be undertaken. Direct incentives (price discounts) during the pilot phase to ensure convincing penetration rates from the start.
The VCM-administered commercial fund fails to operate in a financially sustainable manner (high default rate, insufficient rate of return on investments)	M	VCM will be requested to use competitive tendering procedures to attract the best technical and financial management expertise available to operate the commercial fund.

by commercial standards).		
The subsidy fund is used beyond the level necessary to support energy efficiency investments for low-income households.	N	The Municipality will periodically check the targeting and will be closely involved in the discussions of optimal size and delivery mechanism for the subsidy. The Bank will monitor the targeting during supervision missions.
The performance of the ECP does not set a replicable standard. The appropriate target audiences are not effectively reached.	M	To ECP model will be designed to demonstrate replicability. The transparent separation of commercial sales from subsidies is to make sure that each fund demonstrates clearly what is required to achieve sustainable results. To reach the intended audiences effectively, the Energy Efficiency Advisory Centers will be relied upon in Lithuania. Outside Lithuania, the demonstration zones under the Energy Efficiency 21 program of UNECE may be used.
After the depletion of the funds allocated for incremental operating costs, no sufficient internal resources are found by VCM to keep the ECP running.	N	Either a portion of the service charge from the customers or contributions from VCM can be used to support the ECP.
<b>Overall Risk Rating</b>	<b>M</b>	

Risk Rating - H (High Risk), S (Substantial Risk), M (Modest Risk), N (Negligible or Low Risk)

### 3. Possible Controversial Aspects:

The provision of grant-capitalized financing from the GEF, if not properly structured, may have unintended impacts on the financial sector. In the process of public information campaign by the Municipality (as well as through the network of field offices set up by IFC under the CEEF project), it should be clearly explained that the revolving fund proposed to be set up under the Municipality's purview is expected to finance demand-side management measures on commercial terms and exclusively in the residential sector, which is an area of relatively low priority for the commercial banks - in part, due to existing regulatory uncertainties. These uncertainties are being addressed by the Bank through the Lithuanian Housing Strategy. By stimulating co-financing of projects in the residential sector, the revolving fund catalyzes and facilitates the lending to the sector on commercial terms rather than suppressing such lending.

## G. Main Grant Conditions

### 1. Effectiveness Condition

- Cross-effectiveness condition between the VE and VCM-implemented GEF grant agreements.
- VE shall develop and present to the Bank a model contract for AL DSM installation.
- VCM shall establish a Management Board for the ECP Commercial Fund.

## 2. Other [classify according to covenant types used in the Legal Agreements.]

The steps to be taken by VE prior to negotiations are:

- Implement the due steps of the Financial Management action plan.
- Develop a procurement plan for the AL DSM component of the project acceptable to the Bank.
- Develop a list of monitoring indicators for the AL DSM component of the project acceptable to the Bank.

Agreed Action Plan for VE to strengthen the financial management system before the negotiations.

	Action	Responsibility	Deadline
1	Identifications of Project Team responsible for managing the Project. Updating the job description for the staff involved in the project.	VE	April 5, 2003
2	Inputting new activity codes for project in accounting system.	VE	March 31, 2003
3	Agreeing on the final FMR formats	VE	April 5, 2003
4	Preparation of accounting and financial procedures manual for the project.	VE	April 5, 2003
5	Submission of the VE audit report for 9 months of 2002 and management letter.	VE	March 31, 2003

The steps to be taken by VCM prior to negotiations are:

- Develop a draft TOR (Terms of Reference) for the ECP Commercial Fund Management contract.
- Implement the due steps of the Financial Management action plan.
- Develop a procurement plan for the VCM-implemented components of the project acceptable to the Bank.
- Develop a list of monitoring indicators for the VCM-implemented components of the project acceptable to the Bank.

Agreed Action Plan for VCM to strengthen the financial management system before the negotiations.

	Action	Responsibility	Deadline
1	Preparation of FMR formats according to the Project specifications.	VCM	March 31, 2003
2	Preparation of accounting and financial procedures manual for the project including internal control procedures, roles and responsibilities of the VCM and Fund Manager, flow of funds in the project, the reporting requirements, auditing requirements, chart of accounts used for the project, TOR for project audit.	VCM	April 15, 2003
3	Inputting new activity codes for project in accounting system enabling for maintaining separate records of the project transactions.	VCM	April 15, 2003
4	Defining the reporting module in the system for automatic generation of the FMR and SOE	VCM	April 15, 2003

5	Training of the financial accounting staff in WB disbursement and financial management procedures in ILO training center.	VCM	June 2003
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#### Board conditions:

- Project Implementation Plan (Operations Manual) to be finalized by VE.
- Terms of Reference for the ECP Commercial Fund Manager to be finalized by VCM.
- VCM to confirm that its accounting system will separately record the project transactions in order to enable the preparation of the FMRs, submit updated and finalized version of the Project Accounting Manual, and provide a copy of the VCM annual financial statements audited by the Municipality controller.

#### Disbursement conditions:

- **Disbursement conditions for VE. Disbursement of the second half of the GEF's Subsidy Fund category (Category 1-b) equal to \$1.25 million is contingent upon:** (1) A mid-term review report to be prepared in 2006 that would demonstrate successful preliminary results of implementation of the AL DSM component of the Project and the existence of favorable conditions for the expansion of its activities to additional residential buildings; and (2) commitments by VE beginning no later than the completion of the Project to provide additional funds (from sources other than the GEF) and other resources as necessary for the expansion of the activities under the AL DSM component to additional residential buildings.
- **Disbursement conditions for VCM.** Any disbursement to VCM under the \$3 million ECP Commercial Fund component will be contingent upon: (1) the selection of a Fund Manager according to TOR acceptable to the Bank; (2) satisfactory results of the Fund Manager's financial management capacity assessment (including, if applicable, compliance with OP 8.30 requirements on financial intermediaries), and (3) adoption of a project manual (ECP Manual) acceptable to the Bank. For Category 1-b of the VCM Grant Agreement (\$1.5 million), contingent finance provisions will focus on the provision of co-financing: (4) A mid-term review report to be prepared in 2006 that would include information on commitment of funds from sources other than the GEF in an amount not less than \$1.5 million during the first phase (i.e., before the mid-term review) and commitment of further \$1.5 million after the mid-term review. Acceptable co-financing is either: (i) additional infusions into the ECP Commercial Fund itself; or (ii) parallel commercial bank or other private financing of the same investments that are receiving funds from the ECP Commercial Fund.

**Other financial management covenants.** VCM and VE will maintain a financial management system (both for the project and for the entity) acceptable to the Bank. Additionally, VCM will be responsible to cause Fund Manager to maintain the sound accounting and financial management system for project and entity. The VE and Fund Manager as entities and project financial statements, SOEs, and Special Account will be audited by independent auditors acceptable to the Bank and on terms of reference acceptable to the Bank. The annual audited statements and audit reports together with the Management Letter will be provided to the Bank within six months of the end of each fiscal year.

## H. Readiness for Implementation

- ☐ 1. a) The engineering design documents for the first year's activities are complete and ready for the start of project implementation.

- ☒ 1. b) Not applicable.
- ☐ 2. The procurement documents for the first year's activities are complete and ready for the start of project implementation.
- ☐ 3. The Project Implementation Plan has been appraised and found to be realistic and of satisfactory quality.
- ☒ 4. The following items are lacking and are discussed under loan conditions (Section G):

**VE-implemented part:** Finalized Project Implementation Plan.

**VCM-implemented part:** Finalized TOR for Fund Manager and Financial Procedures Manual.

## **I. Compliance with Bank Policies**

- ☒ 1. This project complies with all applicable Bank policies.
- ☐ 2. The following exceptions to Bank policies are recommended for approval. The project complies with all other applicable Bank policies.

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Victor B. Loksha  
**Team Leader**

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Henk Busz  
**Sector Manager**

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Roger W. Grawe  
**Country Director**

**Annex 1: Project Design Summary**  
**LITHUANIA: Vilnius Heat Demand Management GEF Project**

<b>Hierarchy of Objectives</b>	<b>Key Performance Indicators</b>	<b>Data Collection Strategy</b>	<b>Critical Assumptions</b>
<b>Sector-related CAS Goal:</b> Build capacity in local and municipal institutions;  Ensure access to basic services for the poor;  Decrease the negative fiscal impact of heating subsidies on the fiscal deficit.	<b>Sector Indicators:</b> Increased profitability of heating companies;  Reduced rate of disconnection by customers;  Decrease supply costs in real terms.	<b>Sector/ country reports:</b> Sector reports, corporate annual reports;  Auditors reports;  Regular project reports.	<b>(from Goal to Bank Mission)</b> Strong macro-economic framework;  Improved price setting procedures;  Reasonable primary energy prices.
<b>GEF Operational Program:</b> (OP-5)  Stimulate the development of a market for heat demand management equipment and related services in Vilnius.  Achieve indirect/downstream GHG emission reduction benefits due to demonstration effect and replication activities.	<b>Outcome / Impact Indicators:</b>  Reduction in market price of heat demand management equipment in Vilnius and in Lithuania.  The number of similar projects emerging in Lithuania, the Baltic Region and elsewhere in ECA based on the following criteria of similarity: <ul style="list-style-type: none"> <li>▪ District heating utility is involved in DSM;</li> <li>▪ Revolving fund or similar crediting facility for DSM (Regardless of the source of initial capitalization);</li> <li>▪ Identifiable GHG reduction benefits.</li> </ul>	Reports from the marketing department of VE and from VCM.  Reports from the marketing department of VE, VCM, and from other sources (HUDDF, etc.).	ECP provides an essential push to the development of demand-side energy efficiency market in Lithuania's residential sector creating more buyers and suppliers.  Effective and well targeted dissemination of information.





Financially and institutionally sustainable operation of the ECP including a Commercial Fund adequately supported by customer payments for energy efficiency equipment and services.	<p>appropriate audiences.</p> <ul style="list-style-type: none"> <li>▪ Rate of return on the investments made from ECP Commercial Fund;</li> <li>▪ Reductions in utility subsidies for low-income households as result of AL DSM investments;</li> <li>▪ Government subsidy contributions or regulatory measures to support the introduction of AL DSM and apartment-level consumption-based billing.</li> </ul>	Regular project reports and midterm review focusing on the question of financial sustainability of the ECP.	Terms of financing from ECP are sufficiently attractive to fulfill the market penetration objectives.
<p><b>Project Components / Sub-components:</b></p> <p>Heat exchanger substations with metering and temperature control at building level.</p> <p>GEF-financed Energy Conservation Program (ECP) to support apartment-level DSM investments including a commercial fund and a subsidy fund.</p> <p>Monitoring and Evaluation of the global environmental benefits; information dissemination for replication.</p> <p>The ECP Management.</p>	<p><b>Inputs: (budget for each component)</b></p> <p>\$26 million (VE-financed).</p> <p>\$5.5 million to support AL DSM investments, of which \$3 million for the commercial fund and \$2.5 million for the subsidy fund.</p> <p>\$0.2 million (GEF grant), including for Midterm Review.</p> <p>\$0.3 million (GEF grant) to help VCM meet the incremental operating costs of ECP management.</p>	<p><b>Project reports:</b></p> <p>Regular project reports.</p> <p>Regular project reports, monthly disbursement summaries.</p> <p>Regular project reports.</p> <p>Regular project reports.</p>	<p><b>(from Components to Outputs)</b></p> <p>Homeowners are sufficiently informed about the substations and are capable of participating in their energy efficient operation.</p> <p>Demand exists for DSM measures (including apartment-level DSM).</p> <p>The commercial fund operates in a financially sustainable manner (low default rate, sufficient rate of return by commercial standards).</p> <p>The subsidy fund is used to the level necessary to support energy efficiency investments for lower-income households.</p> <p>The performance of the ECP sets a replicable standard. The appropriate target audiences are effectively reached.</p> <p>After the depletion of the funds allocated for incremental operating costs, sufficient internal resources are found to keep the ECP running.</p>

## Annex 2: Detailed Project Description

### LITHUANIA: Vilnius Heat Demand Management GEF Project

#### Project Implementation Arrangements

**The VCM-implemented part.** The key guiding principle of this part of the project is the need to demonstrate a profitable operation based on energy efficiency savings in the residential housing sector. The approach to defining the implementation arrangements for VCM and its key contractor is not intended to be overly prescriptive at this time. Rather, the plan is to have VCM conduct a tender and invite detailed operational proposals from commercial parties interested in becoming the appointed Commercial Fund Manager (ECP Management Contractor). Such competitive proposals should cover, *inter alia*, how it is proposed to deal with institutional and legal aspects (buildings where there is or is not a home-owners' association), the prioritization of investment packages, the pricing of packages, the profit margin sought, payment terms, energy efficiency targets, the nature of contractual arrangements, how maintenance will be dealt with, and other areas which will have an impact on the market penetration or acceptability of the program. Annex 13 contains a draft TOR for the ECP Management Contractor (to be finalized by VCM).

The activities aimed at the **replication** of the project's concept, approach, and delivery mechanisms would be carried out through the GEF-funded Monitoring & Evaluation of Global Environmental Benefits and Information Dissemination for Replication component. The consultant engaged by the Municipality for this task would work closely with the Marketing Department of VE and the Vilnius City Municipality.

The information disseminated through these activities would include: (i) the role of the ECP in supporting the Vilnius district heating company's evolution from its historical role of a supply-driven heat provider to the new role of provider of energy services and DSM to meet the comfort needs of the customer; (ii) technical performance of the heat demand management equipment; (iii) commercial viability and institutional sustainability of the revolving fund created under ECP; (iv) the role of the local community in making decisions about their energy saving options.

The specific arrangements for the delivery of this information would include: (i) producing fact sheets about the Project; (ii) presenting the experience of VE and VCM at a workshop for government officials, community leaders, private sector interests, NGOs, etc.; and (iii) developing a published case study in English, Lithuanian, and Russian, to use with municipal governments, ministries of energy and communal services, etc. As a possible forum, one of the regular meetings under the Energy Efficiency Demonstration Zones Program of the UNECE could be used to present the case. UNECE's website could be utilized for electronic publication (in addition to the World Bank's standard press releases).

**The VE-implemented part.** The VE-implemented part of the project consists primarily of the GEF-supported Component B. The roles of the people and departments involved will be described in the Project Implementation Plan (Operations Manual), which will be developed by VE by the time of the Board presentation. At this time, the following roles have been agreed upon with VE.

**Vilniaus Energija (VE) President.** The President of Vilniaus Energija (VE) is responsible for the implementation of the AL DSM component of the Project. For the purposes of this component, the President is responsible for *inter alia* (i) providing leadership on the implementation of project components, including coordination among project stakeholders; (ii) ensuring compliance with the GEF Grant Agreement; (iii) approval of annual work plan and budget; (iv) monitoring and reporting project activities, ensuring proper quality and timeliness of reports to the Bank and other stakeholders, as

necessary; (v) communications with the Bank and other stakeholders.

**Vice President for Operations** reports to the VE President. He manages operations departments for heat supply, network distribution and engineering services. He is assisted by directors for each of these departments. Operations is responsible for ensuring technical quality of AL DSM equipment and installation works, this includes but is not limited to: (i) engineering designs, where applicable; (ii) review of procurement documents and evaluation of bid proposals; (iii) supervision of works; (iv) ensuring environmental guidelines as agreed with the Bank are applied (Environmental Management Plan); (v) provision of reports, as needed, for technical issues.

**VE Vice President for Marketing and Business Development** will be responsible for leadership of sales, marketing, fulfillment and procurement for the AL DSM component of ECP. He reports to the President of VE. He will be assisted by the **VE Commercial Director** in day-to-day department operations. The primary responsibilities will include (i) developing and executing an external communications program, and the development of tools for sales support, such as promotional material (brochures, letters, etc.), direct mail, advertising and other activities targeted to current or potential customers; (ii) coordinating public information campaigns on energy efficiency with the City Municipality Representative.

**Vice President for Finance** reports to the VE President and is responsible for financing, billing and collections, financial control and accounting functions. For the purposes of Project accounting, he will be in particular responsible for: (i) preparation of financial monitoring reports (unaudited quarterly reports; audited annual reports); (ii) updating of general ledger, ensuring compliance with International Accounting Standards; (iii) authorization of disbursement transactions; (iv) updating of project accounting documents/ledgers (e.g. purchase orders, cash receipt book, etc.); (v) maintaining the fixed asset register; (vi) preparing the fixed asset spreadsheet, including calculating depreciation, and financial models that provide timely and accurate information on VE's financial position and monitor financial covenants undertaken in legal agreements; (vii) preparing source documents (receipts, invoices, payment vouchers, bin cards, etc.) and maintaining a clear filing system of these documents; (viii) updating cash receipts and disbursements book, petty cash disbursements listing. He shall delegate functions to his subordinate divisions as needed to fulfill these tasks.

