Document of
The World Bank

Report No: ICR00001088

IMPLEMENTATION COMPLETION AND RESULTS REPORT
(TF-50314 TF-52278)

ON A

GLOBAL ENVIRONMENT FACILITY GRANT

IN THE AMOUNT OF US$ 6.5 MILLION

TO THE

VILNIUS CITY MUNICIPALITY AND UAB VILNIAUS ENERGIJA

FOR A

LITHUANIA: VILNIUS HEAT DEMAND MANAGEMENT PROJECT

June 29, 2009

Sustainable Development Department
Central Europe and Baltics Country Unit
Europe and Central Asia Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective 31-Dec-08)

1.00 LTL = US$ 0.40507
US$ 1.00 = **Error! Reference source not found.** LTL 2.4687

FISCAL YEAR: January 1 – December 31

ABBREVIATIONS AND ACRONYMS

AL DSM	Apartment-Level DSM
BLS	Building-Level Substation
CHP	Combined Heat and Power
CO2	Carbon Dioxide
DH	District Heating
DSM	Demand-Side Management
ECP	Energy Conservation Program
ESCO	Energy Service Company
FM	Financial Management
FMR	Financial Monitoring Report
FMS	Financial Management Specialist
GEF	Global Environment Facility
GEO	Global Environmental Objective
GHG	Greenhouse Gases
HOA	Homeowners' Association
HCA	Heat Cost Allocator
ICR	Implementation Completion (and Results) Report
IP	Implementation Progress
ktCe	Kiloton (1000 tons) of Carbon Equivalent
ktCO2	Kiloton (1000 tons) of CO2
M&E	Monitoring and Evaluation
PAD	Project Appraisal Document
PPP	Purchasing Power Parity
tCe	Ton of Carbon Equivalent
tCO2	Ton of CO2
TCV	Thermostatically Controlled Valve
toe	Tons of oil equivalent
UNFCCC	The United Nations Framework Convention on Climate Change

VCM	Vilnius City Municipality
VE	UAB Vilniaus Energija
VST	AB Vilniaus šilumos tinklai (former DH company of Vilnius)

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Lithuania
Vilnius Heat Demand Management Project

CONTENTS

I N S E R T

D A T A S H E E T

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1. Project Context, Global Environment Objectives and Design

(this section is descriptive, taken from other documents, e.g., PAD/ISR, not evaluative)

1.1 Context at Appraisal

(brief summary of country and sector background, rationale for Bank assistance)

Country and Sector Background: At appraisal, Lithuania had virtually no primary energy resources, apart from wood, and thus relied heavily on imports of oil and gas from Russia for its energy needs. Although commercial energy use decreased nearly 50 percent during the 1990s, the energy intensity of Lithuania's GDP (based on purchasing power parity (PPP)) was 0.25 toe/US$ thousand, almost 60 percent higher than the EU average. Part of this problem would be addressed by continued structural changes in the economy. However, a more immediate impact was thought to be achievable through focused energy efficiency measures – particularly, in the residential sector.

High heat consumption by the residential sector. It was calculated that it took twice as much energy to heat one square meter of residential space in Lithuania as in Denmark. The main reason was poor insulation and heat losses in the network, as well as lack of possibility for consumers to control heating. Lithuania's second National Communication to United Nations Framework Convention on Climate Change (UNFCCC) estimated that it would be possible to save up to 45 percent of energy used for heating if buildings were properly insulated and modern heating systems were installed.

Inefficiencies in heat supply by the district heating sector. District heating (DH) systems, when well designed and run efficiently, can be quite energy-efficient. Power plants have efficiencies of about 40 percent when used just for electricity, but can be up to 90 percent efficient when run as combined heat and power (CHP) plants in DH systems. However, the Vilnius DH system had been losing its customers to other heat suppliers such as building-level gas boilers because the service quality had been too poor in the past. The DH of Vilnius was technically outdated as it supplied heat through block substations operating in a supply driven constant flow mode.

At the same time VCM decided to implement a Housing Renovation Program which could benefit from support from a national program for improved energy efficiency in apartment buildings. The main tool for both the municipal and the national programs were subsidies to homeowners that carried out building envelope rehabilitations.

The GEF-supported Energy Conservation Program (ECP) under the project was aimed to help the DH supplier to regain and consolidate its customer base and support fundamental design changes including installation of energy saving equipment, to support the Housing Renovation Program and to increase consumers' control over consumption of energy and make them more aware of options to reduce the cost of heat consumed.

Vilniaus Energija (VE), a private operator owned by a foreign investor, took charge of district heat supply in Vilnius on April 1, 2002. Under the lease contract with the City, VE committed to undertake 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.

Rationale for Bank assistance: The Bank's Country Assistance Strategy for Lithuania in effect at appraisal was designed to deepen the reforms[1] with a view to EU Accession, build capacity in municipal and local institutions and support the social areas which were not a part of the immediate requirements for accession. The project largely focused on capacity building at the local level through commercialization of DH in Vilnius. Improving financial viability and decreasing the cost of heat supply would help residents in Vilnius and decrease the fiscal burden of heat supply on the budget. The Project would also help reduce Lithuania's current account deficit by reducing gas imports for heating needs.

1.2 Original Global Environment Objectives (GEO) and Key Indicators (*as approved*)

The objective of the project was to reduce the emissions of greenhouse gases (GHG) 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 Vilnius City. This would be achieved by: (i) 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 apartment-level DSM (AL DSM) equipment - particularly, for low-income customers; (ii) 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; and (iii) implementing monitoring, evaluation, and information dissemination activities aimed at facilitating the replication of the project's experience.

There are several different sets of **key indicators**. The Project Appraisal Document (PAD) is internally inconsistent with five indicators for each of the two components presented in the main text and then a number of, mostly different, outcome indicators presented in the PAD's annex 1. During implementation the Bank team agreed with VE and VCM that the six most important of these indicators would be monitored regularly, namely:

1. GHG emission reduction relative to base case ("without project") scenario;
2. The number of buildings with modern building-level substations (BLS) installed by VE;
3. The number of buildings (and apartments) with apartment-level DSM (AL DSM) equipment installed by VE;
4. The co-financing ratio for the VE implemented components (for the apartment-level DSM only);
5. The number of buildings (and apartments) having received financing from ECP Commercial Fund implemented by VCM; and

[1] The main reforms needed for EU accession supported by the CAS were: (i) enhancing competitiveness; (ii) developing the rural economy; (iii) strengthening the public administration; and (iv) upgrading infrastructure and environmental management.

6. The co-financing ratio for the VCM implemented components.

The first of these indicators is from the PAD's annex 1 and the five others are selected from the ten indicators in the main text. This compromise was due to a need to focus on important indicators that showed real progress. However, all ten intermediate outcome indicators mentioned in the PAD were covered during the ICR work and the results are presented in Section 3.2.

1.3 Revised GEO (*as approved by original approving authority*) and Key Indicators, and reasons/justification

The objective was not revised.

1.4 Main Beneficiaries

(original and revised, briefly describe the "primary target group" identified in the PAD and as captured in the GEO, as well as any other individuals and organizations expected to benefit from the project)

The primary target beneficiaries were the residential consumers of heat – specifically, the inhabitants of the City's multi-apartment buildings constructed during the Soviet era. The project would particularly benefit the residents of buildings who have organized themselves into homeowners' associations.

The City as a whole would benefit from reduced pollution and the global environment would benefit from reduced emissions of GHG.

1.5 Original Components (*as approved*)

I - Substation Modernization Program (no GEF funding)

A. Substation Modernization - US$26.1 million. This component of VE's investment program consisted of substation modernization including the replacement of all block substations (also known as group substations) with energy efficient building-level substations (BLS) in residential buildings. By the end of 2008, the plan was to have about 2260 BLS installed in buildings previously served from block substations. In addition, about 470 old-fashioned and ineffective (elevator-type) BLS would be upgraded to modern standards. The implementation of the substation modernization component was key to the transformation of the Vilnius DH system into a modern, customer friendly, and energy efficient system. This was an essential technical prerequisite for the demand-side management measures at the apartment and building level supported by the GEF under the other components.

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

In this table from the PAD, Sub-components A and B were to be implemented by VE, while Sub-components C-F by VCM. Sub-components B-F constituted the GEF-supported ECP. The investment costs shown in the table were initially planned for the period through 2007. Activities under the VE implemented components were eventually extended through June 2008, and VCM activities were extended through December 2008.

II - Energy Conservation Program (including funding from GEF)

B. Apartment-Level Demand-Side Management (AL DSM) - US$10 million was a 5-year program aiming to cover some 500-600 apartment buildings in Vilnius during the project 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 would allow VE to introduce billing based on the actual heat consumption by apartment (consumption-based billing). 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 was uncertain. To increase the chances of successful market penetration, the GEF would participate in this component with $2.5 million (to be disbursed in two tranches of $1.25 million, the second tranche contingent on the provision of co-financing for the expansion of the program by VE). The GEF contribution would allow VE to forgive the low-income families the cost of the downpayment (connection fee) on the AL DSM equipment, thus addressing the barrier of up-front cost affordability. The co-financing by VE was equal to LTL 20 million (about $6 million).

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 for home owners. The fund would operate on a revolving basis and would be used for energy efficiency investments as long as demand existed. Most of the investments would be made in the building-envelope improvements (including installation of new windows, insulation of walls, roofs, etc.). However, the final decision on specific investments made by the Commercial Fund would be made upon the completion of the tender for the operation of the fund under the ECP Management Contract.

The ECP Management Contract - US$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, an ESCO – would be competitively selected by the Vilnius
Municipality. The firm would operate the ECP Commercial Fund in a financially sustainable manner and make profitable investments in energy efficiency in the residential sector.

Administration of ECP by the Municipality - US$0.3 million (Component E) - would cover incremental operating costs 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 were covered by a consultant services allocation, and an allowance for individual consultants was made.