Billing and Collection Division is subordinate to the VP of Finance and is responsible for (i) preparation of monthly bills to ECP/VE customers; (ii) tracking collections for ECP AL DSM purchases; (iii) inputting data from sales contracts into VE's customer database; (iv) providing customer reports on arrears to Commercial Department for collections; (v) coordinating with the Chief Accountant to develop an information system that tracks billing and collection.

### ***The coordination of the VCM- and VE-implemented parts of the project***

The Vilnius City Municipality, as the implementing agency for the ECP Commercial Fund component and the primary owner of the assets operated by VE, would oversee the activities of ECP, and would take the lead in the social aspects of the program including compliance with legislation on support to low-income people and coordination of the ECP operations with the existing utility subsidies. The Municipality would assist VE in managing the information dissemination and public education aspects of ECP and advocate the concept of ECP with the national Government. The City Municipality Representative (CMR) on the ECP Management Board would be officially designated by the Mayor.

**City Municipality Representative.** The CMR is the head of the Economics Department of the Vilnius

City Municipality. This person is responsible for (i) organizing and chairing the meetings of the Management Board; (ii) supervising the work of consultants and communicating their findings and recommendations to senior management and other stakeholders; (iii) authorizing the list of eligible low-income households for a targeted subsidy for ECP products; (iv) solving problems in the legal and regulatory framework that hinder project implementation for which the City Municipality is responsible; (v) reporting to senior City Management on the progress of the project and any implementation issues.

## **Project Components**

In the following description, the first two Components (A and B) are proposed to be implemented by VE, while the rest of the Components are implemented by the Vilnius City Municipality aided by appropriate consultancy support. The investments included in the description would take place during the period **2003-2007**.

### **By Component:**

#### **Project Component 1 - US\$26.10 million**

**The Substation Modernization** - is shown in the table in Section C-1 as Component A. This component is part of VE's investment program and it consists of substation modernization including the replacement of all block substations with building-level substations in residential buildings. VE plans to install 2,286 building-level substations (most of them over the next four or five years) in buildings currently served from block substations. The implementation of this component is of utmost importance to the transformation of the Vilnius DH system into a modern, customer friendly, and energy efficient system. This is also an essential prerequisite for the technical feasibility of the demand-side management measures at the apartment and building level and thus ties in most closely with the GEF-supported components.

## **Energy Conservation Program**

#### **Project Component 2 - US\$10.00 million**

**Apartment-Level Demand-Side Management (AL DSM) component** - is shown in the table in Section C-1 as Component B. The AL DSM program would be a 5-year program, and it would cover some 500-600 apartment buildings in Vilnius, with the possibility of expanding the program to another similar number of buildings in the following years. The AL DSM measures would include the supply and installation services for thermostatically controlled valves (TCV) and heat cost allocators (HCA) on room radiators, remote readers for hot water meters, and balancing works for the risers connecting the substation to the radiators. These investments will allow VE to introduce billing based on the actual heat consumption by each apartment where the AL DSM equipment is installed. Thus, the incentives for the residents to conserve heat would be substantially enhanced. However, the potential level of acceptance of the AL DSM installation program by the Vilnius residents is uncertain. To increase the chances of successful market penetration, the GEF will participate in this component by financing a \$2.5 million "subsidy fund" (to be disbursed in two tranches of \$1.25 million each, the second tranche being contingent on the provision of co-financing for the expansion of the program by VE). The subsidy fund will allow VE to forgive the low-income inhabitants of the 500-600 buildings all or most of the cost of the downpayment (connection fee) on the AL DSM equipment, thus addressing the barrier of up-front cost affordability. During the years of the GEF project duration (2003-2007), the co-financing by VE is expected to equal at least LTL 20 million (roughly \$6 million), with the homeowners contributing about \$2.5 million through connection fees.

#### **Project Component 3 - US\$ 3.00 million**

**ECP Commercial Fund** (Component C). This component would capitalize a revolving fund (run by a firm contracted by the Municipality - see the ECP Management Contract component below) through a \$3 million worth of energy efficiency (demand-side management) investments during the years of the GEF project implementation (2003-2007). The fund would operate on a financially sustainable basis and would be used for energy efficiency investments as long as demand exists. The Municipality envisages that most of the investments will be made in the building-envelope improvements (including window replacement). However, the final decision on the type of the investments made by the Commercial Fund will be made upon the completion of the tender for the operation of the fund under the ECP Management Contract. The intent is to solicit the most effective and innovative proposals (business plans) from the firms competing for the Contract. To ensure an integrated approach with the investment program pursued by VE, one of the conditions will be that the ECP Commercial Fund would only extend its services only to buildings connected to district heat and receiving either building-level substations and/or AL DSM equipment.

#### **Project Component 4 - US\$0.50 million**

**The ECP Management Contract** would be an essential component of the Project which would create an institutional and operational basis for the energy efficiency investment program pursued by the Municipality. A commercial entity (consulting firm – preferably, with credentials of an ESCO) would be selected by the Vilnius Municipality through a competitive tender. Under the contract with the Municipality, the firm would implement the business plan that it will have developed for the tender. The responsibilities under the business plan will include the operation of the ECP Commercial Fund in a financially sustainable manner through profitable investments in energy efficiency in the residential sector.

#### **Project Component 5 - US\$0.30 million**

**Administration of ECP by the Municipality** - would cover the incremental operating costs to Vilnius Municipality associated with the management of ECP during the five years of GEF project implementation. This allocation would cover Incremental Operating Costs (US\$ 100,000) helping VCM to meet the expenditures for contractual staff, office supplies, transportation, advertising, marketing, public relations and other public outreach effort, as well as training for financial staff. In addition, the costs of financial audits of the GEF project accounts will be covered by a consultant cost allocation of \$100,000, and an allowance of \$100,000 for individual consultants will be made.

#### **Project Component 6 - US\$0.20 million**

**Monitoring & Evaluation of Global Environmental Benefits and Information Dissemination for Replication.** The monitoring and evaluation of the achievement of the global environmental objective would focus on quantifying the GHG savings associated with energy savings and the performance of ECP. The M&E would include a mid-term review (planned for June 2006), which would place a special emphasis on the performance of the ECP from the perspective of GHG reduction impact as well as market penetration and financial sustainability of the Commercial Fund.

In addition to the M&E of GHG reductions and the ECP performance, this component would include *information dissemination* activities aimed to realize the Project's replication potential to the maximum. Lithuania would be the initial target area for replication, where the information dissemination can be facilitated through the several existing Energy Efficiency Advisory Centers. Replication outside Lithuania would be achieved through disseminating the information through the existing networks of experts and agencies engaged in energy efficiency projects – e.g., the network of energy efficiency demonstration zones established within the framework of the Energy Efficiency 21 program of the United Nations Economic Commission for Europe (UNECE), which is coordinating activities among similar zones throughout Eastern Europe and the former Soviet Union. It is expected that both the

Marketing Department of VE and the Vilnius City Municipality will be closely involved in the implementation of this component, contributing substantially to the efforts of the consultant that would be engaged.

**Annex 3: Estimated Project Costs**  
**LITHUANIA: Vilnius Heat Demand Management GEF Project**

Component	Indicative Costs (US\$M)	% of Total	Bank financing (US\$M)	% of Bank financing	GEF financing (US\$M)	% of GEF financing
A. Substation Modernization	26.10	65.1	0.00	0.0	0.00	0.0
B. Apartment-level DSM (Subsidy Fund)	10.00	24.9	0.00	0.0	2.50	38.5
C. ECP Commercial Fund	3.00	7.5	0.00	0.0	3.00	46.2
D. ECP Commercial Fund Management Contract	0.50	1.2	0.00	0.0	0.50	7.7
E. Administration of ECP by the Municipality	0.30	0.7	0.00	0.0	0.30	4.6
F. Monitoring and Evaluation of Global Benefits	0.20	0.5	0.00	0.0	0.20	3.1
<b>Total Project Costs</b>	40.10	100.0	0.00	0.0	6.50	100.0

**Estimated Project Costs, US\$ thousand**

VE-implemented Component B

	Foreign	Local	TOTAL
AL DSM Costs	5,112	2,440	7,552
Physical contingencies	272	132	404
Price contingencies	500	-	500
Taxes and Duties	-	1,548	1,548
TOTAL Project Costs	5,884	4,120	10,004
TOTAL Financing Required	5,884	4,120	10,004



## **Annex 4: Economic Analysis Summary**

### **LITHUANIA: Vilnius Heat Demand Management GEF Project**

**Least-Cost Analysis.** District heating options were considered relative to individual gas-fired boilers and electricity-based heat supply. Generally, district heating is economically viable if the density of heat demand is high (above 5 MWh/year per meter of pipe) and if heat as a by-product from a power plant is used to meet part of the supply. Vilnius has two CHP plants that can be used as a source of low-cost heat, thus meeting one of the criteria. Most of Vilnius meets the heat density criterion, if not all. Consultants undertook an analysis of each of the 24 districts within Vilnius to assess which districts should be retained as market areas for district heat. Of the 24 districts, 15 met the criteria with the remaining nine requiring a detailed analysis. Of these nine, one district (A. Paneriai) was proposed to be disconnected from the centralized heat supply system. In three other districts, some design changes and limited disconnection will make district heating supply economically viable. In the remaining five districts, centralized heat is least-cost due to their proximity to a transit pipe to neighboring districts.

Part of the problem with the financial viability of district heating stems from cross-subsidies in gas prices. Household gas prices remain below their economic levels while larger customers pay relatively high prices than can be economically justified. The Energy Pricing Commission (EPC) has been gradually eliminating these cross-subsidies, but further adjustments need to take place. This issue is of particular importance to district heating companies as gas is both their primary supplier and primary competitor (at the household level). As a result, their input price subsidizes the price paid for the primary competitor to district heat - individual boilers. This issue was addressed with the VDHC, EPC and the Ministry of Economy at the time of preappraisal, when it was agreed that it would be addressed through the regulatory process.

**Cost-Benefit Analysis** focused on the returns that could be achieved based on tariffs as a proxy for valuing benefits. This underestimates the economic returns, which is a conservative approach. The project benefits consist of the following: decreased fuel consumption from energy savings caused by improved temperature control at consumer substations and in the apartments; decreased fuel consumption from CHP and HOB upgrades; improved supply reliability from equipment replacement at the CHP and HOBs; decreased water losses as a result of new substations; decreased electricity consumption by lowering pumping loads; decreased maintenance costs; lower staffing requirements; and decreased emissions (including CO<sub>2</sub>).

Only components that have a real incremental financial return greater than 10% have been considered for the project because of the need to decrease the cost of supply. All project components have an individual EIRR exceeding 11%, with a total project EIRR of 13% (excluding environmental benefits).

The replacement of block substations with BLS is expected to have a high rate of return (in excess of 15%), consistent with the experience in Bank-funded projects in other countries. The primary source of savings comes from the fundamental design change from a constant flow, variable temperature design (as was the case in all of the Former Soviet Union) to a variable flow design as is the norm in Western European countries. This design change enables heat losses to be dramatically reduced. Water meters at the building level enable a reduction in nontechnical losses while piping improvements decrease the technical losses. Furthermore, it also enables new markets to develop by extending the season for those customers willing to pay for this service. Lower electricity and maintenance costs have a minor impact on the project benefits.

## Annex 5: Financial Summary

### LITHUANIA: Vilnius Heat Demand Management GEF Project

Factors relevant to the financial analysis of VE include:

The single-part tariff in Vilnius set in 1998 was LTL 108.8 per MWh for residential customers. The company is aware that the current tariff structure does not cover its real costs (particularly cost recovery of fixed costs during warm winters). The introduction of a two-part tariff structure is expected to improve this.

The competitive environment within which VE operates is difficult because of the sharp challenge to district heating presented by suppliers of alternative heat sources, particularly gas. The research conducted on the company's behalf confirms that it is likely to lose customers at an increasing rate if tariffs for heat rise faster than the consumer price index. A key element of its survival strategy, therefore, will be to seek to use targeted investment to transform its cost paradigm so that tariffs can remain at or below their present level in real terms.

By law, the Municipality of Vilnius constitutes the heating authority, and tariff applications to the Energy Price Commission (EPC) come from it rather than from the district heating company operator. This arrangement allows for a degree of political input into VE's pricing strategy which could, in certain circumstances, prevent it from maintaining prices in real terms.

The district heating company operated by VE is a reconstituted VDHC, from which its regional branches (serving communities which are physically separated from the Vilnius infrastructure) have been separated. While separation will pose major strategic and financial problems for the smaller communities (the transition will be supported separately by an ESMAP study), it has greatly assisted the financial position of VE.

#### Financial Problem Areas

Despite the recent signs of financial profitability, VE is still facing a number of legacy problems and it faces new challenges. If not countered, the combination of these is likely seriously to compromise its future financial performance, and could lead to an inability to fully service its debt with the Ministry of Finance.

**Technical shortcomings:** the impact of the technical characteristics of the company's assets, including its CHP plant, its distribution networks and its substations, will be increasingly felt in financial terms. Shortcomings in the original design, compounded by the technical deficiencies of the heat installations within buildings will lead to increased operating costs, particularly maintenance costs, and to significant opportunity costs arising from the limited availability of the CHP plant to sell power to the national grid.

**Competition:** VE is encountering new and increasingly effective competition from providers of alternative sources of heat, particularly natural gas. The greater flexibility and control which gas boilers provide to consumers will increasingly dislodge district heating customers from the network and erode VE's revenue base. Research conducted by the consultants indicates that the disconnection rate would probably be 1% of consumers per annum without improvements to the existing assets. The actual experience during 2000 suggests that disconnections are currently occurring at a substantially higher rate.

**Tariff limitations:** In these competitive conditions VE can not regard itself as having monopoly status in the Vilnius heat market, and will not be able to rely on regular tariff increases in real terms to cover the increased unit costs which will result from both of the above factors -- higher fixed operating costs and a narrower customer base. It is likely that the only pricing stance which will be compatible with VE's profitable operation will be a strategy of unchanged real prices over the medium term. In order to provide incentives for customers to economize heat consumption (while not compromising VE's ability to recover its fixed costs, particularly during mild winters), it will also be necessary to achieve continued real price stability within a two-part tariff environment of instead of the current single-part scheme.

### **The impact of the Project on the financial position of VE**

The impact of the AL DSM program on VE's financial position is difficult to quantify at this stage. On the one hand, if 15% or so of the households in Vilnius are enabled to control their heat consumption, there may be some tendency towards reduced heat sales. On the other hand, consumer preferences for greater comfort, at the discretion of the consumer, may tend to maintain consumption levels, particularly if the proposed two-part tariff has a high fixed element. Furthermore, the program may play an important part in affecting consumer perceptions of the district heating system in Vilnius and thus help to slow down the rate of disconnections and/or facilitate the substation replacement program pursued by VE.

The projections made by the consultants who prepared the earlier World Bank-financed rehabilitation project calculated that VDHC could expect significantly improved financial performance as a result primarily of rehabilitation investments in substations, heat-only boilers and the CHP facilities. At net profit level the improvement was projected to be of the order of LTL 20 million annually following the completion of the rehabilitation program, rising in later years as the customer base was stabilized and tariffs rose faster than operating costs. In general it seems likely that the factors mentioned above in relation to AL DSM investments will balance out, so that VE's operating environment should be at least as good as was previously projected for VDHC, perhaps substantially better if the promised improvements in management performance, particularly in marketing and customer care, are realized.

## **Annex 6(A): Procurement Arrangements**

### **LITHUANIA: Vilnius Heat Demand Management GEF Project**

#### **Procurement**

##### **Procurement guidelines and special considerations**

All procurement financed by the GEF grant would be conducted in accordance with the World Bank Guidelines for Procurement under IBRD loans and IDA Credits, January 1995, revised January and August 1996, September 1997 and January 1999, and using the Bank's Standard Bidding Documents. Consulting services would be procured in accordance with the Guidelines for Selection and Employment of Consultants by World Bank Borrowers, January 1997, revised September 1997, January 1999, and May 2002. A General Procurement Notice containing information about bidding opportunities was published in the October 2001 issue of Development Business (No. 569) in accordance with paras 2.7 and 2.8 of IBRD Guidelines and will be updated. Specific Procurement Notices will also be published, as appropriate, in Lithuanian newspapers of national circulation.

Under the VCM-implemented Commercial Fund component, the procurement methods for goods and works are defined by the need for quick turnaround capability and the need to keep the transaction costs to a reasonable limit. In particular, the need for quick turnaround is key, given that the final contracting should be done in response to customer demand.

##### **The AL DSM Component (VE-implemented)**

###### ***Supply and Installation***

The goods to be procured under ECP are represented by equipment and related incidental services (including installation) for demand-side energy efficiency measures in the apartments. The measures cover installing thermostatic valves and cost allocators on room radiators, remote reading devices for hot water meters, and water flow balancing of the risers connecting the substation to the radiators. VE would like to proceed with the tender for the supply and installation of equipment as soon as possible and to limit the number of tenders to not more than two, totaling an estimated US\$10 million. The methods of procurement agreed between VE and the Bank include: International Competitive Bidding (ICB) in case VE would like to have only one contract, and own procedures of VE for contracts for goods and works in amounts not exceeding US\$5 million, provided that these procedures will ensure a transparent competitive process of seeking bids and evaluation of bids based on pre-disclosed clear bid evaluation criteria for award of contract to the lowest evaluated responsive bidder. The contractors and suppliers selected for award should have adequate financial and technical resources to perform the contract satisfactorily. VE and any of its affiliates and shareholders are not eligible to bid for the contracts. The Bank will review the procurement documents for compliance with these principles. The GEF contribution would be not more than \$2.5 million (of which \$1.25 million would be released only after a satisfactory mid-term review).

##### **The VCM-implemented Components**

###### ***Works (and Goods)***

**The ECP Commercial Fund** (US\$ 3 million) would finance investments in energy efficiency improvements in buildings. These investments would capitalize the revolving fund owned by the Municipality and operated by the ECP Commercial Fund Manager (Management Contractor, see below). The works to be procured by the ECP Management Contractor on behalf of VCM are represented by demand-side energy efficiency measures in the residential buildings and apartments. The measures would

cover replacement and refurbishment of windows, thermal insulation of walls and roofs, etc. The supply will include materials and goods (e.g., new windows) as necessary. The exact scope of investments will be chosen based on the proposals received under the tender for the ECP Management Contractor and will ultimately depend on the demand by the apartment owners, who would select the content of the investments for which they are paying.

The recipient of the GEF grant (VCM) would follow **national competitive bidding** procurement methods modified to meet the above-mentioned special needs of ECP. Under this modified NCB method, ECP Management Contractor acting on behalf of VCM would annually publish a procurement notice nationally, inviting bidders for **rate contracts** for standard works and goods (with installation) as appropriate. Rate contracts would not specify quantities to be procured, but estimates may be specified, if practical. The bidders would be asked to indicate unit prices (without any assurance of quantities that may be awarded as the quantities are not known at the time of invitation) valid for a period not less than one year, and ECP Management Contractor would enter into rate contracts with the first three lowest responsive bidders that are within 15% of the lowest bid. The Management Contractor would conclude separate contracts for specific quantities when demand arises during the rate contract period. The Management Contractor will assist the homeowners in obtaining the equipment and related incidental services from one of the three firms that has a rate contract with Management Contractor, on terms and conditions specified in the rate contract. Each beneficiary would thus not have to negotiate contract terms with multiple suppliers. This approach would allow Management Contractor to limit the frequency of tendering to one time a year and to benefit from the economies of scale.

The total aggregate amount of equipment procured under NCB would be limited to \$3 million.

#### ***Consultants Services***

The consulting services will be procured on the basis of Quality- and Cost-based Selection (QCBS). Least-cost selection will be allowed for financial audits up to an aggregate limit of \$100,000, and a separate allowance of \$100,000 will be made for individual consultants.

*The ECP Management Contract* (US\$ 500,000) is needed to assist the Municipality in the operation of the Commercial Fund. The Management Contractor (MC) would be selected according to QCBS and would have procurement specialists familiar with the Bank's procurement guidelines. Preferably, an energy service company (ESCO) would be hired to work as the Management Contractor.

*Monitoring and Evaluation of Global Environmental Benefits* (US\$ 200,000) would be carried out under the Municipality's oversight to focus on quantifying the energy savings and associated GHG savings and the performance of the ECP. Information dissemination for barrier removal would be an integral element of this component.

#### ***Administration of ECP by the Municipality***

This allocation to cover the Incremental Operating Costs (US\$ 100,000) would help VCM to meet the expenditures for contractual staff, office supplies, transportation, advertising, marketing, public relations and other public outreach effort, as well as training for financial staff. In addition, the costs of financial audits of the GEF project accounts will be covered by a consultant cost allocation of \$100,000 (under LCS), and an allowance of \$100,000 for individual consultants will be made.

#### ***Institutional Capacity Building in Procurement***

An assessment of VE capacity to implement project procurement was completed in 2002, and a similar review was undertaken in April 2003 for VCM. This review addressed the legal aspects, procurement

cycle management, organization and functions of the PIU, support and control systems, record keeping, and staffing. Based on the assessment, VE and VCM have adequate capacity to conduct procurement under this project, and the risk level is average.

### Prior Review

**For the VE-implemented part**, the Bank's prior review would include the full review of all contracts (in practice, this will be limited to two contracts executed under VE's own procurement rules or, alternatively, one comprehensive ICB contract).

For the VCM-implemented part, prior review would apply to the first three contracts in the first year and the first contract in the following years procured under the modified NCB procedure, and all the consultant contracts procured through QCBS. The Bank will also review, regardless of the value and the financier, terms of reference of all consultants.

### Procurement methods (Table A)

**Table A: Project Costs by Procurement Arrangements**  
(US\$ million equivalent)

Expenditure Category	Procurement Method <sup>1</sup>				Total Cost
	ICB	NCB	Other <sup>2</sup>	N.B.F.	
<b>1. Works</b>	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
<b>2. Goods</b>	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
<b>3. Services</b>	0.00 (0.00)	0.00 (0.00)	0.90 (0.90)	0.00 (0.00)	0.90 (0.90)
<b>4. Miscellaneous</b>	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
<b>5. Supply and Installation</b>	0.00 (0.00)	3.00 (3.00)	10.00 (2.50)	26.10 (0.00)	39.10 (5.50)
<b>6. Increm. Operating Costs</b>	0.00 (0.00)	0.00 (0.00)	0.10 (0.10)	0.00 (0.00)	0.10 (0.10)
<b>Total</b>	0.00 (0.00)	3.00 (3.00)	11.00 (3.50)	26.10 (0.00)	40.10 (6.50)

<sup>1/</sup> Figures in parentheses are the amounts to be financed by the Bank Grant. All costs include contingencies.

<sup>2/</sup> Consulting services (including ECP Management Contract), the Supply and Installation package(s) conducted by VE, and incremental operating costs for VCM.

Note: N.B.F. \$26.1m corresponds to the Substation Modernization component financed by VE.

**Table A1: Consultant Selection Arrangements (optional)**  
(US\$ million equivalent)

Consultant Services Expenditure Category	Selection Method							Total Cost <sup>1</sup>
	QCBS	QBS	SFB	LCS	CQ	Other	N.B.F.	
<b>A. Firms</b>	0.70 (0.70)	0.00 (0.00)	0.00 (0.00)	0.10 (0.10)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.80 (0.80)
<b>B. Individuals</b>	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.10 (0.10)	0.00 (0.00)	0.10 (0.10)
<b>Total</b>	0.70 (0.70)	0.00 (0.00)	0.00 (0.00)	0.10 (0.10)	0.00 (0.00)	0.10 (0.10)	0.00 (0.00)	0.90 (0.90)

<sup>1/</sup> Including contingencies

Note: QCBS = Quality- and Cost-Based Selection

QBS = Quality-based Selection

SFB = Selection under a Fixed Budget

LCS = Least-Cost Selection

CQ = Selection Based on Consultants' Qualifications

Other = Selection of individual consultants (per Section V of Consultants Guidelines), Commercial Practices, etc.

N.B.F. = Not Bank-financed

Figures in parentheses are the amounts to be financed by the Bank Grant.



## Prior review thresholds (Table B)

**Table B: Thresholds for Procurement Methods and Prior Review**

(US\$ million equivalent) Section 1: Procurement Review							
Goods and Civil Works	ICB	NCB	IS	NS	Minor Works	Other methods	
Procurement thresholds: individual and aggregate, in ( )	VCM: Above US\$2,000,000 VE: Above US\$5,000,000	Not higher than US\$2,000,000	NA	NA	NA	VE's own procurement methods acceptable to the Bank for contracts not higher than US\$5,000,000	
Prior Review	All contracts	First three contracts the first year, then first one every year	NA	NA	NA	All VE contracts based on its own procurement methods	
Consultants	QCBS	QBS	Fixed Budget	LCS	Qualifications	Sole Source	Individual
Procurement method thresholds	Above US\$100,000	NA	NA	US\$100,000	NA	NA	NA
Prior Review	All	NA	NA	US\$10,000	NA	NA	Above \$20,000
Ex-post Review	Explain briefly the ex-post review mechanism: All the procurement packages not subject to prior review will be subject to ex-post review.						
<b>Section 2: Capacity of the Implementing Agency in Procurement and Technical Assistance requirements</b>							
An assessment of VE capacity to implement project procurement was completed in 2002. This review addressed the legal aspects, procurement cycle management, organization and functions of the PIU, support and control systems, record keeping, and staffing. Based on the assessment, VE has adequate capacity to conduct procurement under this project, and the risk level is average. A similar review for VCM was completed in April 2003.							
Country Procurement Assessment Report or Country Procurement Strategy Paper status: NA			Are the bidding documents for the procurement actions of the first year ready by negotiations Yes No X - the documents will be finalized by July 2003				
<b>Section 3: Training, Information and Development on Procurement</b>							
Estimated date of Project Launch Workshop Sept. 2003	Date of publication of General Procurement Notice: October 2001 (to be updated in May 2003)	Indicate if there is procurement subject to mandatory SPN in Development Business Yes X No		Domestic Preference for Goods VE Component: Yes No X VCM Component: Yes No X		Domestic Preference for Works, if applicable Yes No X	
Retroactive financing Yes X No Explain: \$100,000 for VCM for consultants and incremental operating costs.				Advance procurement Yes No X Explain:			
Explain briefly the Procurement Monitoring System: Procurement implementation progress will be monitored through progress reports and supervision missions. Supervision missions will include a procurement specialist. She/he will be responsible for updating the procurement plan, and conducting ex-post reviews. His/her findings will be included in the supervision reports for monitoring their implementation.							
Co-financing: Explain briefly the procurement arrangements under co-financing: VE will co-finance the US\$10m package for AL DSM equipment by contributing US\$6m. The procurement for VE will consist of two \$5m contracts executed under VE's procurement method acceptable to the Bank. Alternatively, the US\$10m package would be procured under ICB.							
<b>Section 4: Procurement Staffing</b>							
Indicate name of Procurement Staff or Bank's staff part of Task Team responsible for the procurement in the Project: Name: Leonid Vanian, Sr. Procurement Specialist, Ext. 84796; Elzbieta Sieminska (procurement capacity assessments and supervision).							

**Table C: Procurement Plan**

1	2	3	4	5	6 Estimated dates				
Description	Type	# of slices/ items/ sub-packages	Estimated cost, US\$ thousand	Procurement Method	Prequalification on /SL 1. Invitation GPN/SPN/Lo cal 2. Opening 3. Eval & Recom	(BD/RFP) Preparation	Bid 1. Invitation GPN/SPN/ Local 2. Opening 3. Eval&Recom Award	Contract signing	Contract Completion
<b>VE-implemented Component B<sup>1</sup></b>									
AL DSM Component: Supply and installation of thermostatic valves, heat cost allocators, and balancing valves in family apartments	S&I	1	10,000	LIB		05/15/2003	06/01/2003 07/15/2003 08/15/2003	09/15/2003	03/15/2007
<b>Subtotal for VE-implemented Component B</b>			<b>10,000</b>						
<b>VCM-implemented components</b>									
<b>Component C (Commercial Fund): Works for demand-side energy efficiency in buildings</b>	W	3 rate contracts in Year 1	500	NCB		06/01/2003	07/01/2003 08/15/2003 09/15/2003	10/15/2003	10/31/2004
As above	W	3 rate contracts in Year 2	1,000	NCB		06/01/2004	07/01/2004 08/15/2004 09/15/2004	10/15/2004	10/31/2005
As above	W	3 rate contracts in Year 3	1,000	NCB		06/01/2005	07/01/2005 08/15/2005 09/15/2005	10/15/2005	10/31/2006
As above	W	3 rate contracts in Year 4	500	NCB		06/01/2006	07/01/2006 08/15/2006 09/15/2006	10/15/2006	10/31/2007
<b>Subtotal for Component C</b>			<b>3,000</b>						
<b>Component</b>	CS	1	500	QCBS	05/15/2003	08/01/2003	08/15/2003	12/15/2003	12/31/2007

D: ECP Management Contract					06/15/2003 07/15/2003		09/15/2003 11/01/2003		
<b>Subtotal for Component D</b>			<b>500</b>						
<b>Component E:</b> Administration of ECP by VCM	IOC		100	N/A					
Consultant services for financial audits under component E	CS	1	100	LCS		08/01/2003	08/15/2003 09/15/2003 11/01/2003	12/15/2003	12/31/2007
Individual consultant services under Component E	CS	Several	100	Individual					
<b>Subtotal for Component E</b>			<b>300</b>						
<b>Component F:</b> Monitoring and Evaluation of Global Benefits			200	QCBS	05/15/2005 06/15/2005 07/15/2005	08/01/2005	08/15/2005 09/15/2005 11/01/2005	12/15/2005	12/31/2007
<b>Subtotal for Component F</b>			<b>200</b>						
<b>Subtotal for VCM-implemented Components</b>			<b>4,000</b>						
<b>TOTAL:</b>			<b>14,000</b>						

<sup>1</sup> Component A (Substation Modernization) is not included since no GEF financing is involved.

AL DSM = apartment-level demand-side management

W = works

S&I = supply and installation

CS = consultant's services

ICB = international competitive bidding

NCB = national competitive bidding

QCBS = quality and cost based selection

LCS = least-cost selection

NA = not applicable

ECP = Energy Conservation Program

M&E = monitoring and evaluation

VCM = Vilnius City Municipality

VE = Vilniaus Energija, the district heating company operator

IOC = incremental operating costs

## **Annex 6(B): Financial Management and Disbursement Arrangements**

### **LITHUANIA: Vilnius Heat Demand Management GEF Project**

#### **Financial Management**

##### **1. Summary of the Financial Management Assessment**

The financial management assessment was performed during the project's appraisal mission in the period March 4-7, 2003 and updated prior to Board presentation.

**The financial management arrangements of the project will be fully acceptable to the Bank after the completion of the Action Plan prior to Negotiation and Board Presentation.**

Since the Project will be implemented separately by VE and VCM and two separate grant agreements will be signed, the financial management arrangements will be maintained separately for VE and VCM, and two sets of reports will be prepared and audited.

**Country Issues.** In 2002, the Bank conducted a ROSC Accounting & Auditing review. The ROSC report on Accounting & Auditing provides description of the overview of standards and practices in Lithuania. Although the use of IAS is required for listed companies, banks and other public joint stock companies, the enforcement and monitoring of compliance with IAS should be strengthened. The audit of the financial statements must be carried out by qualified auditors and in accordance with Lithuanian standards that are based on International Standards on Auditing ISA. While many audit firms make efforts to carry out the audits in accordance to ISA, there are variations in the quality of audits. Furthermore, the quality of some audits is affected by management attitudes and misconceptions about the role of audits. These risks will be taken into account while designing the auditing arrangement for the project and entity.

**The banking sector** in Lithuania has made substantial progress and undergone continued consolidation since the 1995 banking crisis. The tight supervision exercised by the Bank of Lithuania (Central Bank) and tougher regulatory framework proved beneficial. VCM will open a Special Account in a commercial bank acceptable to the Bank and whose financial status and statements are reviewed on an ongoing basis by the Bank. The commercial bank will issue a comfort letter for the Special Account to be opened.

**Supervision Plan.** During project implementation, the Bank will supervise the project's financial management arrangements in two main ways: (i) review the project's quarterly financial management reports as well as the entity's and project's annual audited financial statements and auditor's management letter; and (ii) during the Bank's supervision missions, review the project's financial management and disbursement arrangements (including a review of a sample of SOEs and movements on the Special Account) to ensure compliance with the Bank's minimum requirements. As required, a Bank-accredited Financial Management Specialist will assist in the supervision process.

#### **I. Vilniaus Energija Part**

##### ***Strengths***

There are no significant strengths.

##### ***Weaknesses***

There are no significant weaknesses of the project financial management system. However, there are some risks connected to the fact that it is a newly created company with inherited staff, procedures and leased assets which is implementing organizational changes in management style, internal control procedures, and information systems.

### ***Implementing Entity***

Vilniaus Energija (VE) commenced officially its operations as district heating company in April 2002. VE is subsidiary of Dalkia International which won the tender for the 15 year lease of assets in use by former Vilnius District Heating Company. Under the lease agreement, most of the VDHC staff has been transferred to VE. VDHC continues to own the assets.