Monitoring & Evaluation of Global Environmental Benefits and Information Dissemination for Replication - US$0.2 million (Component F). The monitoring and evaluation of the achievement of the global environmental objective would focus on quantifying the GHG savings and the financial performance of ECP. The component would also include information dissemination activities aimed to maximize the project's replication potential.

1.6 Revised Components

The components were not revised.

1.7 Other significant changes

(in design, scope and scale, implementation arrangements and schedule, and funding allocations)

When it became clear that the original implementation setup for the VCM-implemented components was ineffective and unlikely to produce any results, an alternative set-up including commercial banks as financial intermediaries was considered. In July 2005, VCM requested transferring the role of the ECP Fund Manager under Component D from the company originally selected for this role to the municipally owned company AB Vilniaus šilumos tinklai (VST). An amendment of the grant agreement with VCM was carried out to this effect – a Country Director level restructuring. Simultaneously, the implementation arrangements were changed to accommodate the participation of commercial banks. The original version of the Energy Conservation Program Manual (ECP Manual), which served as the project implementation plan, did not provide for a specific mechanism to involve commercial banks. The modified ECP Manual included a provision whereby GEF grant proceeds under the VCM implemented components were passed on to homeowners through pre-selected commercial banks. The banks were required to contribute co-financing (generally 50% of the total loan to the homeowner) from their own resources. This change stimulated lending by commercial banks for residential energy efficiency in Vilnius. It also led to a substantial increase in the level of co-financing for the project, which eventually reached about $5 (including municipal and state support) per dollar of GEF.

The original project design also included an M&E component to quantify the GHG emission reductions and evaluate the financial performance of ECP Commercial Fund. However, VCM felt that GEF funding was not needed for the monitoring for three reasons: (i) VE made a very useful monitoring on their own; (ii) financial performance and most of the quantitative aspects of the ECP Commercial Fund could be judged on the basis of the financial monitoring reports (FMRs)

produced by VCM; and (iii) there were obvious capacity constraints on VCM's part to procure and manage the consultancy services required for M&E as a separate project component.

2. Key Factors Affecting Implementation and Outcomes

2.1 Project Preparation, Design and Quality at Entry

(including whether lessons of earlier operations were taken into account, risks and their mitigations identified, and adequacy of participatory processes, as applicable)

The project design incorporated many useful features of earlier operations, including the Bank financed Energy Efficiency and Housing Pilot (EEHP) Project in Lithuania. Experience from Poland and Bulgaria had shown that conversion of a district heating system from constant to variable flow could achieve substantial energy savings. Metering in individual apartments with thermostatic valves and heat cost allocators had been piloted under EEHP and had demonstrated substantial energy savings and customer satisfaction. Thus, the decision of the City of Vilnius to follow the same paths was supported by the Bank's technical experts. EEHP also showed that homeowners were willing to invest in energy efficiency and renovation if supported with financial incentives, i.e. tax benefits and grant elements. This was taken into account in the design of the ECP in Vilnius, where both the city and the national governments contributed their financial support to the homeowners under the program.

However, many design features were novel for Lithuania and certainly for Vilnius. This was a GEF project in the Climate Change focal area. The project design aimed to support the principles of GEF's *OP No. 5: Removal of Barriers to Energy Efficiency*. Thus, it focused on areas that had potentially high economic returns but were facing implementation barriers. The ECP was designed as a joint barrier removal effort by VCM and VE. This implied that VCM would be VE's strong ally in securing public support for the DH modernization program implemented by VE. This would apply, among other things, to VE's initiative to install AL DSM in residential buildings. The fact that contracting out the Vilnius DH company operation to a private operator was an initiative by the Mayor of Vilnius gave reason to believe that VCM's support to VE would continue.

GEF allocated US$6.5 million for this project, with US$4.0 million and US$2.5 million for the VCM and VE implemented components, respectively. The design of the project proved to be relatively complicated for its size. Both grant recipients were at the city level rather than the national government and the only participation of the national government was through the support to Vilnius City's Housing Renovation Program. This support proved essential for sustaining the financial scheme created by VCM with GEF participation. However, it also made the scheme vulnerable to disruptions in such support, as the developments of the last year of the project have shown. Because of the municipality's decision to privatize the management of the Vilnius district heating system the project would also involve a private company, Vilniaus Energija (VE), who was operating the district heating system on a management lease contract. The management of VE preferred to keep its component financially independent from the component implemented by the City, which resulted in two separate GEF grant agreements for this project. Such an arrangement made project supervision more challenging – especially, for the Financial Management Specialist (FMS) staff (see Section 2.4). The other limitation of splitting the grant into two was the impossibility to reallocate grant proceeds between the VE and VCM implemented components.

One of the achievements of the project design stage was to make sure that VE had a sufficient amount of co-financing set aside for energy efficiency purposes consistent with the GEF grant objectives. This amount (LTL 20 million or about $6 million) was specified in VE's lease agreement with VCM, allowing VE to co-finance the GEF component on a 4:1 basis. To achieve a similarly impressive leveraging ratio under the VCM component, new elements such as participation of commercial banks had to be introduced into the project design during implementation. It might have been best to make a provision for participation of commercial banks from the outset.

The risk mitigation matrix included in the PAD was helpful in identifying and addressing the risks of this project. The notable risks that did materialize and proved difficult to mitigate included the following: "Homeowners are not sufficiently informed about the [benefits of] AL DSM…" and "Insufficient demand for DSM measures (including apartment-level)". Demand for AL DSM proved lower than expected, partly due to lack of public outreach efforts on this subject by VCM. One anticipated enabling factor that did not materialize was the proliferation of homeowners' associations. Buildings with an established HOA continue to be a minority (less than 25 percent) in Vilnius. Moreover, obtaining homeowners consent for housing renovations and energy efficiency improvements remains complicated even when an HOA exists.

The approach to stakeholder participation was generally adequate, with some notable limitations.

VE implemented components. The substation replacement component was sufficiently well publicized. Early on, a survey was undertaken to take customer views into account. The project was covered in television interviews, news articles, and a brochure was published describing the benefits of BLS technology. Later in the project, VE developed customer relations further by deploying dedicated staff to promote both BLS and AL DSM and conducting an advertising campaign including billboards, posters, TV programs, etc. However, participation of the homeowners in the initial decision to introduce AL DSM as a project component was less apparent. Some possibilities for alternative project design might have been missed (such as using GEF funding to upgrade the elevator-type BLS to modern level; this upgrading was known to be in demand by homeowners but most of it had to wait until 2007 – 2008 to take place). The AL DSM technology had been piloted under EEHP with encouraging results, but its assumed acceptance by the majority of the residents was not very well tested.

VCM implemented components. Public outreach undertaken by VCM to promote its Housing Renovation Program helped associate the benefits of the GEF-financed ECP with housing renovations and thus helped engage the HOAs. However, the HOAs were not fully informed of the synergies of the program with the VE implemented components.

2.2 Implementation
(including any project changes/restructuring, mid-term review, Project at Risk status, and actions taken, as applicable)

The first year of effectiveness (2003) saw little progress – especially in terms of disbursements – as the parties still had to complete the procurement of the key services to initiate implementation of the project. In 2004, the VE implemented components initially proceeded fairly smoothly after completing a US$5 million procurement package for supply and installation of AL DSM equipment and works. The support of the project by the Mayor of Vilnius was strong. However, the ECP Commercial Fund component fell behind on the procurement of the ECP Fund Manager services. The eventual winner of the contract fulfilled the ECP Fund Management function for about two years, after which VCM requested transferring the fund management role to VST (see

Section 1.7). This was done after it became clear that the investments planned by the original Fund Manager by the end of 2005 were not forthcoming due to its lack of effectiveness in generating the project pipeline. While the original Fund Manager had made progress in identifying potential borrowers and carrying out important technical work (such as energy audits), by the end of 2005 it was no longer realistic to expect that the ECP concept would be successful as originally envisaged. It turned out that the Fund Manager lacked the logistic reach to follow up and keep contacts to the large number of HOAs needed to build a sufficient pipeline of projects and was not well enough connected in the local market (being a branch office of an international consultant) to achieve effective networking and outsourcing. As a result, the IP rating of the project was downgraded to "MU" in December 2005 (ISR No. 5), recognizing that the project was at risk.

After an amendment made by the Bank to the grant agreement with VCM (see Section 1.7), VST became the fund manager and fulfilled this role from 2006 on. The amendment extended the implementation period of the VCM implemented components by six months. The mid-term review of March 2007 assessed the implementation of the new arrangements and found them appropriate. The modified implementation arrangements did make a positive difference. The new co-financing mechanism attracted additional resources to the program, including those of two significant commercial banks (Parex and SEB). This new arrangement subsequently paved the way for the accelerated disbursement of funds (including GEF). However, recognizing the implementation lag that had accumulated, the Bank did not change the "MU" rating until June 2007 (ISR No. 8), when the VCM program made significant progress with the homeowners.

Later in 2007, however, the relations between VCM and VE became strained, when a new administration took office in Vilnius City. The VCM and VE components proceeded largely independently of each other – e.g., VCM did not play an active part in marketing VE's successes in AL DSM and vice versa. Meanwhile, the LTL 20 million energy efficiency fund established by VE was increasingly used for new housing rather than for the existing housing stock, which was eligible for GEF grant financing. The issue of the increasing lack of coordination between the VCM and VE components was stressed by the Bank during a November 2007 mission and highlighted in the Bank's Aide Memoire and follow-up letter, where the project team proposed merging the two components into one comprehensive project. In the Bank team's opinion, this was the most effective way of utilizing the remaining resources. Secondly, the Bank requested VCM to allow the commercial banks to continue to play an active role in the scheme. One of the key banks actively participated in the city's Housing Renovation Program through a commercial entity called "Atnaujinkime Būstą" (AB), owned jointly by the commercial bank and VST. However, after a change of political leadership in the City following local elections there was little appetite for private sector involvement in the Program. Lack of active VCM support was an important reason for downgrading the IP rating of the project to "MU" again in April 2008.