### ***Funds Flow***

Project funds will flow from: (i) the Bank, by direct reimbursement on the basis of withdrawal applications; or (ii) the Energy Efficiency Fund, or (iii) own contribution of VE or final beneficiaries; (iv) contributions from other sources.

### ***Staffing***

The Vice President for financial matters is responsible for the project's financial management. He is also supervising the Financial Director, Chief Accountant and the Head of the Billing Department. The organizational structure of the financial division is also supported by the Financial Controller.

### ***Accounting Policies and Procedures***

The accounting books and records are maintained on accrual basis and project financial statements will be presented in EUR and LTL. VE has in place a set of accounting procedures and internal controls including authorization and segregation of duties. VE has prepared draft project financial-accounting manual including the procedures, roles and the responsibilities of the staff, accounts used for the project accounting, the agreed formats of the FMR, TOR for project audit.

### ***Internal Audit***

VE has no internal audit department. Creation of such function is planned in the future. However, at present VE is overseen by the internal auditors of the Dalkia mother company.

### ***External Audit***

The first audit report of VE (for 2002) was received by the Bank in mid-April 2003. VE financial statements are audited by a local member firm of the international audit networks. The selection of the auditor is ruled by the mother company Dalkia which is using the same auditor.

VE's auditing arrangements will include audit of the entity and the VHDMP's project financial statements and SOEs. The standard terms of reference was transferred to VE, which will be used for the project. The audit of the project will be conducted by independent private auditors acceptable to the Bank, on terms of reference acceptable to the Bank. The audit will be financed by VE. The annual audited project financial statements will be provided to the Bank within six months of the end of each fiscal year and also at the closing of the project.

At the moment the WB accepted three audit firms in Lithuania.

The following chart identifies the audit reports that will be required to be submitted by the project implementation agency together with the due date for submission.

<b><i>Audit Report</i></b>	<b><i>Due Date</i></b>
VE Entity	Within six months of the end of each fiscal year and also at the closing of the project
Project/SOE	Within six months of the end of each fiscal year and also at the closing of the project

Other (specify) Management Letter should be issued both for entity and Project	As above
--	----------

### ***Reporting and Monitoring***

The new information system enables to create separate activity codes for recording the project transactions. It is possible to generate the trial balance of the project or even the report in ready to use graphical form (after defining the links to the project accounts). VE will have to define the activity codes in the system to enable the proper recording of transactions. The activity codes and the accounting treatment for project transactions should be included in VE project financial manual.

Since VE is a commercial entity the project cost will show the net cost without VAT. VAT is anyway refundable to VE and therefore it does not constitute a real cost for VE.

Financial Monitoring Reports (FMRs) will be used for project monitoring and supervision and the indicative formats of these will be included in the VE accounting manual. VE will be producing a full set of FMRs every three months throughout the life of the project. Draft formats of these FMRs will be finally agreed upon after negotiations and prior to Board presentation.

### ***Information Systems***

In January 2003 VE launched a new Management Information System including the accounting system. The new system gives the possibility to create separate activity codes and dimensions for the project. In addition it is possible to upgrade the system for keeping the record of the physical measures and for automatic generation of the required project reports.

### ***Disbursement Arrangements***

During negotiations (April 2003), VE indicated that it will need no Special Account. The GEF funds will be disbursed under the Bank's direct reimbursement method against invoices paid to contractors for supply and installation of equipment (with a disbursement rate ratio of 25% as most of the payment to the contractors would be covered by VE itself). All withdrawals are expected to be above the SOE thresholds and will be made against presentation of full documentation relating to those expenditures. There is no plan to move to periodic disbursements. Since VE is a commercial entity the project cost will show the net cost without VAT. VAT is anyway refundable to VE and therefore it does not constitute a real cost for VE.

### ***Action Plan for VE***

As noted earlier, the financial management arrangements of the project should be strengthened before the negotiations and the Board Presentation.

Agreed Action Plan for VE to strengthen the financial management system before the Board Presentation.

	Action	Responsibility	Deadline
1	Identification of Project Team responsible for managing the Project. Updating the job description for the staff involved in the project.	VE	April 5, 2003
2	Inputting new activity codes for project in accounting system.	VE	March 31, 2003
3	Preparation of FMR formats according to the Project specifications.	VE	April 5, 2003
4	Preparation of accounting and financial procedures	VE	April 5, 2003

	manual for the project.		
5	Submission of the VE audit report for 9 months of 2002 and management letter.	VE	March 31, 2003

## II. VILNIUS CITY MUNICIPALITY PART

### *Strengths*

There are no significant strengths of the project financial management system.

### *Weaknesses*

Due to the fact that implementation of VCM components will be implemented with the assistance of a Fund Manager yet to be hired, the assessment was limited to VCM and aimed at ensuring that adequate eligibility criteria and disbursement conditions should be included in the TOR and other legal documents including GEF grant, negotiation minutes.

### *Implementing Entity*

Vilnius City Municipality is a local government body which has the right of an administrative unit of the territory of the State to manage the affairs freely and independently in accordance with the Constitution and laws of the republic of Lithuania via a municipal council consisting of representative directly elected by the population, as well as via executive institutions formed by the municipal council. The Parliament of the Republic of Lithuania ratified the European Charter of Local Self-Government on May 25, 1999.

On April 17, 2002, Standards & Poor's granted the city of Vilnius the rating triple B minus. Standards & Poor's pointed out that this rating reflects Vilnius' service-driven economy and its position as Lithuania's engine for growth as well as the stabilized relationship between the local and central authorities, the city's stable financial performance, and its low debt. However the city's limited financial autonomy and flexibility, need for vast improvement in infrastructure, and constrained liquidity was also taken into account.

The Municipality will be overall responsible for project implementation and coordination. Municipality will have to hire the Fund Manager to run the ECP commercial fund of USD 3 million on behalf of the Municipality. The Fund Manager will have to meet the eligibility criteria including also financial management requirements, i.e. maintaining proper financial management system including accounting, reporting and auditing. Under the contract the Fund Manager shall provide monthly and quarterly project reports, its annual audit report of the financial statement, and other information as required by the project auditor.

### *Funds Flow*

Project funds will flow from: (i) the Bank, either via a single Special Account which will be replenished on the basis of SOEs or by direct payment on the basis of direct payment withdrawal applications; or (ii) own contribution of VCM; (iii) contribution of final beneficiaries; (iv) commercial or other sources of co-financing. The GEF funds for the ECP Commercial Fund will be transferred to the special purpose account held in a reputable bank in the name of VCM

on the basis of invoices for eligible expenditures for energy saving investments (such as window replacement, insulation and repair works) implemented in homes. The Fund Manager will receive delegation for paying to the contractors on VCM's behalf. Then the Fund Manager will collect the repayments from the homeowners, accumulating them in a separate account of the ECP Commercial Fund, to be used for further energy efficiency investments on a revolving basis. The counterpart funds will be provided by VCM, final beneficiaries, commercial banks, bilateral sources, etc.



See the diagram in this Annex for a tentative project flow of funds for VCM.

### ***Staffing***

Staff responsible for finance and accounting assigned for the project by VCM include three persons who have adequate educational background and experience.

The Fund Manager financial staff will have to meet the criteria included in TOR.

### ***Accounting Policies and Procedures***

The accounting books and records are maintained on modified cash basis and project financial statements will be presented in EUR and LTL. VCM has in place a set of accounting procedures and internal controls including authorization and segregation of duties, however, the existing procedures are not presented in written form.

The VCM will have to prepare project financial-accounting manual including the procedures, roles and the responsibilities of the staff, accounts used for the project accounting, typical accounting treatment, the agreed formats of the FMR, TOR for project audit.

### ***Internal Audit***

There is internal control department in VCM which reports directly to the Mayor. Council decides what actions should be taken as a results of the findings.

### ***External Audit***

For the part implemented by VCM, the two sets of audit reports are required: for Fund Manager entity financial statement and for project financial statement. The project auditing arrangements will include the project financial statements, SOEs, Special Account and Commercial Fund. The standard terms of reference was transferred to VCM, which will be used for the project. The audit of the project will be conducted by independent private auditors acceptable to the Bank, on terms of reference acceptable to the Bank, and procured by VCM through the Least-Cost Selection procurement process if the audit is financed from the GEF grant. The annual audited project financial statements will be provided to the Bank within six months of the end of each fiscal year and also at the closing of the project. The contract for the audit awarded during the first year of project implementation and thereafter extended from year-to-year with the same auditor, subject to satisfactory performance.

The following chart identifies the audit reports that will be required to be submitted by the project implementation agency together with the due date for submission.

<b><i>Audit Report</i></b>	<b><i>Due Date</i></b>
Entity – Fund Manager	Within six months of the end of each fiscal year and also at the closing of the project
ECP Commercial Fund	Within six months of the end of each fiscal year and also at the closing of the project
Project/SOE	Within six months of the end of each fiscal year and also at the closing of the project
Special Account	Within six months of the end of each fiscal year and also at the closing of the project
Other (specify) Management Letter should be issued both for entity and Project	As above

### ***Reporting and Monitoring***

The VCM information system enables to create separate activity codes for the recording the project transactions. It is possible to generate the trial balance of the project or even the report in ready to use graphical form (after defining the links to the project accounts). VCM will have to define the activity codes in the system to enable the proper recording of transactions.

Financial Monitoring Reports (FMRs) will be used for project monitoring and supervision and the indicative formats of these will be included in the VCM accounting manual. VCM will be producing a full set of FMRs every three months throughout the life of the project. Draft formats of these FMRs will be finally agreed upon after negotiations and prior to Board presentation. VCM will report on components for which it is responsible including ECP Commercial Fund. VCM will be responsible for monitoring of the Fund Manager and the consolidation of the reports received from Fund Manager into the one consolidated FMR to be prepared by VCM.

### ***Information Systems***

In 2000 VCM launched new information system including the accounting system. This system gives the possibility to create separate activity codes and dimensions for the project. However, the Fund Manager will be obliged to maintain the Loan Administration System which enables preparation of the financial statements of the fund in accordance with the International Accounting Standards.

### ***Disbursement Arrangements***

The GEF funds will be disbursed under the Bank's traditional procedures including SOEs and direct payments to suppliers as appropriate. Supporting documentation for SOEs, including completion reports and certificates, will be retained by the Borrower and made available to the Bank during project supervision. Disbursements for expenditures above the SOE thresholds will be made against presentation of full documentation relating to those expenditures. There is no plan to move to periodic disbursements.

VCM will open and manage a Special Account (SA) and account for ECP Commercial Fund specifically for this project, in a bank acceptable to the Bank, including appropriate protection against set-off, seizure and attachment in the case of a commercial bank. Withdrawal applications for the replenishments of the SA will be sent to the Bank monthly or at least every three months regardless of the activity during the period or size of the Special Account. Replenishment applications must include reconciled, detailed bank statements as well as other appropriate documents (e.g. SOE or source documentation). The bank statement must indicate both the opening and closing balance of the Special Account for the period covered by the expenditures claimed, and likewise, indicate all transactions and activity on the account during the period. The reconciliation statement must also explain any discrepancies (surplus or shortage of funds) and the status of any previously deducted expenditures. In case there is no need for replenishment of the Special Account the application should be also sent on at least quarterly basis with the indication that no replenishment is needed and the application is sent for recovery of the Special Account. Such recovered amount can be later requested for replenishment with a new application without any additional SOE.

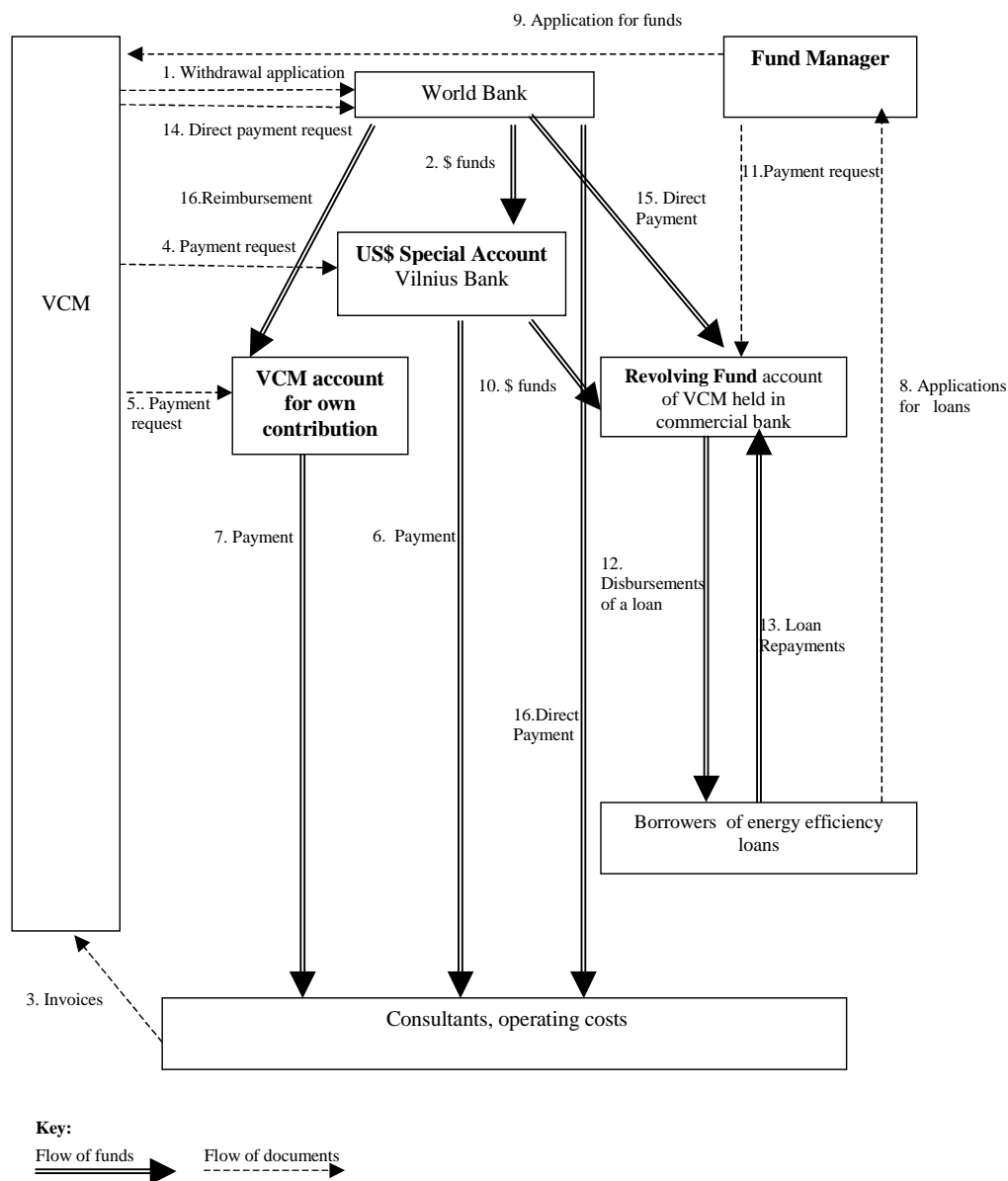
The interest earned on the Special Account will be at disposal of VCM, however it should be used for the project.

***Action Plan***

Agreed Action Plan for VCM to strengthen the financial management system before the Board Presentation:

	Action	Responsibility	Deadline
1	Preparation of FMR formats according to the Project specifications.	VCM	March 31, 2003
2	Submission of the VCM annual financial statement (balance sheet, income & expenditures) and the audit report for 2002 prepared by the Municipality Controller.	VCM	April 30, 2003
3	Preparation of accounting and financial procedures manual for the project including internal control procedures, roles and responsibilities of the VCM and Fund Manager, flow of funds in the project, the reporting requirements, auditing requirements, chart of accounts used for the project, TOR for project audit.	VCM	April 15, 2003
4	Inputting new activity codes for project in accounting system enabling for maintaining separate records of the project transactions.	VCM	April 15, 2003
5	Defining the reporting module in the system for automatic generation of the FMR and SOE	VCM	April 15, 2003
6	Training of the financial accounting staff in WB disbursement and financial management procedures in ILO training center.	VCM	June 2003

## Proposed Sequence and Flow of Documents and Funds for VCM



Step	Description
1-2	<b>Replenishment of Special Account.</b> As required (normally monthly at least on quarterly basis), the Chief Accountant prepares a withdrawal application together with relevant supporting information - SOE listings for expenditures below the prior review thresholds and full documentation details for expenditures greater than the prior review thresholds. The withdrawal application is then reviewed and approved by the VCM management authorized to sign the payment document before it is sent to the WB Loan Department for the replenishment of the Special Account.
3-7	<b>Purchases.</b> The purchases are approved by the relevant unit. After the provision of the subject of contract (works, goods, services) the relevant purchasing unit also confirms the compliance with the contract and the receipt. The Accountant confirms the accuracy of the invoice. The payment is

	<p>authorized by the purchasing unit responsible for the budgeted funds. Payments are effected in two ways, depending upon the source of financing:</p> <p>(i) from WB funds – a bank payment order from the relevant SA is prepared and funds are transferred from the SA to the transfer account to meet with VCM funds to make one payment to contractor.</p> <p>(ii) from VCM funds – this option can be utilized if the VCM would like to pre-finance the GEF share and then seek reimbursement either form Special Account or directly from the WB.</p> <p><b>Note 1:</b> GEF funds are not used to pre-finance VCM contributions.</p> <p><b>Note 2:</b> Transit Account – the Transit Account is used for converting US\$ funds from the various special accounts into the currency of payment to contractor and to consolidate the funds from GEF and VCM to make one payment to contractor; therefore, GEF funds are not kept in the Transit Account except for very brief periods of time.</p>
8-13	<p><b>Financing of the loans from revolving ECP Commercial Fund</b> - The GEF funds for will be transferred to the account of the ECP Commercial Fund on the basis of the approved loan applications. The Fund Manager will receive delegation for use of the funds for the active loans. Then the ECP Commercial Fund will be replenished with repayments and other revenues according to the contract.</p>
14-16	<p><b>World Bank Direct Payments.</b> Direct Payment requests are sent from the VCM to the World Bank Loan Department when circumstances require. The payment request is prepared on Form 1903 and authorized as for normal Withdrawal Applications (see above). The World Bank makes direct payment to the suppliers as directed. The similar method is also used to reimburse for the expenditures pre financed by VCM. However in this case the World Bank will make the payment directly to the VCM bank account (16).</p>

## 2. Audit Arrangements

See above

## 3. Disbursement Arrangements

See above

### Allocation of grant proceeds (Table C)

#### VCM-implemented Part

	Category	Amount of the GEF Grant Allocated (US\$)	% of Expenditures to be Financed
(1)	DSM Measures (financed by the ECP Commercial Fund)		80%
	(a) Phase I (before midterm review)	1,500,000	
	(b) Phase II (after midterm reivew)	1,500,000	
(2)	Commercial Fund Management Services	500,000	82%
(3)	Consultants' Services	400,000	82%
(4)	Incremental Operating Costs	100,000	82%
<b>TOTAL:</b>		<b>4,000,000</b>	

**VE-implemented Part**

	Category	Amount of the GEF Grant Allocated (US\$)	% of Expenditures to be Financed
(1)	AL DSM Equipment Supply and Installation (financed by the ECP Subsidy Fund)		
(a)	Phase I (before midterm review)	1,250,000	25%
(b)	Phase II (after midterm review)	1,250,000	25%
<b>TOTAL:</b>		<b>2,500,000</b>	

In both cases, the major investment component is split into two portions - Categories 1(a) and 1(b), with disbursement conditions triggering the release of funds for the second portion. The conditions are described in Section G as well as in the Grant Agreements. The mid-term review separating the respective phases of project implementation is planned for June 2006.

**Annex 7: Project Processing Schedule**  
**LITHUANIA: Vilnius Heat Demand Management GEF Project**

<b>Project Schedule</b>	<b>Planned</b>	<b>Actual</b>
<b>Time taken to prepare the project (months)</b>	12	30
<b>First Bank mission (identification)</b>		10/01/2000
<b>Appraisal mission departure</b>		03/03/2003
<b>Negotiations</b>	04/14/2003	04/14/2003
<b>Planned Date of Effectiveness</b>	10/01/2003	

**Prepared by:**

ECSIE

**Preparation assistance:**

Procurement: Snezana Mitrovic, Leonid Vanian, Elzbieta Sieminska.

Legal: Nightingale Rukuba-Ngaiza;

Disbursement: David Freese.

**Bank staff who worked on the project included:**

<b>Name</b>	<b>Speciality</b>
Victor Loksha (ECSIE)	Task Team Leader
Gailius Draugelis (ECSIE)	Institutional Analysis, Housing Sector Issues
Gary Stuggins (EWDEN)	Energy Policy Specialist, ex-TTL
Peter Kelly	Consultant, Financial Analysis
Iwona Warzecha (ECSPS)	Financial Management Specialist
Atro Nuorkivi	Consultant, District Heating and Power Specialist



**Annex 8: Documents in the Project File\***  
**LITHUANIA: Vilnius Heat Demand Management GEF Project**

**A. Project Implementation Plan**

Financial operations manual prepared by VE.

**B. Bank Staff Assessments**

Environmental Management Plan (in InfoShop); Incremental Cost Analysis (model in Excel); Financial model of ECP operation.

**C. Other**

Feasibility studies by AF-International, Sweden, 4 volumes.

\*Including electronic files

**Annex 9: Statement of Loans and Credits**  
**LITHUANIA: Vilnius Heat Demand Management GEF Project**  
26-Mar-2003

Project ID	FY	Purpose	Original Amount in US\$ Millions		Cancel.	Undisb.	Difference between expected and actual disbursements <sup>a</sup>	
			IBRD	IDA			Orig	Frm Rev'd
P070112	2002	EDUC IMPRVMT	25.39	0.00	0.00	30.45	6.17	0.00
P035780	2000	HEALTH	21.24	0.00	0.00	13.44	3.00	0.00
P035776	2000	KLAIPEDA PORT	35.36	0.00	0.00	14.38	6.35	0.00
P035802	1999	MUNICIPAL DEV'T.	20.10	0.00	0.00	7.48	3.88	0.00
P008539	1997	SOC POL COMM SERV	3.70	0.00	0.00	1.04	1.04	0.00
Total:			105.79	0.00	0.00	66.78	20.43	0.00

LITHUANIA  
STATEMENT OF IFC's  
Held and Disbursed Portfolio  
Jun 30 - 2002  
In Millions US Dollars

		Committed				Disbursed			
		IFC				IFC			
FY Approval	Company	Loan	Equity	Quasi	Partic	Loan	Equity	Quasi	Partic
2000	Drobe Wool	5.89	0.50	0.00	0.00	3.59	0.50	0.00	0.00
1999	Ekranas	11.71	0.00	2.18	0.00	11.71	0.00	2.18	0.00
2002	Hotel Lietuva	9.93	0.00	0.00	9.93	0.00	0.00	0.00	0.00
0	Margarino	0.26	0.00	0.00	0.00	0.26	0.00	0.00	0.00
1999/01	Vilniaus Bankas	0.00	0.00	21.84	0.00	0.00	0.00	21.84	0.00
Total Portfolio:		27.79	0.50	24.02	9.93	15.56	0.50	24.02	0.00
		Approvals Pending Commitment							
FY Approval	Company	Loan	Equity	Quasi	Partic				
Total Pending Commitment:		0.00	0.00	0.00	0.00				

## Annex 10: Country at a Glance

### LITHUANIA: Vilnius Heat Demand Management GEF Project

POVERTY and SOCIAL		Europe & Central Asia	Upper-middle-income
	Lithuania	Asia	
2001			
Population, mid-year (millions)	3.5	475	504
GNI per capita (Atlas method, US\$)	3,290	1,960	4,460
GNI (Atlas method, US\$ billions)	11.5	930	2,248
Average annual growth, 1995-01			
Population (%)	-1.1	0.1	1.3
Labor force (%)	0.1	0.6	1.8
Most recent estimate (latest year available, 1995-01)			
Poverty (% of population below national poverty line)	..	..	..
Urban population (% of total population)	69	63	77
Life expectancy at birth (years)	73	69	71
Infant mortality (per 1,000 live births)	9	20	24
Child malnutrition (% of children under 5)	..	..	9
Access to an improved water source (% of population)	67	90	87
Illiteracy (% of population age 15+)	0	3	10
Gross primary enrollment (% of school-age population)	101	102	127
Male	102	103	128
Female	99	101	126

Development diamond\*

Life expectancy

GNI per capita

Gross primary enrollment

Access to improved water source

Lithuania

Upper-middle-income group

KEY ECONOMIC RATIOS and LONG-TERM TRENDS					
	1981	1991	2000	2001	
GDP (US\$ billions)	..	14.8	11.3	12.0	
Gross domestic investment/GDP	..	24.3	20.5	21.5	
Exports of goods and services/GDP	..	29.6	45.3	50.4	
Gross domestic savings/GDP	..	33.0	14.1	16.1	
Gross national savings/GDP	..	..	14.6	16.8	
Current account balance/GDP	..	..	-6.0	-4.8	
Interest payments/GDP	..	0.0	1.9	1.6	
Total debt/GDP	..	0.1	43.0	43.9	
Total debt service/exports	..	..	19.6	30.1	
Present value of debt/GDP	..	..	39.6	..	
Present value of debt/exports	..	..	84.4	..	
	1981-91	1991-01	2000	2001	2001-05
(average annual growth)					
GDP	..	-0.9	3.8	5.9	5.2
GDP per capita	..	-0.2	4.5	6.4	3.3
Exports of goods and services	..	5.8	9.0	20.8	6.1

Economic ratios\*

Trade

Domestic savings

Investment

Indebtedness

Lithuania

Upper-middle-income group

STRUCTURE of the ECONOMY				
	1981	1991	2000	2001
(% of GDP)				
Agriculture	..	16.7	7.9	7.1
Industry	..	50.7	32.5	34.9
Manufacturing	..	45.3	21.2	23.2
Services	..	32.5	59.7	58.0
Private consumption	..	56.3	64.5	63.8
General government consumption	..	10.8	21.4	20.1
Imports of goods and services	..	21.0	51.7	55.8
	1981-91	1991-01	2000	2001
(average annual growth)				
Agriculture	..	-0.3	4.9	-6.9
Industry	..	2.8	0.6	16.4
Manufacturing	..	4.4	8.8	18.0
Services	..	4.3	5.4	2.6
Private consumption	..	5.2	4.6	3.0
General government consumption	..	0.5	-0.7	0.4
Gross domestic investment	..	6.4	-9.7	19.5
Imports of goods and services	..	7.4	4.5	17.7

Growth of investment and GDP (%)

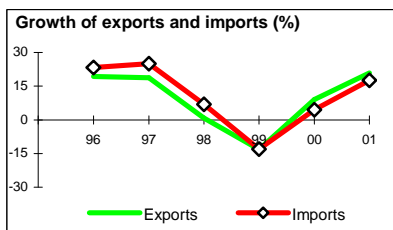
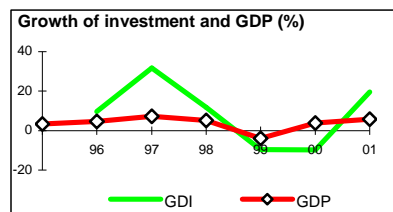
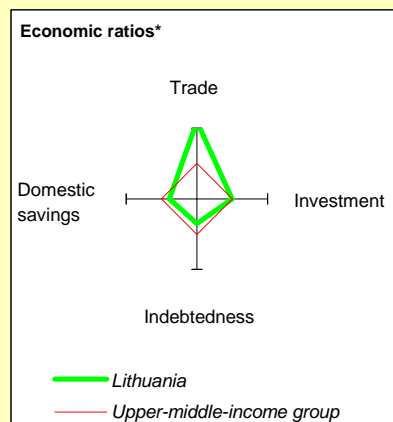
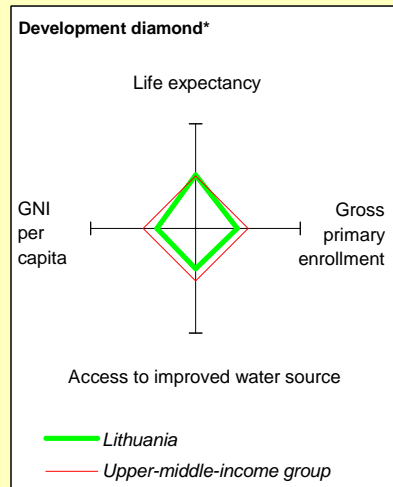
GDI

GDP

Growth of exports and imports (%)

Exports

Imports

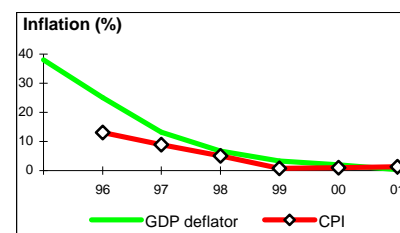


Note: 2001 data are preliminary estimates.

\* The diamonds show four key indicators in the country (in bold) compared with its income-group average. If data are missing, the diamond will be incomplete.

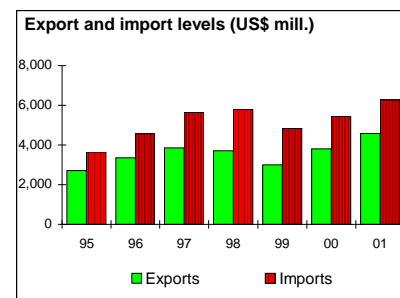
## PRICES and GOVERNMENT FINANCE

	1981	1991	2000	2001
<b>Domestic prices</b>				
(% change)				
Consumer prices	..	..	1.0	1.3
Implicit GDP deflator	..	228.3	2.0	0.4
<b>Government finance</b>				
(% of GDP, includes current grants)				
Current revenue	..	..	30.4	29.8
Current budget balance	..	17.3	-0.3	0.5
Overall surplus/deficit	..	12.5	-2.8	-1.9



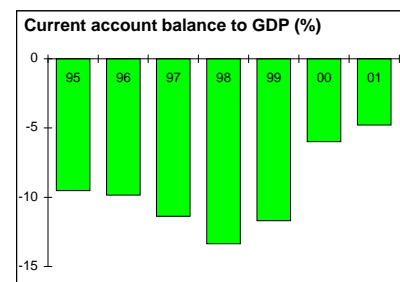
## TRADE

	1981	1991	2000	2001
(US\$ millions)				
Total exports (fob)	..	..	3,809	4,583
Mineral products	..	..	809	1,082
Agriculture and food	..	..	446	567
Manufactures	..	..	1,621	1,947
Total imports (cif)	..	..	5,457	6,282
Food	..	..	363	375
Fuel and energy	..	..	1,185	1,402
Capital goods	..	..	684	897
Export price index (1995=100)	..	..	110	107
Import price index (1995=100)	..	..	98	95
Terms of trade (1995=100)	..	..	112	113



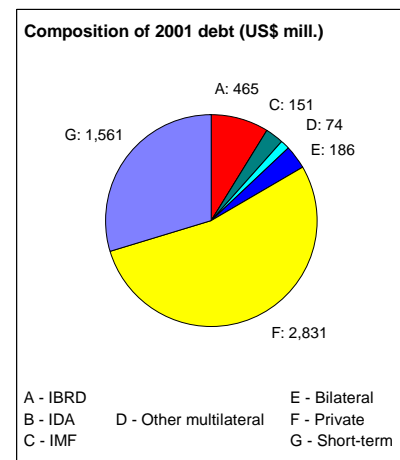
## BALANCE of PAYMENTS

	1981	1991	2000	2001
(US\$ millions)				
Exports of goods and services	..	..	5,109	6,046
Imports of goods and services	..	..	5,833	6,697
Resource balance	..	..	-724	-651
Net income	..	..	-194	-180
Net current transfers	..	..	243	258
Current account balance	..	..	-675	-574
Financing items (net)	..	..	806	899
Changes in net reserves	..	..	-131	-325
<b>Memo:</b>				
Reserves including gold (US\$ millions)	..	..	1,359	1,669
Conversion rate (DEC, local/US\$)	..	2.80E-2	4.0	4.0



## EXTERNAL DEBT and RESOURCE FLOWS

	1981	1991	2000	2001
(US\$ millions)				
Total debt outstanding and disbursed	..	22	4,855	5,268
IBRD	..	..	253	465
IDA	..	..	0	0
Total debt service	..	1	1,039	1,880
IBRD	..	..	24	27
IDA	..	..	0	0
Composition of net resource flows				
Official grants	..	..	63	35
Official creditors	..	..	44	134
Private creditors	..	..	269	-15
Foreign direct investment	..	..	375	439
Portfolio equity	..	..	120	-15
World Bank program				
Commitments	..	..	134	17
Disbursements	..	..	66	40
Principal repayments	..	..	9	13
Net flows	..	..	57	27
Interest payments	..	..	15	14
Net transfers	..	..	42	13



## **Additional GEF Annex 11: Incremental Cost Analysis Summary**

### **LITHUANIA: Vilnius Heat Demand Management GEF Project**

#### **Scope of Analysis**

The incremental cost analysis implemented to justify the GEF support to the project focuses on the energy efficiency measures on the demand side. The energy savings are categorized as direct and indirect (or downstream) energy savings. The direct savings are due to investments within the scope of the project such as: (i) improvements to the apartment-level heating systems (thermostatically controlled valves and heat cost allocators) with simultaneous introduction of billing based on actual heat consumption by each apartment; and (ii) building-envelope improvements, including window replacement and better insulation of walls and roofs. These savings have been estimated in this analysis.