As indicated by the slow pace of disbursements during most of project implementation (with the exception of the last year when disbursements picked up), the utilization of GEF grant funds was unexpectedly slow. It accelerated considerably in the first half of the last year (2008) with about half of total disbursements taking place in that period, but then slowed again as the whole scheme began to be affected by the worldwide financial crisis in the fall of 2008. In November 2008, a key commercial bank (*Parex bankas*) had to suspend its participation in the project due to lack of co-financing from the Lithuanian government (both the state and municipal levels), without which the homeowners would not take loans.

It must be noted that the slow utilization of GEF funds was partly due to the co-financing requirements attached to every GEF dollar spent. During implementation, this GEF project proved to be even more highly leveraged than it was designed to be, with funding from other sources dominating the financing package.

During the Bank's final supervision mission in March 2009, the new political leadership of Vilnius City expressed its commitment to the housing renovation program in the City. Furthermore, the Mayor expressed his support of the ECP concept and the idea of its replication at the national level (see Section 2.5). The Bank fully supports this encouraging development – particularly, if the lessons learned from this project are reflected in the design of the new program.

2.3 Monitoring and Evaluation (M&E) Design, Implementation and Utilization

M&E design. For the M&E design, please see comments in Section 1.2 regarding the somewhat confusing presentation of the key indicators to monitor progress toward PDO/GEO in the PAD. The original project design included an M&E component to quantify the GHG emission reductions and evaluate the financial performance of ECP Commercial Fund. However, it was decided not to pursue the implementation of this component through hiring an outside consultant for the reasons stated in Section 1.7.

M&E implementation. In reality the M&E arrangements for the project were based largely on the quarterly FMRs which covered mostly financial aspects of the operation as well as periodical status reports from VE. The monitoring of GHG emission reductions was conducted on an *ad hoc* basis, with most of the primary information coming from VE. The monitoring was satisfactory. The information was useful and provided on a timely basis.

M&E utilization. Both VCM and VE used the collected key indicator data to measure progress (or lack of same). Both entities have stated that they will keep using the monitoring framework after the exit of the World Bank.

2.4 Safeguard and Fiduciary Compliance
(focusing on issues and their resolution, as applicable)

Financial management. From the financial management perspective, the project was complicated. It included two separate grants to two separate entities. In addition, changes to the implementation arrangements of the VCM component mentioned in Section 1.7 (inclusion of VST and commercial banks) required modifications to the financial manual and took additional time to work out proper arrangements. Existing staff of VCM, generally quite busy with their regular tasks, had to be relied upon. This slowed down the start up and complicated the transition to the new implementation arrangements.

The final overall rating of the financial management arrangements for the project was *Moderately Satisfactory*. However, during the project implementation FM ratings ranged from Unsatisfactory to Moderately Satisfactory for VE and from Moderately Unsatisfactory to Satisfactory for VCM. The main reasons for unsatisfactory performance were significant delays in submission of quarterly financial reports, changes in financial staffing (resulting in periodic vacancies in the financial function), and delays in finalizing the project financial software and revised financial manual.

Project financial statements were audited on an annual basis by acceptable auditors and the audit opinions were unqualified (clean), although the auditors did recommend improvements to internal control procedures and staffing. The final audit of the VCM project financial statements was received in January 2009, and the audit reports of the VE project part and VE entity are due on June 30, 2009.

*Procurement***.** There were no procurement issues during implementation. Both VE and VCM followed Bank procurement guidelines and no irregularities were recorded.

Environmental safeguards. The project triggered Operational Policy (OP) 4.01 Environmental Assessment. It was classified as Category B, which was a conservative choice as most of the project's activities took place either inside existing buildings or at their perimeter and had very little impact on the environment. Nevertheless, Environmental Management Plans (EMPs) were developed and included in the Project Operation Manuals. Compliance with the Environmental Assessment policy was considered *Satisfactory* throughout implementation.

2.5 Post-completion Operation/Next Phase
(including transition arrangement to post-completion operation of investments financed by present operation, Operation & Maintenance arrangements, sustaining reforms and institutional capacity, and next phase/follow-up operation, if applicable)

The VE implemented components. The buildings with BLS and apartments retrofitted by AL DSM will continue to be supplied with heat and receive the appropriate maintenance services by VE under a 15-year lease contract valid through April 2017. VE's plans to expand the AL DSM program to more buildings from the existing building stock are less certain as the LTL 20 million energy efficiency fund is now depleted. Furthermore, since the integration of the AL DSM component with VCM's Housing Renovation Program did not materialize under the ECP, the motivation for VE to expand the program on its own is unclear.

The VCM implemented components. VCM has confirmed its commitment to continue the Housing Renovation Program in the future. The ECP Commercial Fund component will require continued management by VCM – at least temporarily until the operation of the fund is transferred to the proposed national level facility (see below), which appears likely. At GEF project closing, US$1.191 million of the GEF grant had been transferred to homeowners as loans through commercial banks. US$0.397 million was repaid but US$0.794 million remained outstanding. Although the homeowners have been very disciplined in making their payments and the default rate has been zero, continued servicing of the loans will be required. The VCM Financial Department has acquired new Oracle based financial management software which will allow tracking the homeowners' payments more easily.

The ECP as a whole (replication at the national level). The ECP concept implemented under the project had several successful elements, such as high financial leverage, involvement of commercial banks and a private DH company in investments saving energy and improving the quality of heating services for the people. Some of these positive results of the Energy Conservation Program of Vilnius City have been noticed by the national level authorities. The Prime Minister of Lithuania has issued a decree to establish a working group to replicate the results of the Vilnius pilot program at the national level. The working group has recommended the following scheme. The EU structural funds (extended to Lithuania under a program called JESSICA - Joint European Support for Sustainable Investment in City Areas) will take over the role of the grant facility played by the GEF in Vilnius. The proposed implementation scheme is a scaled up (est. US$ 320 million, i.e. about 50 times larger) version of the Vilnius GEF project.

The most notable similarities are: (i) the residential sector is the main target of the national level energy efficiency program; (ii) a grant facility is used to capitalize a revolving fund that serves as a source of low cost capital for local commercial banks participating in the scheme; (iii) the commercial banks participating as co-financiers contribute additional lending from their own resources; (iv) the state provides a subsidy covering a substantial share of the investment costs of the program.

3. Assessment of Outcomes

3.1 Relevance of Objectives, Design and Implementation

(to current country and global priorities, and Bank assistance strategy)

GHG emission reduction through energy efficiency remains a very relevant objective for Lithuania. Most Lithuanian cities, including Vilnius, still have a massive stock of buildings that require renovation of their heating systems and building envelopes. The project has demonstrated the powerful potential of DH modernization in reducing GHG emissions, along with improving the country's energy security by mitigating Lithuania's dependency on imports of Russian gas for heating. The project has demonstrated the technical feasibility and economic benefits of AL DSM and building envelope investments. The replication of this experience on a broader scale is a desirable objective for future investment projects to be implemented in Lithuania.

The Bank has no active Country Assistance/Partnership Strategy in Lithuania. Following graduation, a limited program of free technical assistance has concentrated on demand-driven analytical and advisory services, mostly in the context of EU integration, including financial sector assessment, building capacity to produce and absorb innovation, consumer protection, and assistance with the Public Private Partnerships (PPP) framework. Of these themes, the project has particular relevance to PPP as the energy efficiency program in Vilnius was carried out in the context of a privately operated district heating system.

3.2 Achievement of Global Environmental Objectives

(including brief discussion of causal linkages between outputs and outcomes, with details on outputs in Annex 2)

The overall objective of the project was to reduce the emissions of greenhouse gases (GHG) from the Vilnius District Heating System.

Key outcomes:
Indicator 1. GHG emission reduction relative to base case ("without project") scenario. The annual emissions of GHG (CO2) have been reduced markedly relative to the pre-project level: from 718 ktCO2 in 2002 to 555 ktCO2 in 2008, or by 23%. While similar reductions were anticipated at appraisal, the actual *reductions achieved have been calculated to be about 13% higher*: 1.729 million tCO2 instead of the 1.526 million tCO2 targeted at appraisal. These GHG emission reductions are largely due to the VE-implemented BLS component. Although no funds for this component came from the GEF, the BLS component was an integral part of the ECP and a pre-requisite for the technical feasibility of the AL DSM component. The inclusion of these GHG savings is consistent with the methodology used at appraisal.

Key intermediate outcomes:
Indicator 1. The number of buildings with modern building-level substations (BLS) installed by VE. This number has reached 3062, which is 12% higher than the 2733 targeted at appraisal. The speed of introduction of BLS has also substantially exceeded the appraisal expectations.

Indicator 2. The number of buildings (and apartments) with apartment-level DSM (AL DSM) equipment installed by VE. Only 79 buildings have been equipped, against the appraisal target of 550. This is a disappointing 14% of the appraisal target. This dramatic shortfall is due to: (i) insufficient information about the benefits of AL DSM provided to homeowners by VCM; (ii) lower than expected demand for AL DSM equipment by homeowners, despite the substantial price discounts; (iii) failure of VE and VCM to combine the AL DSM and ECP Commercial Fund components in a common set of buildings; (iv) greater than expected challenges involved in obtaining homeowners' consensus to implement AL DSM within a multi-apartment building; and (v) VE's preference for implementing AL DSM in new buildings, which were not eligible for GEF support.

Indicator 3. The co-financing ratio for the VE implemented components (for the apartment-level DSM only). A ratio of 4:1 has been achieved, which means that one dollar of GEF has leveraged 3 dollars from other sources. This compares favorably with other similar projects. The ratio was set by specifying the disbursement ratio in the grant agreement. As such, it did not deviate from the appraisal target.

Indicator 4. The number of buildings (and apartments) having received financing from ECP Commercial Fund implemented by VCM. Thirty-five buildings have received this funding. No specific target for the number of buildings was set at appraisal. However, the amount of funding mobilized for this component ended up 2.9 times higher than the appraisal estimate (US$8.7 million instead of US$3.0m). This is a result of the high leveraging effect achieved per GEF dollar (see Indicator 5 below). However, this also speaks to the high cost of the building renovations undertaken.

Indicator 5. The co-financing ratio for the VCM implemented components. A ratio of 5:1 has been achieved, which means that one dollar of GEF has leveraged 4 dollars from other sources. This compares favorably with other similar projects and is the key reason why the amount of funding mobilized exceeded expectations, even though only about US$1.84 million out of the total allocation of US$4.0 million was disbursed under the VCM implemented components. No specific target for the co-financing ratio was set for the VCM implemented components at appraisal.

The table below reiterates the key performance indicators including all indicators mentioned in the main text of the PAD

Key performance Indicators	End-of-Project Target Value 2008.12.31		Actual	Achieve-ment in %	Comment
1. GHG emission reduction	Million ton CO2	1.526	1.729	113%	Estimated CO2 reduction **for VE and VCM parts** over 20 years
Replacement of group substations (GS) with BLS and upgrades of old-type BLS					
Modern BLS installed by VE	number of buildings	*2733*	*3062*	*112%*	
Apartment-level DSM					
Buildings equipped with AL DSM	number of building	*550*	*79*	*14%*	
Heat consumption with AL DSM	GWh/year	not specified	27.0 against 34.7 before	-	Heat consumption reduced to 78% of baseline
Cost of AL DSM equipment – per unit or per m2	LTL/m2	not specified	n/a	-	Prices have fluctuated much due to external circumstances. Effect from project has been negligible
Co-financing ratio for AL DSM	percent or multiple (times)	not specified	4:1	-	Ratio of total costs divided by amount of GEF funds
Building envelope improvements					
Buildings financed from ECP	number of building	not specified	*35*	-	
Volume of ECP investments	LTL	not specified	6.8 million	-	Value of contracts with homeowners
Repayments received and defaults	-	not specified	2.3 million	-	All payments received on time – no defaults
Co-financing ratio for VCM implemented components	percent or multiple (times)	not specified	5:1	-	Ratio of total costs divided by amount of GEF funds
Heat consumption with building envelope improvements	GWh/year	not specified	29.1 against 39.1 before	-	Heat consumption reduced to 75% of baseline

3.3 Efficiency
(Net Present Value/Economic Rate of Return, cost effectiveness, e.g., unit rate norms, least cost, and comparisons; and Financial Rate of Return)

The economic analysis at project appraisal consisted of an incremental cost analysis in accordance with GEF requirements. In line with the principles of the GEF Operational Policy No. 5 for removal of barriers to energy efficiency, the GEF resources had to be allocated to barrier removal activities enabling otherwise profitable ("win-win") investments. The unit abatement cost for such investments might either be very low or negative, if not for the barriers.

Based on the overall GHG emission reduction of 1,729 kton CO2 achieved by the project and the actual expenditure of the GEF grant of US$2.562 million, the unit abatement cost can be estimated to be **1.4 US$/tCO2** (or 5.3 US$ per ton of carbon equivalent) instead of 2.29 US$/tCO2 (8.4 US$ per ton of carbon equivalent) expected at appraisal. This is generally considered by GEF to be a cost-effective price of GHG emission reductions. For specific components including AL DSM and the VCM-implemented building envelope investments, the unit abatement cost is much higher (see Annex 3 for details). The assessment of the GHG-related cost effectiveness of this project therefore depends on the strength of the argument that the project should be seen as an integral barrier removal package, in which none of the components should be seen as completely separable.

3.4 Justification of Overall Outcome Rating
(combining relevance, achievement of GEOs, and efficiency)
Rating: MU

The final outcome in terms of GHG emission reductions is quite successful when the overall impact of the VE investments on the Vilnius District Heating system is considered. These reductions were mostly achieved by means of a complete overhaul of the DH system with the installation of over 3000 energy-efficient building-level substations (BLS). The speed of introduction of BLS throughout the city exceeded the Bank's appraisal projections. The introduction of BLS has allowed VE to reduce commercial losses in the district heating network to practically zero. The quality and reliability of heat supply to homes has also improved. All in all, it was a win-win investment.

Unfortunately, additional opportunities for energy savings and GHG reductions have been missed by the slow start of the building envelope investments by VCM and the lack of a coordinated approach between VCM and VE with respect to the AL DSM component. Substantial synergies could have been achieved if the AL DSM component managed by VE had been implemented in the same buildings that underwent renovation under the VCM implemented components. However, at project closing, very few buildings in Vilnius renovated by VCM also got AL DSM from VE.

The contribution of the AL DSM component to the overall GHG emission reduction was expected to be limited. Its role was to demonstrate the benefits of consumer-controlled use of heat in homes and consumption-based billing at the apartment level. This objective has been achieved only partially. On the positive side, the technical feasibility and energy saving benefits of AL DSM have been proved by VE and appreciated by the owners of the apartments who did get AL DSM. Apartment buildings with AL DSM tend to consume about 20% less energy than similar buildings without AL DSM. However, the scale of demonstration was far from sufficient both in terms of the number of buildings and in terms of the marketing and dissemination efforts

undertaken. Although consumption-based billing is becoming the norm in new buildings, many of which were connected to VE's system during the project, the scope of the GEF project did not include those. Within the Soviet-built housing stock in the city, consumption-based billing at the apartment level is currently practiced only in those 79 buildings where VE installed AL DSM. The homeowners in the rest of those buildings are still billed on the basis of heat consumption data for the building as a whole, and many of them are not aware that there is another way.

The creation of the commercially sustainable (revolving) financial facility - ECP Commercial Fund – cannot be considered fully successful. A financial mechanism involving both commercial and public funds has been designed and implemented under the project. However, sustainability of the fund's operation is not assured, and the fact that only 35 buildings have received support from the fund is clearly below the ECP model's potential. The Lithuanian government's decision to adopt a similar scheme at the national level (see Section 2.5), however, speaks to the success of some of the elements of the program. The most successful aspect of the fund's operation was its ability to attract the participation of commercial banks. However, VCM's ability to keep the banks motivated in participating throughout the project was not so successful, with at least one bank having to suspend its operations late in the project. The fund's ability to be self-sustaining as a revolving facility is also unlikely. While the repayments from the homeowners are coming back on time and with no defaults, the loan maturity periods of 10 years and more do not allow for the funds to revolve fast enough for self-sustaining operation.

3.5 Overarching Themes, Other Outcomes and Impacts

(if any, where not previously covered or to amplify discussion above)

(a) Poverty Impacts, Gender Aspects, and Social Development

Improvements in the quality and reliability of district heating services and reducing the heating bills by saving energy are beneficial to all customers of participating municipalities, but especially to the poor, for whom district heating is the only viable alternative. However, given the small number of buildings retrofitted (in total less than 100) the impact has been weak at best. More importantly, VE's program to install AL DSM included exemption of installation cost payments for low-income families. More than 300 families were granted such exemptions throughout the project.

(b) Institutional Change/Strengthening

(particularly with reference to impacts on longer-term capacity and institutional development)

The Country Assistance Strategy in effect at project appraisal included an objective of building the capacity of the Lithuanian municipal and local institutions. The institutional development impact of this project concentrated on the Vilnius City Municipality and its program to renovate its housing stock. In particular, the project assisted VCM in finding ways to reduce energy consumption where this aspect might have been neglected otherwise. The project also sought to contribute to VCM's capacity for productive engagement with a private partner such as VE.

The experimental activities such as the AL DSM pilot project have produced essential learning by doing. Last but not least, the project increased the capacity of the Lithuanian counterparts to engage with financial institutions. As Lithuania has acceded to the European Union, the opportunities for its participation in international projects have increased dramatically. The project has shown the necessity for the municipal authorities to engage with commercial banks and provided a model for doing so. The prospect of replication of the VCM/GEF financial mechanism at the national level using EU funds (see Section 2.5) is a sign of a positive overall institutional impact produced by the project.

(c) Other Unintended Outcomes and Impacts (*positive or negative, if any***)**
One positive side effect of the energy efficiency investments in the housing stock under the VCM implemented components was the increased value of the housing after renovations. Energy efficiency measures such as insulation of the exterior walls and replacement of windows are typically combined with an overall refurbishment, often producing a dramatic aesthetic improvement. Partly due to this (along with the increased comfort and other functional improvements), the housing market puts a substantially higher value on renovated buildings – sometimes, dramatically. The combined benefits of energy efficiency and market value of the housing may result in reasonably short payback time for such investments, even though they might take many years to pay off based on energy savings alone.

3.6 Summary of Findings of Beneficiary Survey and/or Stakeholder Workshops
(optional for Core ICR, required for ILI, details in annexes)
NA

4. Assessment of Risk to Development Outcome
Rating: M

The main objective of the project and its development outcome was to reduce the emissions of GHG (CO2). By the project closing date (end of 2008), the Vilnius DH system had reduced the annual emissions from 718 ktCO2 in 2002 to 555 ktCO2, or by more than 20%. While it is theoretically possible that the emissions may increase again, this would be contrary to the trend observed in Vilnius over the past six years. In all likelihood, further energy efficiency improvements and GHG emission reductions will be achieved, making the achievement of the project's development objective all the more certain.
The risks to sustaining the operation of the ECP Commercial Fund are more substantial. On the one hand: (a) VCM has the staff and systems in place to continue operating the fund; and (b) there is a reasonable chance for the program to advance onto the national level based on the experience of VCM. On the other hand, (c) VCM's action on the Bank's request to develop a plan for future operations of the fund is lagging behind and will slip outside the cycle of this ICR.

5. Assessment of Bank and Recipient Performance
(relating to design, implementation and outcome issues)

5.1 Bank
(a) Bank Performance in Ensuring Quality at Entry

(i.e., performance through lending phase)
Rating: MS
The Bank's performance in the identification, preparation, and appraisal of the project was moderately satisfactory. During preparation and appraisal, the Bank took into account the adequacy of project design and all major relevant aspects, such as technical, environmental, financial, economic, and institutional, including procurement and financial management. The The Bank provided guidance and oversight in the preparation of operational manuals (project implementation plans) for both the VCM and VE implemented components. A number of alternatives were considered for the project design. However, the choice of emphasis of the VE implemented components on apartment-level investments (AL DSM) should be reconsidered in future designs of similar projects, given the implementation challenges that this component

subsequently faced. Given the amount of time it took for VCM to complete the procurement of the necessary consulting services, it must also be questioned whether the process could have been accelerated by earlier guidance from the Bank on the procurement side. Splitting the GEF allocation into two separate grant agreements also might not have been optimal. Finally, it might have been best to incorporate a provision for participation of commercial banks into the VCM implemented components from the outset.