The indirect energy savings are due to additional benefits as a result of: (i) accelerated implementation of VE's core program of investments in the building-level substations (BLS) coming to replace the group (or block) substations with the simultaneous reconfiguration of the distribution network from a four-pipe system to a two-pipe one; (ii) accelerated implementation of VE's program of upgrading of old-type building-level substations by replacing of tube heat exchangers with plate heat-exchangers and introduction of automatic temperature control; (iii) savings due to avoided disconnections from the district heating system as it is believed that district heat is the most energy-efficient option in a high heat load density area such as Vilnius City; (iv) stimulating impact on the creation of a market of DSM equipment in Lithuania as a result of which, when the initial seed money from GEF and EEF is spent, the market price of DSM equipment and services will decrease to a level sufficient to enable broader introduction of DSM on a fully commercial basis; (v) demonstration effect of the project leading to its replication that results in further GHG reductions. Of these indirect savings, the first two have been estimated. The other three are believed to be similar or larger in magnitude but too difficult to quantify within the scope of this analysis.

The global environmental impact from the project is due to the fuel and associated GHG emission savings that would not have been feasible outside the framework of the project. The relationship with the supply-side of the district heating system is based on the impact of these savings on the heat production needs of the district heating company (VE). The costs of VE's program of investments in the generation capacities such as the CHP rehabilitation and the replacement of HOBs are considered not to be affected and remain outside the system boundary of the analysis.

The current fuel mix used by the district heating system (about 90% gas and 10% heavy fuel oil) is potentially subject to fluctuations depending on the relative prices for gas and oil products. However, both the project and the baseline (the "without-project" scenario) are subject to the same uncertainty in this respect and thus the impact of this variable on the incremental cost analysis is considered minimal.

#### **Baseline**

The baseline scenario is built on the assumption that VE would continue its operation in the conditions of a declining demand for its heat. The company would continue replacing group substations with building-level substations, but the progress of the program would be hampered by the lack of incentives for the homeowners to accept the replacements (as noted before, the heating bill would increase for the majority of the customers currently receiving heat from group substations - i.e., for 60% of the DH customers in Vilnius). This would result in the replacement of about 100 group substations by some

1,500 new building-level substations (in about 60% of the total number of buildings) by 2015. This estimate is somewhat higher than the VDHC's original plan to replace the group substations by 2015 (50%), but lower than the one under the GEF project scenario as the substation replacement program would still be passively resisted by a substantial number of customers. Higher replacement rates have been modeled as sensitivity analysis cases. The 50% success rate was based on experience over the past three years in substation replacements of about 3-5 group substations per year, each group substation being replaced with 15 building-level substations on average. In addition, 230 building-level substation upgrades (or about 10% of the potential total number) would be implemented by VE (and possibly other actors in the market) in the buildings currently supplied from old-type building-level substations without temperature control. The penetration of thermostatically controlled valves and heat cost allocators would be limited to 10% of the apartments of the City (most likely, concentrating in the homes of high-income families). Other demand-side energy conservation measures would also be practiced on a limited scale. Broader penetration of these measures would be constrained by the lack of incentives for such measures in the absence of individual billing and customer-controlled heat supply at the apartment level.

### **GEF Proposed Project**

The GEF project's objective is to reduce the emissions of greenhouse gases (GHG) from the Vilnius District Heating System through a targeted effort to remove the existing barriers to energy conservation. This would be achieved by means of introducing demand-side management (DSM) measures such as thermostatically controlled radiator valves and heat meters in Vilnius households to enable consumption-based billing at the individual apartment level, as well as building-envelope improvements to reduce energy losses from the residential housing stock supported by a specially created commercially sustainable (revolving) financial facility. As discussed above (under "Scope of Analysis"), besides direct emission reductions from these measures, additional benefits are expected through accelerated implementation of VE's core program of modernizing the heat exchanger substation network, through avoided disconnections from the district heating system, and through the impact on the market price of DSM equipment and services, which will decrease to a level sufficient to enable broader introduction of DSM on a fully commercial basis.

**VE-implemented Apartment-level DSM (AL DSM) component.** The barrier removal effort will begin with GEF's support to VE-implemented introduction of thermostatically controlled valves (TCV), heat cost allocators (HCA) and billing based on the actual consumption by each apartment. Thus, both the technical possibility and incentives will be created for the homeowners to save heat. It is envisaged that the AL DSM devices will first be introduced in 500-600 buildings over five years (2003-2007), and then VE's program will be expanded to a similar number of buildings in the following several years. The direct GHG savings from this intervention are estimated at about 240,000 tons of CO<sub>2</sub>. The indirect impacts could produce further emission reductions: (i) The active participation of the heat supplier in this heat demand management program would have a powerful demonstration effect and would set a replicable example for district heat suppliers elsewhere; (ii) The participation of other suppliers of AL DSM will be facilitated by reduced prices resulting from the initial push that the VE/GEF program will have on the market. These impacts are likely to produce similar or greater GHG emission reductions downstream than the direct reductions.

**Higher penetration rate of the VE-implemented substation modernization.** Surveys have shown that more customers are willing to accept the substation replacement program when it is combined with the improvements at the apartment-level (thermostatic valves and heat cost allocators), which enables billing based on the actual heat consumption by each apartment. Thus, the GEF support to the AL DSM component is expected to increase the penetration rate of the substation replacement program, resulting



in the replacement of a larger number of group substations than would be the case in the baseline scenario. In the project scenario, the replacement of 90% group substations currently owned by the City with about 2,260 new building-level substations would be completed by the year 2008. Lower replacement rates have been simulated in the sensitivity analysis. As a result of the faster and broader expansion of the substation modernization program, the losses in the heat supply networks will be reduced, with major fuel and GHG emission savings. The upgrades of the existing BLS to modern technology can also be expected to expand, with about 690 upgrades implemented by 2008. The simulation model predicts possible emission savings of up to 0.9 million tons of CO<sub>2</sub> over the period until 2020 due to the stimulating impact of the introduction of AL DSM on the substation modernization program.

**Demand-side management measures in buildings and apartments.** Once the building-level substations are installed, the customer-controlled mode of operation of the substations enables further energy savings in the buildings and in the apartments. These savings are only possible after the substation replacements and thus they depend, first of all, on the realization of the replacements. Further, the AL DSM and individual consumption-based billing enhance the incentives for energy saving. It is expected that the most basic energy conserving behavior (such as avoiding keeping the windows open when not necessary) would be practiced widely (in 80% of apartments in buildings where modern BLS are installed).

For further cost-effective measures (such as weatherization of windows and further expansion of the TCV and HCA installation program), it is expected that the VCM-contracted ECP Manager will offer its services paid for by the customers through a crediting scheme with the repayment fees going from the homeowners into the revolving Energy Conservation Fund (ECF). Measures with relatively high capital costs and longer payback (replacement of windows to install new energy-efficient windows; insulation of walls and roofs, etc.) would be demanded by the customers and supported by the ECP only if found commercially viable. From the customer's perspective, this would be the case inasmuch as the value derived from the investment (including savings on the energy bill) would justify the investment costs involved. In aggregate, emission savings of more than 0.6 million tons of CO<sub>2</sub> are expected over the period until 2020 as a result of the DSM measures in buildings and apartments.

The table below summarizes the projected direct impact of the energy efficiency measures in terms of CO<sub>2</sub> emission reductions achieved over the period until 2020 as a result of investments implemented under the project.

**Table A4-1. Estimated CO2 emission reductions due to the Project**

Energy Efficiency Measure	Rate of Penetration, %		Incremental Emission Reduction, kton CO2
	Baseline	Project	
BLS replacements	60%	90%	702
<i>Number of buildings</i>	1508	2262	
BLS upgrades	10%	30%	210
<i>Number of buildings</i>	231	693	
Thermostatic valves, balancing valves and allocators	10%	40%	238
Basic energy saving behavior (e.g., keeping windows closed)	40%	80%	158
Weatherization of windows	25%	50%	99
Energy-efficient windows	10%	30%	119
<b>TOTAL:</b>			<b>1526</b>

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## The Costs of Barrier Removal

The lack of acceptance of the VE-implemented substation replacement program by the homeowners is the main barrier to BLS penetration as the customers who do not introduce additional DSM measures are generally facing higher energy bills. This resistance, as well as the decentralized structure of ownership and decision-making lead to high transaction costs of obtaining the agreement to implement the needed investments. To stimulate the customer buy-in to the substation replacement program, VE will offer to the homeowners standard packages of heating system improvement (including TCV and HCA) at the apartment-level. To help VE bear the financial burden of these improvements and partially compensate VE for the possible loss of sales revenues resulting from these DSM improvements, the GEF is asked to provide US\$ 2.5 million designated for grants/subsidies under the Energy Conservation Program. The introduction of individualized billing for heat that will accompany the introduction of TCV and HCA will provide a further incentive to the homeowners to accept the BLS, without which the TCV and HCA would not be technically possible.

By utilizing the means of the subsidy fund of the ECP, VE also addresses another key barrier - that of the inability of many low-income consumers to pay the full price of the apartment-level DSM equipment that will make the whole system more efficient in the long run.

The GEF contribution of \$2.5 million would be provided on the condition of co-financing of the AL DSM program by VE at a high leveraging ratio (about 1:5). In the pilot phase starting in 2003, \$1.25 million from the GEF will leverage about US\$6 million from VE.

Another essential incremental cost component supported by GEF is the cost of administration of the Energy Conservation Program. This consists of the ECP management costs for the Municipality (US\$ 0.3 million) and the costs of services of the ECP management contractor (US\$ 0.5 million).

Finally, Monitoring Evaluation and Information Dissemination (US\$ 0.2 million) bring the total GEF grant amount (excluding the capital of the revolving fund) to US\$ 3.5 million:

Grant/capital subsidy for introduction of AL DSM	\$2.5 million
ECP Administration Costs to VCM	\$0.3 million
ECP Management Contractor's Fee	\$0.5 million
M&E and Information Dissemination	\$0.2 million
<b>TOTAL</b> Barrier Removal Costs (undiscounted)	<b>\$3.5 million</b>

These incremental cost components can be considered a barrier removal investment by the GEF. They address the barriers that stand in the way of deeper and broader market penetration of modern energy efficient technology.

**Energy Conservation Fund (ECF).** The revolving fund created from the customers' repayments for the VCM-administered part of the project would ensure the continuity of the Energy Conservation Program. By setting up a financial facility to support DSM investments by the customers, the Municipality addresses such a barrier as the lack of commercial credit for many customers who have no collateral against the risk of default.

The GEF funding through the ECP, as well as the money accumulated in the fund from the return cashflow from the homeowners, would be used to finance additional energy conservation measures. In this way, the Project will sustain the collaborative engagement of public authorities (the Municipality) and private participants in the market working together to promote a comprehensive heat demand management program for the Vilnius City.

## **Project investments**

### ***Substation investments***

The inclusion of the barrier removal measures estimated to cost about US\$3.5 million (without discounting) allows increasing the market penetration of the BLS technology. The relationship between the costs for barrier removal and the market penetration of BLS has not been quantified precisely, but the incremental cost model utilized for this analysis helps estimate the basic dimensions under certain working assumptions.

**Additional replacement of group substations with BLS and upgrades of old-type BLS.** The return on the marginal investment to replace group substations with BLS is about 16-19%. As noted above, the installation of some 1,500 BLS replacing group substations is considered part of the baseline scenario. Achieving a target of 2,260 substations would bring an additional reduction of CO<sub>2</sub> emissions by about 700,000 tons due to the additional network loss reductions (see Table A4-1 above). The upgrades of the existing BLS to modern technology can also be expected to expand. An increased penetration of the upgrades from 230 buildings to 690 buildings (10% and 30% of the market, respectively) brings emission reductions of about 210,000 tons of CO<sub>2</sub>.

Even though the rate of return is above the discount rate of 12%, the additional substation replacement investments (including the barrier removal costs) are considered part of the project costs rather than the baseline. The assumption of additionality of these costs rests on the following considerations: (i) the initial increase of the heat bill for 60% of the DH customers is a barrier for the acceptance of the program by the customers; (ii) the nature of the barrier removal measures makes them unlikely to be implemented outside the framework of the proposed project.

The high economic return on the substation investments should not mask the fact that, simultaneously with the reduced losses in the system, the introduction of modern BLS opens up the opportunities for the consumers to reduce heat consumption and thus heat sales for VE - particularly, when coupled with individual billing and the introduction of TCV and HCA in the apartments. Even the most basic demand-side conservation measures are estimated to reduce the DH company's sales by US\$ 10 - 15 million in terms of present value (assuming that the company has no possibility to compensate for this loss by raising the tariff).

It should be noted that no direct investment of GEF resources is envisaged for the replacement of group substations, and the expanded penetration of this market is expected only due to the barrier removal activities described above.

### ***VE-implemented Apartment-Level DSM measures (TCV and HCA)***

240,000 tons of additional CO<sub>2</sub> emission reduction can be achieved by a 40% penetration of thermostatically controlled valves and heat cost allocators into the homeowners' market (against a baseline of 10% penetration). There is a synergy between these measures and the substation modernization program since: (i) these measures only become technically possible after the introduction of BLS; (ii) the possibility of demand-side conservation is an important factor contributing to the acceptance of the substation replacements by the homeowners. As shown above, the project may allow the possibility of expanding the penetration of BLS from 1,500 to 2,260 (90% of the buildings currently served from group substations) and an increased penetration of the BLS upgrades from 230 buildings to 690 buildings, resulting in some 910,000 tons of CO<sub>2</sub> abatement until the year 2020.

### ***Basic energy conservation measures at the apartment level***

No-cost and low-cost apartment-level measures at the apartment level are expected to be practiced more widely due to the introduction of individual heat consumption accounting accompanying the introduction of TCV and HCA. No-cost measures such as avoiding keeping the windows open when not necessary are expected to be practiced in the majority of households (80% penetration) eliminating about 160,000 tons of CO<sub>2</sub> relative to the baseline of 40% penetration of these measures. Low-cost measures such as weatherization of windows (e.g., refurbishment of window frames and applying durable tape to the perimeter) are projected to expand from 25% to 50% penetration, bringing an additional reduction of about 100,000 tons of CO<sub>2</sub>.

### ***Further apartment-level and building-level investments***

Further carbon savings can be realized on the next level of the demand-side management program, which will be supported through the crediting scheme administered by VCM. By achieving a market penetration of 30% for energy-efficient windows (against a baseline of 10% penetration), a further 120,000 tons of CO<sub>2</sub> can be saved. Finally, more capital-intensive building-envelope investments (such as insulation of walls and roofs), if they reach a penetration rate of 25% (against a baseline of 10%), can save another 150,000 tons of CO<sub>2</sub>. The latter investments, however, have not been included in the estimates below as their financial profitability is marginal.

## **Unit Abatement Costs**

**The unit abatement costs (UAC)** resulting from the described investments and GHG reductions are summarized below. The unit abatement cost of the Project can be represented in three different ways. As

shown below, the economic value of the unit abatement cost is negative at US\$ -5.24 per ton of carbon equivalent (tCe), consistent with the nature of the GEF Operational Program 5, which supports "win-win" energy efficiency projects through barrier removal. On the other hand, the UAC can be calculated as a ratio of GHG reductions to the size of the GEF resources utilized for the project. Then, if the entire GEF budget for the project is treated as a cost, the UAC equals US\$15.62/tCe. However, it should be kept in mind that less than half of this would be provided on a grant basis, with the remainder being extended on a commercial basis with an obligation to repay into the revolving fund. If the commercial part of the GEF contribution is netted out, the UAC for GEF can be calculated as US\$8.41/tCe.