(b) Quality of Supervision

(including of fiduciary and safeguards policies)

Rating: MS

The Bank's performance during the implementation of the project was moderately satisfactory. The Bank allocated sufficient budget and staff resources, and the project was adequately supervised. The task team regularly prepared Aide-Memoires, alerted VCM and VE about issues found during project execution and facilitated prompt corrective action. The Implementation Status Reports (ISRs) realistically rated the performance of the project both in terms of achievement of development objectives and project implementation. However, the Bank's response to the difficulties faced by VCM and the need to adjust the implementation arrangements in 2005 (see Sections 1.7 and 2.2) might not have been rapid enough. In fact, the amendment letter was issued only in June 2006. On the positive side, the new arrangements worked well eventually as they drew on the local knowledge and ambition of motivated staff.

Later in the project (2007), the Bank may not have been decisive enough in responding to the lack of cooperation from VCM when the Bank proposed remedial action including the virtual integration of the VCM and VE implemented components. It might have been appropriate to take more radical steps at that point – such as suspension of grant proceeds and/or restructuring of the project. Another possible omission of the Bank team was to allow VCM not to implement M&E as a separate component of the project. The reasons for this were explained in Section 1.7.

Bank's procurement and financial management staff worked closely with both Recipients' staff to explain the rules and procedures to be applied during project implementation, with regard to procurement of goods and works, and selection of consultants, as well as audit requirements, based on the grant agreements. As mentioned in Sections 2.1 and 2.4, the FMS staff should be given particular credit for working out the proper financial management and reporting schemes in a challenging environment that required repeated adjustments. Overall, the Bank's supervision was active and flexible enough to adapt to changing conditions and seize opportunities for improvement.

(c) Justification of Rating for Overall Bank Performance

Rating: MS

Based on the Bank's performance during project preparation and implementation, as discussed above, overall Bank performance is rated as *Moderately Satisfactory*.

5.2 Recipient

(a) Government Performance

Rating: MS

The key government counterpart in the project was VCM. The original VCM leadership including the Mayor must be given definite credit for its commitment to undertaking a market-oriented approach to increasing the efficiency of heat supply to the city. The City invited a private company such as VE to operate the DH system and set specific energy efficiency performance requirements that VE had to satisfy. This included the requirement for VE to establish an energy efficiency fund as noted in Section 2.1. At the same time, as noted in Section 3.4, the next

administration of VCM missed significant additional opportunities for energy savings and GHG reductions – due to the slow start of the building envelope investments and the lack of a coordinated approach between VCM and VE with respect to the AL DSM component. There was also a high turnover of key staff – both within VCM and VST – which caused delays and some painful disruptions to the project.

The participation of the national government of Lithuania was largely through the support to the Vilnius City Housing Renovation Program. This support proved essential for sustaining the financial scheme created by VCM with GEF participation. However, it also made the scheme vulnerable to disruptions in such support, as the developments of the last year of the project showed.

(b) Implementing Agency or Agencies Performance

Rating: MS

The implementing agencies were the two grant recipients at the municipal level: VCM and VE. The comments on the performance of VCM were given above. The private company VE proved to be a reliable partner for the Bank. VE cooperated actively with the Bank and has been responsive to its requests. The achievement of the global environmental objective of the project (GHG emission reduction by the Vilnius DH system) is largely due to VE's efforts. At the same time, the decision of VE, after not finding enough political support from the Mayor in 2007, to shift the focus of the AL DSM program to new buildings was not beneficial for the project. New buildings were not eligible to receive grant support from the GEF. The dramatic shortfall on the number of apartments with AL DSM in the existing buildings is a disappointing failure of VE.

(c) Justification of Rating for Overall Recipient Performance

Rating: MS

In light of the performance of VCM and VE as discussed above, the overall performance of the Recipients was moderately satisfactory.

6. Lessons Learned

(both project-specific and of wide general application)

Lesson 1. Energy efficiency improvements in multi-apartment buildings of the Soviet era are a challenging undertaking that requires collective decision making by homeowners. It takes a concerted effort and a long-term partnership between the government and the private sector to successfully promote energy efficiency in these buildings. Key ingredients will be: information campaigns, support to HOA creation and access to preferential, long-tenor loans and/or subsidies.

Lesson 2. The combined energy savings from improving the heating systems and the building envelope can be about 40 or even 50%, with GHG emission reductions of a similar order. A few buildings under this project achieved such combined benefits. A program aiming at such combined energy savings could be very attractive for Lithuania at the national level (subject to finding capital cost reduction opportunities for the building envelope component as stated below under Lesson 4).

Lesson 3. The AL DSM equipment alone can save about 20% of heat energy to a residential apartment. This is the result of economic incentives to save energy created by AL DSM in combination with consumption-based billing. AL DSM implemented on a stand-alone basis (without the building envelope improvements) has a considerable cost advantage over the more comprehensive option under Lesson 2. Furthermore, the project has shown that homeowners

living in apartments with consumption-based billing tend to invest more of their own resources in energy saving measures such as window replacement and insulation. The apartment-level improvements, however, can only be successful if a streamlined mechanism for obtaining homeowners' consensus is in place and the municipal authorities actively participate in "selling" the idea to the public.

Lesson 4. Under the VCM implemented components, the project has demonstrated a model of a municipal-level facility capable of operating in a commercially oriented fashion to finance residential energy efficiency. Creating the incentives for commercial banks to enter the scheme is the key to scaling up a program using such a facility (please see Annex 8 for suggestions on how incentives can be created for banks). However, the project also demonstrated that building envelope investments remain costly, and energy savings alone may not be sufficient to generate a reasonable economic payback on them. For a national-level housing renovation program to be successful, it would be necessary to find ways to reduce the capital costs of building renovations – e.g., by applying more cost-effective procurement methods.

7. Comments on Issues Raised by Recipient/Implementing Agencies/Partners

(a) Recipient/implementing agencies

Both the Vilnius City Municipality and Vilnaiaus Energija have commented on the project. Their comments are summarized in Annex 7.

The team agrees with those comments and assessments.

(b) Cofinanciers

See Annex 8 for a summary of a commercial bank's views.

The team has taken note that the views expressed are mainly forward-looking and of the lesson-learned type. The fit in well with the lessons learned expressed in this ICR, especially lesson 4 that falls about creating incentives for commercial banks to enter a scheme.

(c) Other partners and stakeholders

(e.g. NGOs/private sector/civil society)

Annex 1. Project Costs and Financing

(a) Project Cost by Component (in USD Million equivalent)

Components	Appraisal Estimate (USD millions)	Actual/Latest Estimate (USD millions)	Percentage of Appraisal
A. SUBSTATION MODERNIZATION	**26.10**	**33.54**	**129%**
B. APARTMENT-LEVEL DSM	**10.00**	**3.09**	**31%**
C. ECP COMMERCIAL FUND	**3.00**	**8.74**	**291%**
D. ECP MANAGEMENT CONTRACT	**0.50**	**0.60**	**119%**
E. ADMINISTRATION OF ECP BY MUNICIPALITY	**0.30**	**0.17**	**57%**
F. MONITORING AND EVALUATION	**0.20**	**0.00**	**0%**
Total Baseline Cost	**40.10**	**46.13**	**115%**
Physical Contingencies	0.00	0.00	
Price Contingencies	0.00	0.00	
Total Project Costs			
Project Preparation Facility (PPF)	0.00	0.00	
Front-end fee IBRD	0.00	0.00	
Total Financing Required	**40.10**	**46.13**	**115%**

(b) Financing

Source of Funds	Type of Cofinancing	Appraisal Estimate (USD millions)	Actual/Latest Estimate (USD millions)	Percentage of Appraisal
Recipient	Municipal and state budget, commercial banks, homeowners' equity, VE's Energy Efficiency Fund financed by the parent company	33.60	43.57	130%
Global Environment Facility (GEF)		6.50	2.56	39%

Note: Under the VCM implemented components, the final GEF amount disbursed is US$1,840,869.95 (out of $4m allocated). Under the VE implemented components, the GEF grant disbursed is US$721,027.59 (out of $2.5m allocated). The total GEF grant disbursed is US$ 2,561,897.54 (out of $6.5m allocated).

Annex 2. Outputs by Component

Component A. Substation Modernization
Cost estimate at appraisal: **US$ 26.1 million**
Actual cost at project closing: **US$ 33.54 million**
Outputs: 3062 buildings with modern building-level substations installed by VE
Component B. Apartment-Level Demand-Side Management (AL DSM) component
Cost estimate at appraisal: **US$ 10.1 million.**
Actual cost at project closing: **US$ 3.09 million**
Outputs: 79 buildings (and 4111 apartments) with apartment-level demand side management (AL DSM) equipment installed by VE.
Component C. ECP Commercial Fund
Cost estimate at appraisal: **US$ 3.0 million**
Actual cost at project closing: **US$ 8.74 million**
Outputs: 1907 apartments in 35 buildings have received financing from ECP Commercial Fund implemented by VCM.
Component D. The ECP Management Contract
Cost estimate at appraisal: **US$ 0.5 million.**
Actual cost at project closing: **US$ 0.6 million**
Outputs: Business plan developed and implemented, including technical and financial services and interaction with the homeowners in developing a project pipeline. Results of the ECP Commercial Fund operation (as of December 31, 2008): USD 1,191,298.55 transferred by VCM/VST to banks for loans to HOAs; USD 397,235.60 repaid by the HOAs USD 794,062.95 outstanding balance (to be repaid by the HOAs) USD 74,918.02 currently at VST transit account; USD 70,706.30 still with the Parex bank (subordinated loan principal repaid by HOAs but not yet transferred to VST). USD 251,611.20 the amount in the ECP revolving fund account (accumulated principal repayments from the homeowners)
Component E. Administration of ECP by the Municipality
Cost estimate at appraisal: **US$ 0.3 million.**
Actual cost at project closing: **US$ 0.17 million**
Outputs: Financial reporting systems developed and implemented.
Component F. Monitoring & Evaluation of Global Environmental Benefits and Information Dissemination for Replication
Cost estimate at appraisal: **US$ 0.2 million.**
Actual cost at project closing: **US$ 0.0 million**
Outputs: NA.: the component was cancelled

Annex 3. Economic and Financial Analysis
(including assumptions in the analysis)

The economic analysis at project appraisal consisted of incremental cost analysis to satisfy the GEF requirements. In line with the principles of the GEF Operational Policy No. 5 for removal of barriers to energy efficiency, the GEF resources had to be allocated to barrier removal activities enabling otherwise profitable ("win-win") investments. The unit abatement cost for such investments might either be very low or negative, if not for the barriers.