<b>Costs (discounted at 12%)</b>		<b>Baseline</b>	<b>Project</b>	<b>Increment</b>
Investments	US\$ 000	13,709	40,585	26,877
Fuel	US\$ 000	275,079	243,634	-31,445
O&M	US\$ 000	13,632	12,480	-1,151
Transaction costs	US\$ 000	448	1,012	564
Barrier removal	US\$ 000	0	2,977	2,977
<b>Total cost</b>	<b>US\$ 000</b>	<b>302,867</b>	<b>300,688</b>	<b>-2,179</b>

		<b>Baseline</b>	<b>Project</b>	<b>Increment</b>
<b>Emissions:</b>	kton CO2	12,364	10,838	-1,526
	ktCe	3,372	2,956	-416
<b>Unit Abatement Costs:</b>	US\$/tCO2			-1.43
	US\$/tCe			-5.24

**GEF Unit Abatement Cost (based on GEF contribution):**

Based on full amount of GEF grant	US\$/tCO2	4.26
	US\$/tCe	15.62
Based on the amount of GEF grant net of "commercial" part	US\$/tCO2	2.29
	US\$/tCe	8.41

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**Table 1. Incremental Cost Matrix /Benefit Analysis Summary**

	<b>Proposed Project</b>	<b>Base</b>	<b>Increment</b>	<b>Benefits/Impacts from Incremental Project</b>
				1) Domestic; 2) Global
Benefits/Impacts	2,260 building-level substations (BLS) with customer-controlled operation replacing 150 group substations by 2008	1,500 building-level substations replacing 100 group substations by 2015	More than 760 additional building-level substation replacements	1) Fuel cost savings of about US\$ 1.5 million due to reduced heat network losses;  Cost savings of about US\$ 0.5 million for O&M for substations  2) CO2 emission reduction

				of about 700 kton
	30% penetration of market for substation upgrades (690 building-level substations) by 2008	Less than 10% penetration of market for substation upgrades (230 building-level substations) by 2015	More than 460 additional building-level substations replacements	1) Fuel cost savings of about US\$ 5 million due to reduced heat network losses;  Cost savings of about US\$ 0.2 million for O&M for substations  2) CO2 emission reduction of 210 kton
	80% incidence of basic demand-side energy conservation behavior in 2,960 residential buildings	40% incidence of basic demand-side energy conservation behavior in 1,740 residential buildings	Basic demand-side energy conservation behavior in more than 65,000 additional apartments	1) Fuel cost savings of US\$ 3 million due to reduced consumption of heat in buildings  2) CO2 emission reduction of 160 kton
	Apartment-level heat meters and thermostatic valves in 1,500 residential buildings by 2010	Apartment-level heat meters and thermostatic valves in about 300 residential buildings by 2010	Heat meters and thermostatic valves in about 48,000 additional apartments	1) Fuel cost savings of US\$ 5.6 million due to reduced consumption of heat in buildings  2) CO2 emission reduction of 240 kton
	50% penetration of weatherization of windows in 2,960 residential buildings	25% penetration of weatherization of windows in 1,740 residential buildings	Weatherization of windows in about 40,000 additional apartments	1) Fuel cost savings of US\$ 2 million due to reduced consumption of heat in buildings  2) CO2 emission reduction of 100 kton
	30% penetration of new energy-efficient windows in 2,960 residential buildings	10% penetration of new energy-efficient windows in 1,740 residential buildings	New energy-efficient windows in more than 30,000 additional apartments	1) Fuel cost savings of US\$ 2.5 million due to reduced consumption of heat in buildings  2) CO2 emission reduction of 120 kton
	WB/GEF support to VE-implemented modernization of the Vilnius district heating system	VE-implemented modernization of the Vilnius district heating system - mostly at the supply network and building level	Extension of customer control over heat supply beyond the building level and onto the apartment level  Consumption-based billing for heat in a	1) Better quality DH service for the homeowners  Customer-controlled operation reduces the cost of DH services for the homeowners

			substantial number of buildings enhances incentives for homeowners to save heat	Stronger long-term financial position of VE as a result of a consolidated customer base  2) GHG emission benefits due to increased market penetration of modern technology for space heating and demand-side energy conservation in Vilnius
	Establishment of the Energy Conservation Program	No Energy Conservation Program at the City level	Availability of financial and technical assistance to homeowners  Better awareness of the homeowners about the benefits of energy conservation and options available to them	1) Access to financing and reduced transaction costs for the homeowners interested in implementing energy-conservation measures in their homes  2) GHG savings as described above, plus potential GHG savings downstream as result of reduced costs and demonstration effect
Global Emissions: (thous. ton CO2) (thous. tCe)	10,838 2,956	12,364 3,372	-1,526 -416	
Costs (\$000), discounted at 12%:				
Investment	40,585	13,709	26,877	
Fuel	243,634	275,079	-31,445	
O&M	12,480	13,632	-1,151	
Transaction costs	1,012	448	564	
Barrier removal costs	2,977	-	2,977	
Total (\$000):	300,688	302,867	-2,179	
Unit Abatement Cost: US\$/tCO2 US\$/tC			-1.43 -5.24	
Unit Abatement Cost for GEF (based on the full grant of US\$6.5m including the commercial fund):  US\$/tCO2 US\$/tC			4.26 15.62	
Unit Abatement Cost for GEF (based on the net grant of				

US\$3.5m):				
US\$/tCO <sub>2</sub>			2.29	
US\$/tC			8.41	

### Sensitivity Analysis

The impact of the following variables has been considered:

- Price of natural gas
- Various numbers of substation replacements and upgrades in the Project and Baseline scenarios
- Costs per unit of equipment installed
- Various levels of penetration of building- and apartment-level DSM measures

An increase in the price of natural gas increases the economic return on the proposed investments. However, it would take a much higher price for natural gas to change the ranking of the investments. The analysis shows that the investments for which the economic return decreases with an increasing scale (penetration level) remain so even when substantially higher shadow prices are assigned to natural gas. Conversely, the investments which increase the economic return at the margin do so even at the current level of gas price (US\$83.8 per thousand cubic meters for CHP plants of the district heating system). The capital-intensive demand side measures belong to the former category of investments, while substation replacements represent the latter.



**Additional GEF Annex 12: STAP Roster Technical Review  
LITHUANIA: Vilnius Heat Demand Management GEF Project**

**STAP Review and Response of the Project Team**

**7 March 2001**

**STAP REVIEW OF:**

**Project Brief of 2 March 2001**

**Vilnius District Heating Project**

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The review is based on the Project Brief dated 2 March 2001 and familiarity with the project based on an earlier review of a Project Concept Note. The issues raised in the review of the Project Concept Note have been adequately addressed in the Project Brief and in the response of the Project Team.

**Summary/Conclusion**

The total project is relevant and justified. The GEF component is particularly important and valuable in that it addresses end-use energy efficiency and the transformation of VDHC into an energy services company. Without the GEF component, the technical performance of VDHC would improve, but not necessarily the overall business performance and longer term commercial viability of the company.

**General comments and observations**

The Project Concept Note review concluded that the project is relevant, justified and should be given high priority. The same can be concluded for the Project Brief. The project adequately meets or addresses basic requirements and issues, for example:

- It is clearly relevant and should be given high priority
- Objectives are valid and clearly stated
- Adequate background and justification is provided
- The situation is well analyzed and understood
- Activities and institutional arrangements are adequate and balanced
- Sustainability, replicability and innovativeness is satisfactory
- It is consistent with GEF objectives

These and other issues were assessed in the review of the Project Concept Note. Given that the Project Brief meets such basic requirements, this review is limited to making some general observation that may be useful in finalizing the proposal and for the implementation of the project.

One of the greatest challenges in the project is probably to transform VDHC into a business and customer oriented energy services company in a reformed energy market. DSM measures will, of course, be seen by VDHC as a "cannibal", reducing energy sales and income (incidentally, energy efficiency services may be a better term than DSM which is often associated with energy efficiency and load management in regulated monopoly markets). However, unless VDHC develop the energy (efficiency) services market on its own or in partnership with another company, other actors will (for a U.S./Western Europe parallel see for example Enron Energy Services activities, or Siemens Landis&Staefa's performance contracting concept).

The local VDHC, World Bank and SIDA financing is mainly targeted at areas that are within the traditional business of VDHC (supply side improvements) and will improve technical performance. The GEF financing thus constitutes a very important complement targeting mainly investments that are relevant to end-use energy efficiency and promoting the transformation of VDHC into an energy services company. USD 2.5 million is allocated to technical assistance in the areas of Marketing, Outreach, and Education, and Training for Market Analysis, Measurement and Evaluation. A large part of this will be used for aiding or promoting the transformation of VDHC.

#### **Detailed comments and observations**

Present and future fuel for the CHP and HOBs is not explicitly discussed but understood to be natural gas? Has the prospects and potential for alternative fuels and fuel switching, now or in the future, been explored (biofuels, biogas, energy from waste)?

Should (has?) micro-CHP be considered instead of one or several of the Heat Only Boilers, perhaps mainly for the purpose of demonstrating new technology?

The development of more complex tariffs is mentioned (page 26). Please note that a tariff with a large share of fixed charges will discourage end-use energy efficiency.

Page 11: EEHPP used first time but not spelled out here.

Page 13: VDHC could become the supplier of heat for the 8 small communities in its future role as an energy services company?

Page 13: "The project will assist VDHC to make the transition from being part of a centrally-directed monopoly to being a commercial provider of heat in a competitive marketplace." It would be better yet if VDHC becomes a commercial provider of energy services (including efficiency services, e.g., outsourcing, performance contracting, etc.). Then VDHC need not exit from areas where DH does not have an advantage, but be a supplier of heat (and other services) based on other supply technology.

Page 27: "SODRA" is not defined.

Page 33: Subsidies kick-in at supply cost exceeding 20% of income. At 25% of income according to page 3. Which is correct?

Project results and experience may be valuable input to Joint Implementation discussions? Not mentioned.

I would like to reiterate (from the Concept Note review) the value and importance of involving relevant academic institutions, for the purpose of capacity building.

#### **Response of the Project Team to the STAP Review of 07-Mar-01**

The project team appreciates the comments and conclusions made in the first two sections of the review. We feel that your review has been excellent and insightful. The observation that, unless VDHC itself becomes active in the energy efficiency market, other actors will, is precisely on target. The "mission" of the ECF is, effectively, a win-win proposition since energy savings and associated GHG reductions will be achieved whether the energy efficiency investments are made by VDHC (through the ECF) or by its competitors in the energy efficiency market.

Regarding the detailed comments and observations, the team would like to respond as follows:

The current fuel mix used by the VDHC for heat generation is about 90% gas and 10% heavy fuel oil, and this is potentially subject to fluctuations depending on the relative prices for gas and oil products. However, both the project and the baseline (the "without-project" scenario) are subject to the same uncertainty in this respect and thus the impact of this variable on the assessment of the proposed project is considered minimal. The option of bio-fuel was examined by COWI (Denmark), subcontractor of AF-International, for one of the communities in the Vilnius area. However, this turned to be too expensive in operation. In the future, it is possible that alternative fuels will be displacing gas – especially, in the suburban areas around Vilnius which have been recently (Summer 2000) separated from VDHC, as the gas prices for smaller consumers do not currently reflect the full economic cost of supply and are likely to increase. Wood chips, for example, may become economically attractive.

Micro-turbines and fuel cells in CHP mode have been considered as a supply option for Vilnius and are an integral component of the ESMAP study for the eight outlying towns around Vilnius. These technologies do not appear technically ready or commercially attractive as yet. The proposed ESMAP study will address these issues and consider the option of developing these options on a pilot basis afterward. The market potential for increasing power capacity is limited because of the excess power generation capacity available for the next five years.

Regarding the share of fixed charges lowering energy efficiency incentives – generally, we agree with this point and feel that this will be an important aspect of tariff design. The fixed fee must exist in order to reflect heat supply costs and keep the company's financial stability in the case when savings on customer side are expected. The fixed charge, however, should only be enough to cover the fixed costs, not more, while the marginal cost of heat faced by the consumer should be reasonably close to the variable cost component of heat supply. The relevant comparison for energy saving incentives is how well the latter part is optimized in the new tariff structure and not how the new tariff compares with the old one, which may have not reflected either of the cost components properly. Also, from a practical perspective, it is likely that the end-user's decisions to save energy are driven to a large extent by the total energy bill. Few customers will bother to subtract the fixed cost component even if they do then divide the total bill by the number of GJ consumed. Thus, the transition to a tariff which is higher than the old one because the fixed costs are included may in fact increase the incentives to save energy rather than lower them.

EEHPP is the Energy Efficiency Housing Pilot Project in Lithuania. This will be spelled out when the acronym is first used in the updated Project Brief.

Regarding the possibility of VDHC providing energy services outside the city of Vilnius, it should first be noted that it would not be economically prudent for VDHC to operate these systems jointly. On the other hand, if, in the future, VDHC becomes commercially effective, they could play a management role there – either through a management contract or concession. This is not expected to be the case in the near term, however.

Regarding the point that VHDH should become a commercial provider of energy services including performance contracting, etc. – the idea is absolutely valid, and moving in this direction is one the project's key objectives. However, it will take time to implement such a transformation. In a World-Bank supported project in Krakow, where such a service company (ESCO) was established in 2000 as a daughter company of the central heat supplier, this had taken several years to develop. The GEF project

in Vilnius offers an opportunity for VDHC management to start this process by helping it to establish a customer-friendly, outward-looking organization and modestly expand its product line.

SODRA is the Lithuanian social security system. The acronym is based on the Lithuanian for State Social Insurance Fund Board.

Regarding whether 20% or 25% of income is the kick-in level for the subsidies, our current information is that it is 20% for heat and 25% for heat and domestic hot water. We shall double-check this during appraisal.

We agree that the project results may be valuable input to Joint Implementation discussions. Opportunities for such projects certainly exist – especially, in the disconnected communities around Vilnius (see our comment on alternative fuels above).

Regarding cooperation with academic institutions, we agree that involving academic institutions may be increasingly appropriate as the Government becomes more involved in such aspects of the project as M&E and information dissemination. However, the current focus of the project is on the commercialization of VDHC, and thus cooperation with partners such as Helsinki Energy is more critical for capacity building purposes at present.

**4 January 2001**  
**STAP REVIEW OF:**  
**Project Concept Note of 11 October 2000**  
**Vilnius District Heat Project**

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**Summary**

The review is based on the Project Concept Note and the Aide Memoire. The proposed project is relevant, justified and should be given high priority. Still in the form of a Project Concept Note, several parts of the project remains to be developed in greater detail. The close links to the Vilnius District Heating Rehabilitation Project and the Energy Efficiency Housing Pilot Project (EEHPP) further strengthens the proposal. One suggestion is to strengthen capacity building through involving a Lithuanian university(ies).

**1. Overall impression**

Overall this is an important and relevant project. The main component in the proposed project is to remove barriers and replace existing group substations with new in-building substations that facilitate heat control at the building level (and presumably better measurement/monitoring although the present ways of measuring and billing are not detailed in the project concept note). Measurement and control is, of course, an important prerequisite for realizing future energy efficiency improvements from other demand-side measures.

There is not enough detail and data in the proposal to comment on the viability of achieving the proposed savings. For example, it is stated that it takes 450 kWh to heat one square meter of residential space and that: "The main reason is poor insulation and heat losses in the network, as well as lack of possibility for consumers to control heating." There is no detail on where the losses occur or what percentage of final energy (i.e., energy delivered to the building) that can be saved through the substation installations.

However, more data and references to other reports are found in a background document (The Aide Memoire) indicating a solid foundation for the estimates.

## **2. Relevance and priority**

The project is relevant and should be given high priority given the widely recognized need to improve the performance of district heating systems in Central and Eastern Europe. If present and potential customers are lost to other heating options, the possibility of low-polluting and energy efficient CHP may also be lost. It is a common misconception not only in Vilnius that energy conservation in buildings with district heating is not viable

## **3. Project approach**

The approach is to give loans and grants to substation installations through a GEF supported Energy Conservation Fund, do marketing, outreach and education, and provide technical assistance to the Vilnius District Heating Company. A reasonable mix of carrots and sticks (through lobbying for regulatory changes) is proposed.

It should be a strength that the project is undertaken as a part of a greater project to modernize the heat and power production in the district heating system.

A key barrier is the perceived lack of financial incentive for the district heating company to participate in energy efficiency efforts. This is perhaps the greatest challenge in the project. As a result, it is a (necessary!) risk to establish certain functions at the district heating company and it is crucial that the company can be turned around to see the financial benefits (from reduced peak demand, better competitiveness against other heating options, and developing an energy services market).

It is not clear to what extent the Energy Conservation Fund will/can finance also other energy efficiency measures (windows, insulation, etc.) in addition to substation installations. Co-ordination and co-operation with the ongoing Energy Efficiency Housing Pilot Project (EEHPP) as indicated strengthens the proposal. Combining or co-ordinating substation installations with energy efficiency improvements (without which the installations may result mainly in reduced bills from lower comfort/indoor temperatures) can improve customer acceptance.

## **4. Objectives**

The stated objectives are valid but there is not enough detail in the proposal (e.g., background data or quantified goals and penetration levels) to comment on the prospects for achieving the objectives.

## **5. Background and justification**

As noted there is little technical detail provided in the proposal. Apart from that, the proposal is well justified and other background information is presented. Additional background and justification mainly on the institutional/organisational and economic aspects is presented in the Aide Memoire.

## **6. Critical analysis of the situation**

The Project Concept Note and the Aide Memoire gives the impression that the situation has been well analyzed and is well understood based on previous experiences, discussions with several stakeholders, etc.