The main economic results achieved by the project are summarized in the table below.

	VE implemented components		VCM implemented components
	BLS Subcomponent	**AL DSM Subcomponent**	**Building Envelope Investments**
Capital costs invested, US$	33,541,209	3,085,710	8,740,088
Annual economic benefits (cost savings) in final project year (2008), US$	38,652,261	570,845	797,609
Economic NPV (@10% discount rate), US$	182,547,613	1,501,765	-2,112,144
IRR	65.5%	20.4%	3.9%
IRR with cashflows including GEF grant	65.5%	29.5%	8.5%
Annual GHG emission reduction in final project year (2008), tCO2	109,476	1,617	2,259
Total GHG estimated emission reduction till 2020, tCO2	1,728,709	25,439	31,627
Unit abatement cost, US$ per tCO2	Negative ("win-win")	Negative ("win-win")	66.8
GEF grant proceeds used, US$	None	721,028	1,840,870
GEF grant used per ton of GHG reduced, US$/tCO2	N/A	28.3	58.2

The calculation underlying the economic NPVs and IRRs was done on the basis of actual investment costs and the benefits (cost savings) based on the estimated economic price of delivered heat. This price was assumed to be constant at LTL 200 per MWh, which is slightly above the residential heat tariff in 2008 net of VAT.

The negative NPV for the VCM implemented components points to the fact that the heat energy savings achieved under this component were not sufficient to recoup the investment costs. The factors that can make similar building renovations pay off in Lithuania on the basis of energy savings would be:
1) Further increase in the price of gas and delivered heat;
2) Reduction in the cost of renovations. For example, there is considerable room for cost reductions in the procurement procedures utilized. Under this project, procurement was done on a decentralized basis, with the HOAs independently entering into contracts with local suppliers. If in the future this is done through large scale competitive procurement contracts, the costs may come down - both due to the economies of scale and broader competition. In addition, as mentioned in Section 3.5(c) of this report, renovations also increase the market value of the housing stock. This benefit was not quantified in this economic analysis, but it can be quite substantial and valuable from Lithuania's point of view.

Cost-effectiveness of GHG emission reductions. Based on the overall GHG emission reduction of 1,729 kton CO2 achieved by the project and the actual expenditure of the GEF grant of US$2.562 million, the unit abatement cost can be estimated to be **1.4 US$/tCO2** (or 5.3 US$ per ton of carbon equivalent) instead of 2.29 US$/tCO2 (8.4 US$ per ton of carbon equivalent) expected at appraisal. This is generally considered by GEF to be a cost-effective price of GHG emission reductions. For specific components including AL DSM and the VCM-implemented building envelope investments, the unit abatement cost is much higher, as shown in the table above. The assessment of the GHG-related cost effectiveness of this project therefore depends on the strength of the argument that the project should be seen as an integral barrier removal package, in which none of the components should be seen as completely separable.

Annex 4. Bank Lending and Implementation Support/Supervision Processes

(a) Task Team members

Names	Title	Unit	Responsibility/ Specialty
Lending			
Victor Loksha	Energy Economist	ECSSD	TTL
Leonid Vanian	Sr Procurement Spec.	ECSPS	APS
Iwona Warzecha	Sr Financial Management Spec.	ECSPS	FMS
Supervision/ICR			
Peter Johansen	Sr Energy Specialist	ECSSD	TTL
Victor B. Loksha	Consultant	ECSSD	Consultant
Leonid Vanian	Sr Procurement Spec.	ECSPS	APS
Iwona Warzecha	Sr Financial Management Spec.	ECSPS	FMS
Galina Kuznetsova	Sr Financial Management Spec.	ECSPS	FMS

(b) Staff Time and Cost

Stage of Project Cycle	Staff Time and Cost (Bank Budget Only)	
	No. of staff weeks*	USD Thousands (including travel and consultant costs)
Lending		
FY01		122.82
FY02		77.12
FY03		110.27
FY04		2.95
FY05		0.14
FY06		0.00
FY07		0.00
FY08		0.00
Total:		313.30
Supervision/ICR		
FY01		0.00
FY02		0.00
FY03		0.00
FY04		71.44
FY05		47.77
FY06		63.22
FY07		57.07
FY08		54.57
Total:		294.07

*Note: Staff weeks are no longer supported by Bank information.

Annex 5. Beneficiary Survey Results

NA.

Annex 6. Stakeholder Workshop Report and Results

No workshop was held.

Annex 7. Summary of Recipient's ICR and/or Comments on Draft ICR

I. Input by Vilnius City Municipality, Recipient of the GEF TF Grant No. 052278-LT

The GEF Trust Fund Agreement to the City of Vilnius was approved by the Council of Vilnius City Municipality on the 2nd of July, 2003 by decision No. 01A-41-21.

The grant supported energy efficiency improvements in the housing sector and became an integral part of the Vilnius City housing renovation program „Renew your House – Renew the City". This program was developed in accordance with Lithuanian housing strategy approved by resolution No. 60 of the Government of the Republic of Lithuania of January 21, 2004. The Lithuanian housing strategy was developed with the support of the World Bank, the Japanese Government, the Nordic Council of Ministers', and with the help of the analytical studies drafted by foreign and Lithuanian consultants, analyzing the existing housing situation and the housing programs in progress. The strategy was drafted on the basis of principles of coherent development, subsidiarity, extensive partnership and social justice, and oriented towards the housing model of the EU countries. It was characterized by variety of housing types, standards, forms of property management and mobility of inhabitants. The program became part of the Vilnius City strategic plan for 2002-2011, entitled „Development of a Progressive Society".

The GEF funds were used to implement energy audits of block houses, investment projects to save energy, and technical supervision of the reconstruction work. Consultations with the block houses communities were held. Also, jointly with the commercial banks of Lithuania, loans were afforded for the block houses renovation. The provision of these loans started in December, 2006 and continued till the 31st of December, 2008, when the GEF project closed. Pursuant to the LR Local Self-government decree item 16, by the decree of the National support for acquiring or renting the accommodation and block houses renovation item 13 and the decision of the Council of Vilnius city Municipality on the 23rd of June, No. 1-424 „About Vilnius city renewing the houses program „Renew your House – Renew the City", Vilnius city Municipality decided to grant a subsidy to the owners of the flats in block houses who were participating in the program of Vilnius city renewal. During the project implementation period, 35 projects for modernization of block houses were financed, in cooperation with 31 Homeowners' Associations. The GEF grant funds extended to the homeowners through the commercial banks amounted to 2'919'515.36 Litas (Lt). Of this: 973'505.29 Lt have been repaid by the communities. Approximately 1.946 mln Lt is still outstanding. As of December 31, 2008, the account balance of the VCM revolving fund was 616'623.58 Lt. Also, 183'601.59 Lt was on the transit account of VST, and 173'279.94 Lt more was to be transferred by Parex bank to the transit account of VST.

During 2006-2008, AB SEB Bank lent 455'316.81 Litas for 4 block houses, AB Parex Bank 2'464'200.66 Lt for 24 houses. The repayments of GEF financed loans are: for AB SEB Bank - 307'094.41 Lt (67%), for AB Parex Bank - 666'410.88 Lt (27%). In total for 28 houses, 6'833'134.57 Lt was lent. As of December 31, 2008, 2'303'236.18 (33%) was repaid, and the amount outstanding was 4'529'898.39 Lt (66%). Altogether GEF grant funds in 2006-2008 returned 973'505.29 Lt, or about 30 percent of all the GEF funds lent out.

The final amount of the GEF grant disbursed under the VCM implemented components is 1'840'869.95 USD (from the provided 4 million USD). The loans from the commercial banks have been given for 5, 10 and 15 years.

There are 3'192 residential block houses in Vilnius at the moment. Their whole area is 8'504 thousand sq.m. Every year they use approximately 1.3 GWh, which is 69 percent the city's heat supply. Successfully implementing the projects provided measures, at the heated accommodations would be possible to economize 25-40 % heating energy per year. The table below keeps the estimated savings at 25%.

Year	**2006**	**2007**	**2008**
Number of block houses	10	25	35
Number of apartments	600	1500	2100
Cost in thousand Lt	3000	7500	10500
Average heating consumption per year (counting for standard year) ***before*** *the project, MWh/year*	11160	27900	39060
Heat energy savings, MWh/year (counting for standard year)	2840	7100	9940
Average heat consumption (counting for standard year) ***after*** *the project, MWh/year.*	8320	20800	29120
Average payments for heating per year, ***before*** *the project, in thousands Lt per year.*	1442	4326	7267
Projected heating savings per year, in thousands Lt per year (counting for standard year)	367	1101	1849
Average annual payments for heating ***after*** *the project, in thousands Lt per year.*	1075	3225	5418
Estimated heat energy savings in %	25%	25%	25%

Vilnius city Municipality in pursuance to implement the above measures, collaborated with LR Government and the institutions under the Government, AB Vilnius šilumos tinklai, the institution "Renew the town" – "Atnaujinkime miestą" (AM), UAB "Vilniaus Energija", and the HOAs.