## **7. Activities**

An appropriate and logical set of activities is proposed (The GEF supported Energy Conservation Fund; marketing, outreach and education; technical assistance to the Vilnius District Heating Company). The

exact organization and administration of the activities is yet to be determined. A very close link to, or (as suggested) establishment at the district heating company is suitable.

#### **8. National priorities and community participation**

The project appears to be fully in line with national priorities and involves community participation in various ways. The project, however, does not address the needs in rural areas.

#### **9. Institutional arrangements**

The exact final institutional arrangements are not determined in the proposal but reasonable suggestions are made concerning the involvement of the district heating company, requirements on ownership of installations, etc. The involvement of local banks and other actors is not explicitly discussed in the Project Concept Note but the Aide Memoire makes reference to the training of consultants and banks on servicing the market, indicating that building a lasting institutional capacity will be an important part.

Project evaluation is mentioned but not specified. It would be valuable to involve local academic institutions (the University of Vilnius) to facilitate local capacity building on this and various other relevant aspects of the project. (To my knowledge, the (Technical?) University of Kaunas is stronger in the area of energy and environment and may be a stronger candidate)

#### **10. Time frame**

The time frame is reasonable although it may be slightly optimistic that 25% of the substations can be converted in the first year.

#### **11. Funding**

The level of funding appears to be appropriate and there should be synergies from being linked to the World Bank-led Vilnius District Heating Rehabilitation Project as well as the EEHPP.

The proposed sum (7.5 million USD) divided by 2,400 substations (=3,125 USD) is slightly higher than what is indicated in Annex 2 (1,800 plus 900 USD from GEF in year 1-2 and 1,800 plus 450 USD in year 3-4). This is due to administrative costs?

There is no detail on how the unit abatement cost of -2.9 USD per ton of CO<sub>2</sub> was calculated. Presumably the District Heating Rehabilitation project will include fuel switching if coal is the predominant fuel?

Funding for marketing, outreach, and education is 2 million USD equivalent to more than 800 USD per substation (2,400 substations), or 8% of cost of installation. The activities under this sub-component are not detailed in the Project Concept Note and it is difficult to assess whether this funding allocation is appropriate. Is evaluation included here also? In my view, the value and importance of evaluation (pre-, during, and post-project) is often underestimated.

#### **12. Innovative features/replicability**

The project is innovative (technically and institutionally) from a Lithuanian perspective and should be replicable in similar settings. In many cases the situation in each country/city may be quite unique in many respects. Nevertheless, the project should provide valuable lessons-learned for future applications (if not replications).

#### **13. Sustainability**

The risk that the Energy Conservation Fund does not reach cost-recovery is considered low in the proposal. Various options for the exit strategy are mentioned, including the continued use of recovered

costs for other energy investments.

#### **14. Development dimensions and rationale for GEF support**

The project is consistent with the objectives of GEF operation program 5 *Removal of Barriers to Energy Efficiency and Energy Conservation* through removing various barriers, including barriers to future additional energy efficiency investments.

#### **15. Additional comments or questions**

It may be argued that the substation project (and certainly the "total" project including rehabilitation) is concentrating on supply side improvements in the system although demand and customer orientation is discussed. Nevertheless, upgrading the system and installing substations is important for energy efficiency improvements through future demand-side measures.

With or without the project, the district heating company should be prepared for decreasing heat loads. Through modernizing the system and becoming a more customer oriented energy service provider the company can be competitive and profitable in the future. Without the project, the company risk losing (especially wealthy) customers, and energy service business to other actors. The possibility or likelihood of decreasing heat loads should be an important concern also in the associated District Heat Rehabilitation Project. Closing or moth-balling plants can be an alternative to rehabilitation and replacement if energy efficiency investments are more cost-effective.

Page 4: "the current Vilnius District Heating project largely focuses on capacity building at the local level through commercialization of the district heating functions in Vilnius." What does this mean?

### **Response of the Project Team to the STAP Review of 04-Jan-01**

#### **General Comment**

The STAP review was provided on the basis of the initial Project Concept Document (PCN) and the Aide Memoire from the pre-appraisal mission in November 2000. The answers to the STAP review are given on the basis of the current Project Brief (the draft Project Appraisal Document), in which many of the concerns of the STAP reviewer have been addressed. The Annex numbering here refers to the numbers in the current Project Brief.

1. The breakdown of components showing how much CO<sub>2</sub> is saved on each type of investment is given in Annex 4 (incremental cost analysis).

2. no comment

3. Project Approach

Lessons learned from the EEHPP project showed an increased interest in energy efficiency after the initial investment is implemented. A significant proportion of all investments included substation installation. The types of investments that are eligible under the EEHPP and would be eligible under the proposed ECF are: (i) modernization of the heat substation in the building, which typically includes replacement of the heat elevator (ejector circulation pump) by an electric circulation pump, automatic temperature control for space heating and domestic hot water, and heat exchangers for space heating and domestic hot water. In addition, demand side investments include thermostatic radiator valves and heat cost allocators on the radiators improvement of windows, staircase renovation, wall insulation and roof repair (if justified).

Re: “Combining or co-ordinating substation installations with energy efficiency improvements (without which the installations may result mainly in reduced bills from lower comfort/indoor temperatures) can improve customer acceptance.” – the point is very valid, and the project team has used it in the project design by offering window replacements and similar improvements on the customer’s end as an additional incentive for homeowners to accept the replacement of the substation early on in the program. This measure is expected to contribute to higher market penetration of the substations.

#### 4. Objectives

The market penetration is addressed in Annex 4 (incremental cost analysis summary).

#### 5. Background and Justification

The project brief addresses technical aspects in Annex 2 and economic aspects in Annex 4.

#### 6. No comment

#### 7. Activities

More detail is provided in the Project Description in Section C and terms of reference are provided in the Project Implementation Plan. Operating manual for the Energy Conservation Fund, and terms of reference for public relations and outreach are to be finalized by negotiations.

#### 8. National priorities and community participation

The project addresses the needs of rural areas mainly by assisting VDHC with developing a strategy for disconnecting nonviable sections of the network and installing alternative sources of heat supply in low density areas mainly located in the periurban/rural areas.

#### 9. Institutional arrangements

Institutional arrangements are addressed in Section E: Summary Project Analysis. As mentioned above, the operating manual for the Energy Conservation Fund, and terms of reference for public relations and outreach are to be finalized by negotiations.

#### 10. Time frame

The target number for substation replacements in the first year may have to be revised by the time of submission of the proposal for CEO endorsement. This is not going to change the results of the economic analysis materially. The current assumption is that the full number of substation replacements will occur by 2006, which is considered feasible.

#### 11. Funding

The cost estimates for substation replacement given in Annex 2 of the initial Project Concept Note (PCN) were preliminary. A more complete and accurate calculation summarized in Annex 4 of the current project brief is now available. The economic cost per substation replacement, including a physical contingency, is about \$11,680. In addition, the administrative/transaction costs have been estimated at about \$1,500 per substation. For the financial calculation, the GEF-financed cost per



substation is a useful point of reference, but it should be kept in mind that the full picture of financial flows involved in GEF's financing of the substation replacements through the Energy Conservation Fund is more intricate and involves a different mode of calculation. The options presented in last November's Aide Memoire as Options 1-4 are relevant in that respect.

Unit abatement costs are addressed in Annex 4 (incremental cost analysis).

Marketing, outreach and education is addressed more completely in Section C. Terms of reference would be agreed with VDHC before negotiations.

## 12. Replicability

Lessons learned from the existing Energy Efficiency/Housing Pilot project are applied to the Energy Conservation Fund implementing arrangements. If the project is successful, similar implementing arrangements would be applicable in similar urban areas.

Monitoring and analysis would be included in the economic study and communications programs would be required to have clearly defined, monitorable performance indicators. It is likely that a university or academic institute would be involved in the economic analysis, provided that Bank procurement guidelines would allow for this.

## 13. Sustainability

No comment.

## 14. Development dimensions and rationale for GEF support

No comment.

## 15. Additional Comments

Re: "the current Vilnius District Heating project largely focuses on capacity building at the local level through commercialization of the district heating functions in Vilnius " what does this mean?

The project supports market-based initiatives that would enable the company to change to a more consumer friendly culture from its current inward-looking posture. A significant portion of the technical assistance provided will need to be provided by local consultants. The project would help to create value also by strengthening the company's financial position in preparation for a planned introduction of a private operator.

**Additional GEF Annex 13: Draft TOR for the ECP Commercial Fund Manager  
LITHUANIA: Vilnius Heat Demand Management GEF Project**

*March 24, 2003*

**Vilnius Energy Efficiency Project  
Energy Conservation Fund Program  
World Bank/GEF**

**Draft Terms of Reference  
for  
Energy Conservation Program Commercial Fund Manager**

**I. Background**

The Global Environment Facility (GEF) has provided a grant to the Vilnius City Municipality and Vilniaus Energija, the provider of district heating to Vilnius residents, to support the reduction of greenhouse gas emissions by increasing market penetration of energy efficiency equipment in residential buildings. The benefits of energy efficiency technologies are well known among the energy conservation community in Lithuania, but are not attractive to residents due to a variety of reasons that are endemic of heating markets in the region.

The GEF supported project comprises two components: (i) Apartment Level Demand-Side Management: A \$2.5 million GEF "subsidy fund" would go to VE to support its AL DSM program (valves, heat allocators, balancing valves) by buying down the connection fee (equal to 25% of the cost of equipment and installation) for low-income people. The program would cover notionally 533 buildings or about 21,000 apartments, representing 12% of the total number of apartments (i.e. 176,000 apartments) connected to VE's district heating system. \$1.25 million of GEF support would cover a portion of the downpayment for low income residents. The remaining \$1.25 million would be made available for a follow on AL DSM program if VE demonstrates the availability of additional resources so the overall size of the AL DSM program can be doubled. (ii) ECP Commercial Fund: A \$3.00 million GEF supported "commercial fund" would be established by the Vilnius City Municipality to operate a commercially sustainable business that makes energy efficiency improvements in the residential sector of the Vilnius City. The Municipality will competitively hire an ECP Commercial Fund Manager to operate the business and manage the GEF funding. Some GEF support \$0.5m may be made available for administrative services provided by the ECP Commercial Fund Manager. In addition, the GEF would support technical assistance to monitor and evaluate the global environmental benefits accrued.

The Vilnius City Municipality is soliciting proposals from privately-owned firms to introduce innovative business plans that would improve energy efficiency in buildings. There have been many pilot efforts undertaken across Central and East Europe as well as in the European Union to address market penetration of energy efficiency equipment in the residential sector. Most programs have been heavily subsidized such as through capital grants, tax exemptions, soft loans, etc. that have benefited low income but also in many cases high income individuals. Most of the programs in the residential sector were managed by governments. The Vilnius City Municipality would like to help create a real market for building improvements in energy efficiency by asking the private sector to come up with a viable business plan that does not depend on such heavily subsidized support.

## **II. Objectives**

The objective of the Vilnius City Municipality is to use the \$3.00 m GEF support to achieve maximum coverage of comprehensive energy efficiency improvements in its building stock in minimum time.

The objective of the ECP Commercial Fund Manager is to operate a commercially sustainable (profitable) business that makes energy efficiency improvements in the residential sector of the Vilnius City to meet the Municipality's objectives.

## **III. Scope of Work**

The ECP Commercial Fund Manager shall implement a business plan that achieves the following outcomes:

- Develops and implements installation of energy efficiency measures that:
  - increase energy efficiency in residential buildings and apartments;
  - minimize the recurrent costs necessary to maintain newly acquired assets;
  - include building envelope improvements such as building insulation, windows, and building seals;
  - use technology that is technically feasible and has a proven history of effective and safe use in the Lithuanian market;
  - are environmentally friendly and comply with Lithuanian environmental and occupational health and safety standards;
  - reduce greenhouse gas emissions either directly or indirectly;
  - are affordable to a broad range of the population.
- Executes a marketing and sales program that effectively sells products that attracts consumers regardless of heat supply source. The marketing and sales program should be designed to contribute to a sustainable market development strategy in energy efficiency improvements. This means that business plans should avoid overly concessional terms that would distort the market or exclude new entrants.
- Realizes a sufficient return on its investments to cover at least its operating and capital expenses, and to operate on an ongoing basis.
- Mobilizes significant commercial co-financing with GEF support (measured by the gearing ratio of co-financing mobilized, including financing of operating and capital expenditures, per dollar of GEF fund utilized).
- Uses \$3 m of GEF support over a five-year period to finance eligible capital expenditures, managing the funds on behalf of the Vilnius City Municipality. GEF financed expenditures will need to be procured according to procurement guidelines of the IBRD.

## **IV. Reporting and Deliverables**

### **The Business Plan**

The Business Plan will include but not be limited to: (i) a statement of objectives; (ii) the value

proposition; (iii) a description of the organizational structure, implementation arrangements and responsibilities of stakeholders; (iv) the details of the implementation, procurement, disbursement, financial management, monitoring and evaluation arrangements associated with GEF grant supported activities; (v) sales plans, forecasts and profitability targets; (vi) investment costs and financing plan, including evidence of commitments from funding sources; (vii) customer fulfillment; (viii) marketing and public relations strategy, plans for first year and budget estimates; (ix) the practical steps needed for preparation and roll out, including legal issues; (x) a statement on financial policy and objectives of the fund, including appraisal criteria of investments; (xi) measurable performance indicators designed to evaluate each key technical, social, economic and financial assumption at key milestones; (xii) financial statements, budgets and projections, including funding requirements needed to meet financial objectives; (xiii) detailed proposals on remuneration of contractor; (xiv) suggest a governance structure.

The business plan will include the financial, technical, environmental and social evaluation criteria for investments. The business plan will include selection criteria for participants in any outsourced functions. Eligibility criteria for beneficiaries (i.e. municipalities, groups of homeowners) will be included also. The evaluation and selection criteria will be internally consistent and mutually reinforcing, aiming to achieve task objectives.

The qualified bidder will be selected on the basis of which makes the most convincing case that he can handle all of these issues and achieve the Municipality's central goal.

#### Other Deliverables

In addition, the ECP Commercial Fund Manager will:

- Maintain operational contact with the Vilnius City Municipality
- Report to Vilnius City Municipality and the World Bank no less than on a quarterly basis; Issue the progress report every quarter in a fiscal year covering the physical implementation, financial, energy economical, environmental, and contractual status and plans of the project;
- Maintain project archives of produced documents, correspondence, signed contracts and reached agreements;
- Review the energy savings and reduced emissions achieved by the project.
- Update the business plan and budget before opening its business and present it to the Municipality and the World Bank for review and approval at least once per year and in the beginning of the first fiscal year.

#### **V. Experience**

The ECP Commercial Fund Manager shall be a firm registered in Lithuania and duly licensed for activities proposed in the business plan. It must:

- (i) Have positive profitability and adequate liquidity.
- (ii) Have a management with proven experience in the residential energy efficiency sector in Lithuania for at least two years.
- (iii) Have owners and management that are fit and proper.
- (iv) Be in good standing with any supervisory bodies regulating its activities – it should meet all pertinent prudential and other laws and regulations applicable to its operations – and remain in compliance at all times. This may be evidenced by (i) a valid business license that specifies the date and type of license; (ii) a note from a relevant authority that it is not aware of any criminal proceedings

ongoing against the firm, its management, or any of its major shareholders with voting rights in excess of 10 percent, and (iii) a statement by the supervisory authority that the business is in general compliance with all relevant business laws and regulations.

(v) Have acceptable audit reports which (i) cover two full years of operation and are prepared by an internationally recognized audit firm in accordance with International Accounting Standards (IAS) or US GAAP.

(vi) Have adequate internal controls and audits, and adequate management information systems that are capable of handling the MIS requirements of the business plan.

(vii) If the firm is a bank, it must comply with provisions in the World Bank's Operating Procedures 8.30 "Financial Intermediary Operations".

The ECP Commercial Fund Manager is to appoint specialists familiar with working conditions in Lithuania and with good project management skills. The Consultant shall have a team consisting of specialists at least in energy efficiency, energy audits, project development in particular Demand-Side Management (DSM) projects, procurement, financial accounting and in marketing. Availability of key staff with knowledge of Lithuanian/Russian/Polish language is desirable.

## VI. Timeline

*The Assignment of the Consultant is supposed to last five years and is expected to start in \_\_\_\_\_.*

## VII. Procurement

All procurement related the GEF supported activities shall be made in accordance with World Bank procurement guidelines as shown in [www.worldbank.org](http://www.worldbank.org)

## VIII. Criteria for Technical Evaluation

	Maximum Points
<b>Firm/Staff Experience (sub-total)</b>	20
Energy Efficiency Business and Financial Management	10
Energy Efficiency Technical	10
<b>Business Plan (sub-total)</b>	80
Technical and institutional feasibility	20
Profitability	20
Energy Saving/GHG emission reduction Impact	30
Co-financing	10
<b>TOTAL</b>	100