To implement the project and to use GEF funds effectively, VCM held conferences and seminars, and used various outreach media such as TV, internet, and e-mail.

Successful implementation of the first investment projects in irmūnai district was an example for other block houses owners' communities. By successfully implementing Vilnius Heat Demand Management project, the Vilnius City Municipality hopes to continue the collaboration with the World Bank in implementing the Vilnius City Program "Renew your House – Renew the City". GEF project became the example in Lithuania based on which the Government of Lithuania is planning to create a block houses modernization fund by the end of 2009.

II. Input by Vilniaus Energija, Recipient of GEF TF Grant No. 050314-LT

Introduction

The Implementation Completion and Results Report (Report) is prepared following the World Bank guidelines on the reporting of completed projects (Implementation Completion and Results Report: OPCS, August 2006, last updated on 16-Apr-07). The Report presents outcomes achieved in two Project's components that were implemented by Vilniaus energija. It also gives assessment of the Project's goals, results and Vilniaus energija performance. Finally, lessons learned are presented that could be useful in designing similar projects.

1. Assessment of the Project objectives and design in the light of Vilniaus energija needs at the inception of the Project

Since the beginning of the lease of Vilnius District Heating System (DHS), "Vilniaus energija" (VE) has launched an extensive technical and commercial programme aimed at renovation and development of Vilnius DH system. VE inherited supply-oriented DHS with production controlled operations which meant that such a scheme could not respond to the demands of the customers. The strategy of VE therefore was a compete overhaul of DHS with a view to transform it to modern customer-oriented operations. In line with this strategy, VE proposed to Vilnius City inhabitants' individual heat consumption regulation system. The GEF Project objectives geared towards energy efficiency and demand side management were important to VE and reflected the following needs of the company at the inception of the Project:

- Demonstrate flexibility of district heating and its ability to sustain customized solutions oriented towards customers' demands;
- Stimulate penetration of apartment level demand side management measures into energy efficiency market by removing accessibility barriers;
- Increase competitiveness of VE while ensuring reliable, environment friendly district heat supply of high quality and at least costs.

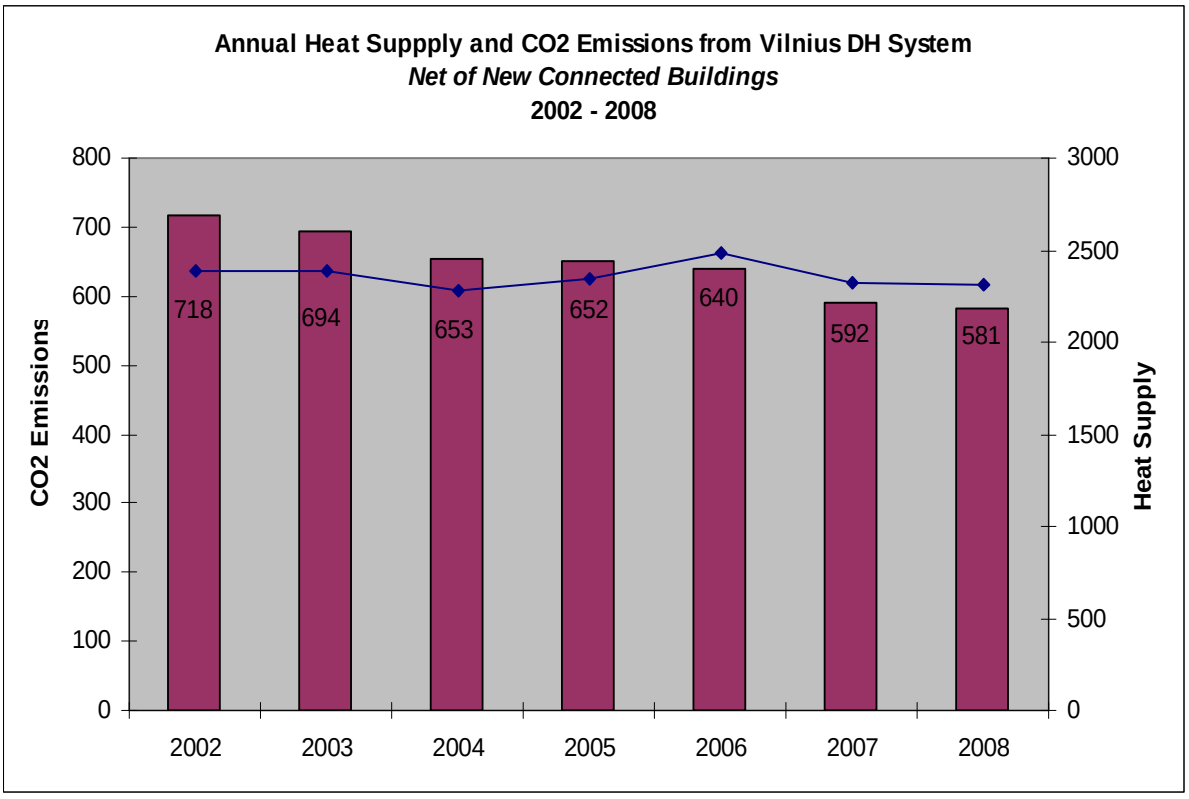
Projects components related to VE, that is, (i)) substations modernization and (ii) apartment-level demand side management (AL DSM) were consistent with the global Project goal to reduce the emissions of greenhouse gases (GHGs) from Vilnius DHS as a result of energy efficiency investments. The replacement of group substations by energy efficient automatically controlled building level substations (BLS) as well as replacement of elevator-type BLS was essential technical prerequisite for the demand-side management measures at the apartment and building level. It also significantly contributed to the reduction of CO2 emissions. Results achieved in AL DSM component demonstrated that energy demand could be decreased by up to 15-20 % and higher. It also allowed VE to introduce consumption based billing at apartments that had AL DSM. However, the projected target of AL DSM component was only partially achieved. Therefore its impact to CO2 savings was limited.

2. Assessment of the Project outcomes against the objectives

Reduction of emissions of GHGs. The global Project objective was to reduce emissions of GHGs from Vilnius District Heating System through reducing barriers to, and implementing sustainable and replicable energy efficiency investments in the residential sector. It was planned to achieve more that 1.5 million tones of CO2 emissions reductions by 2020.

During the life cycle of the project (2002-2008) VE reduced 137 ktones of CO2 excluding new connected buildings, or 19 % against 2002 (see chart No. 1). Based on CO2 reduction and energy efficiency results achieved by VE till end of 2008, it could be estimated that VE alone would save around 1.5 million tones of CO2 over next 11 years (till 2020).

Chart No. 1. Annual Heat Supply and CO2 Emissions from Vilnius DH System

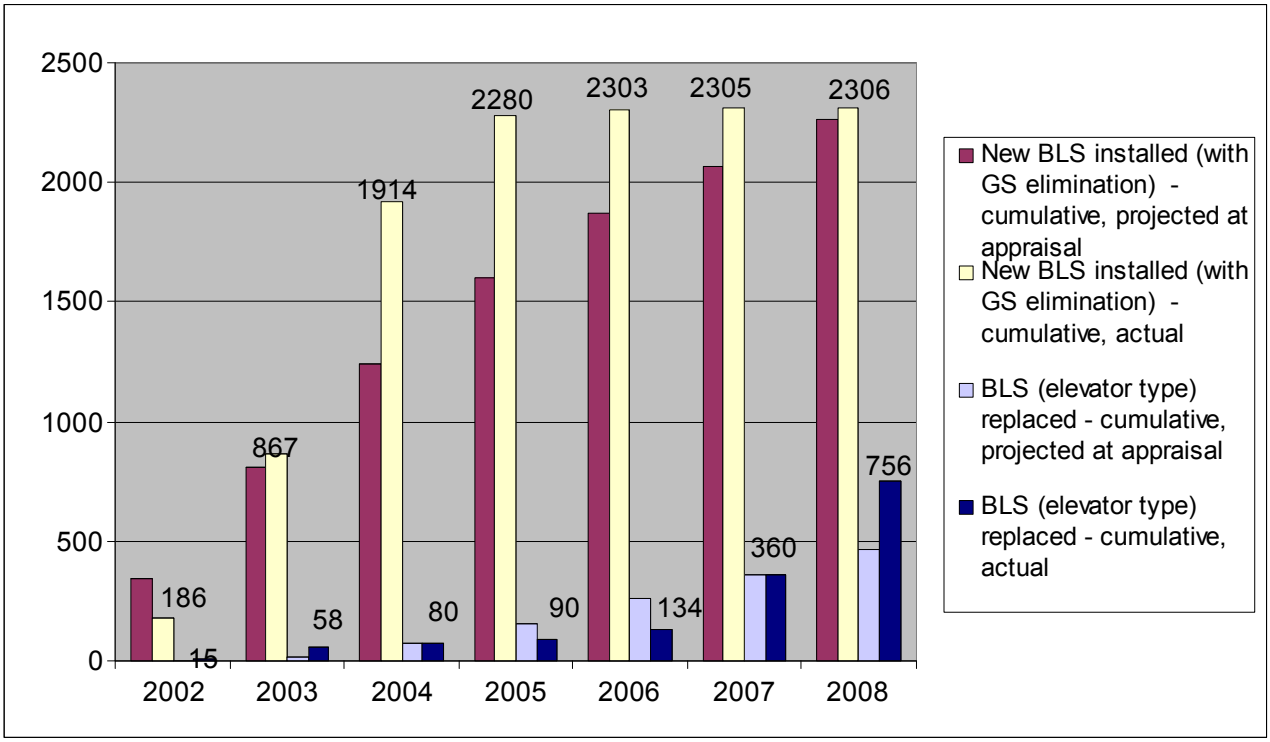


Following internal VE estimate, CO2 reduction is achieved mainly due to the following reasons:

- Rapid replacement of group substations by energy efficient BLS and modernization of old elevator-type BLS;
- Modernization of DH networks (VE replaced or build more that 110 km of pipes) and reduction of losses in the networks by more that 7 % over the period of 2002-2008;
- Reduction in HFO consumption and introduction of biomass since 2006;
- Warmer winters, which led to less degree days.

The Substation Modernization Component was successfully completed in 2007. The last BLS was commissioned in 2008. In total, VE installed 2306 new BLS instead of group substations in residential buildings and renovated 756 elevator-types BLS. The number of replaced/newly installed BLS exceeded projected targets given in the Project Appraisal Document (see chart No. 2).

Chart No. 2. Implementation of BLS Component: Projected vs Actual



As a result of installation of new BLS, more that 157 km of hot water network was eliminated. Investments into replacement of BLS and modernization of network reduced losses in the district heating networks from 21 % (2002) till 13.7 % (2008). Since the completion of BLS program in 2006, so called "commercial loses" (heat wasted for heating "lost" cold water) have disappeared (see table No. 1).

Table 1. Breakdown of losses in Vilnius District Heating Networks from 2002 to 2008

	Unit	2002	2003	2004	2005	2006	2007	2008
1. Heat supplied to the net	thous. MWh	3109	3180	3117	3028	3107	3009.8	2870.2
2. Heat sold	thous. MWh	2452	2532	2498	2505	2669	2577.2	2476.1
3. Losses	%	**21.13**	20.38	19.86	17.27	14.10	14.37	**13.73**
3.1. "Commercial" losses	%	**6.0**	5.2	4.4	3.1	0.6	0	**0**

Assuming that average efficiency of operations when burning gas was 88 %, it was saved approximately 26 MWh of annual energy and 29 MWh of fuel witch translated in around 6-7 ktones of CO2 eliminated annually from 2002 to 2008.

Implementation of **Apartment level Demand Side Management (AL DSM) Component** faced unforeseen barriers like low individual value perception of AL DSM for the average inhabitant, contradictory legislation and other difficulties *(see part 3)* despite the fact that VE dedicated qualified staff, conducted broad advertising campaign through various media (posters, billboards, TV and etc.) in 2004 and constantly demonstrated the benefits of AL DSM. Finally, prices for AL DSM installation works increased from 25 Lt/ m2 till 37-46 Lt/m2 in November 2006. Increased costs were absorbed by VE while costs for inhabitants were kept the same (6.25 Lt or 1 cent for low income people) in order to maintain initial design of the Project for the homeowners.

All these factors impeded sustainability of the component and led to the termination of the program in old construction buildings in October, 2007. Till this date 79 residential buildings out of targeted 550 were equipped with AL DSM (see table No. 2).

Table 2. AL DSM investments from 2002 to 2007

	AL DSM investments	2004	2005	2006	2007	Cumulative	End-of Project Target	Actual vs projected (%)
1.	Number of Buildings with AL DSM equipment installed	18	31	21	9	**79**	550	14%
2.	Number of Apartments with AL DSM equipment	1,099	1,540	1,049	423	**4,111**	24,000	17%
2.1.	*Of which in low income families*	104	132	58	20	**314**	4,800	7%
3.	Living heated area with AL DSM equipments (in m2)	60,797	88,904.46	64,885.78	27,115.50	**241,702**	1,200,000	20%

Heat consumption monitoring in AL DSM buildings proved that AL DSM provided heat energy savings for homeowners of up to 22 % in average (see chart No. 3). In total, it was saved 26,565 MWh of heat energy since November 2004 till February 2009 (see chart No. 4). Thus, homeowners using AL DSM spent 2,746,689 Lt less for heat that those not using the same system.

Chart 3. Heat consumption before and after AL DSM

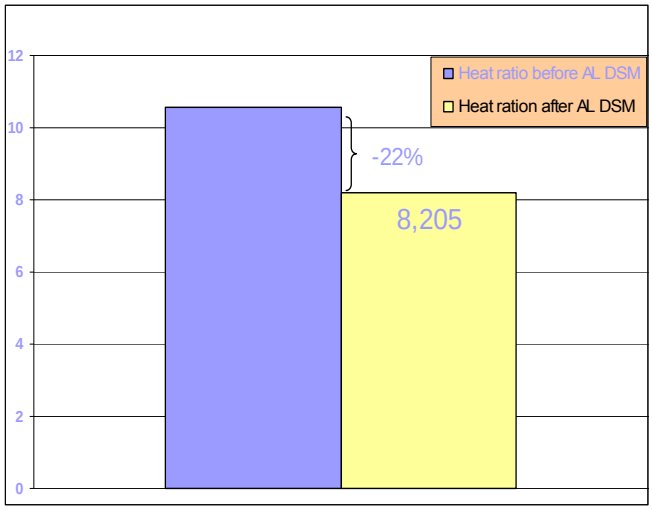
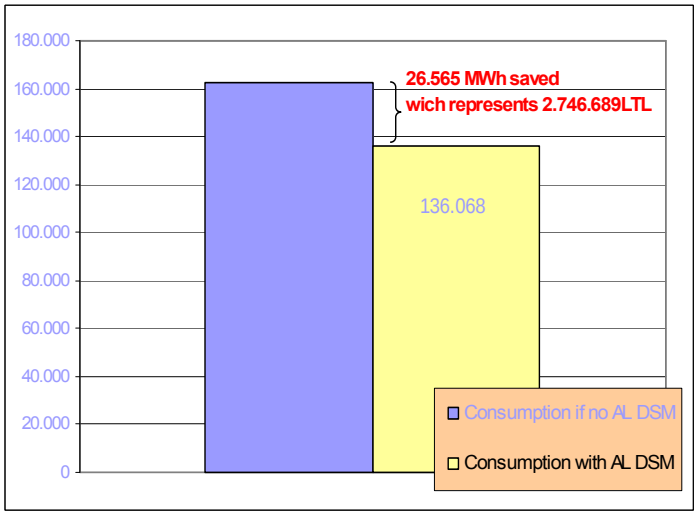


Chart 4. Heat energy saved from Nov-2004 to Febr-2009



Presuming 88 % average efficiency and gas as the main fuel, estimated savings under AL DSM component reached more that 30,000 MWh of fuel and more that 6,000 tons of CO2 during the life of the Project.

As reported to the World Bank's team during their Mid-term Implementation Visit on March 5-9, 2007, one of the important barriers revealed by the VE customers survey was the low trust in the AL DSM between the average inhabitants. In addition, the homeowners believed that refurbishment of buildings should come first. This unveiled that AL DSM and buildings envelope components of the same Project somehow compete in the perception of the homeowners. In May 2008, new scheme of integration of these two components was prepared so that to continue the Project. Regrettably, this new model did not receive sufficient support on due time in Vilnius City Municipality.

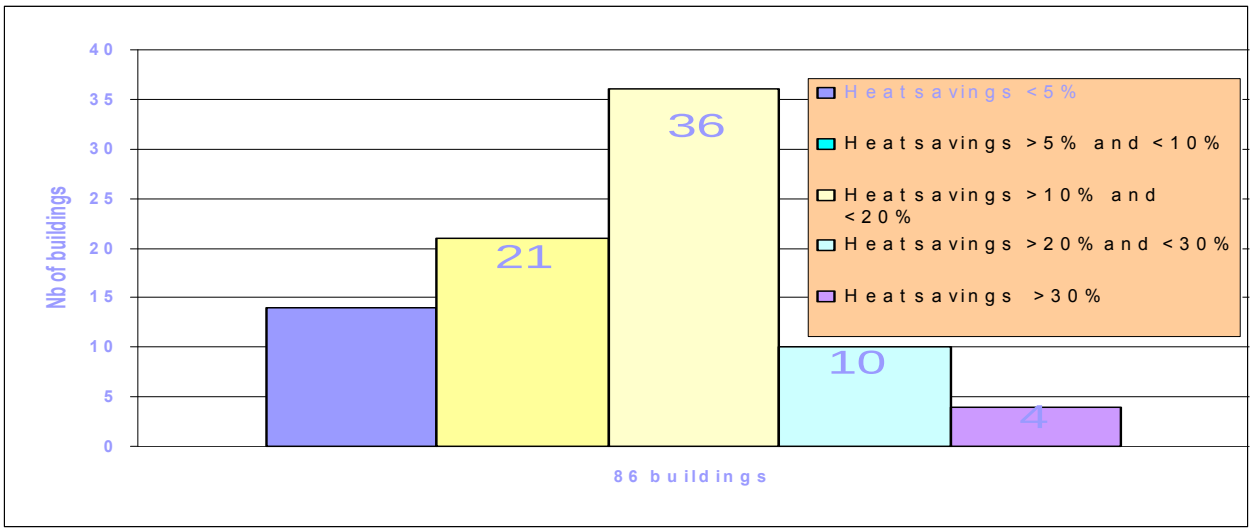
3. Evaluation of Vilniaus energija performance and lessons learned

Investments into installation of new BLS were part of VE long term program of modernization of Vilnius DH system. These investments contributed to the Project objectives of energy efficiency and CO2 reduction. Although AL DSM component did not reach projected targets, it demonstrated great potential in reducing heat consumption in cost-effective way (37-46 Lt/m2 against 300 Lt/m2 for the complete renovation of building). In general, VE customers using AL DSM are satisfied by the system. Monitoring of AL DSM buildings proved that in average AL DSM decreased heat bills by up to 15-20 % and higher in some cases. The actual energy savings varies from building to building (see graph No. 5). This pattern can be explained by inhabitants' financial capabilities and desire to have warmer or colder room temperature.

In several cases as it was in ygio str. 1, Antakalnio str. 89, irmūnų str. 76, 78 and Tuskulėnų str. 14, 16, 18 AL DSM was followed by replacement of windows and doors. According to the opinion of chair people (Mr. Edvardas Montrimas, Ms. Ona Rimšienė, Mr. Stasys Brantas and

Mr. Juozas Balkus) of Homeowners Associations of those buildings, AL DSM coupled with partial refurbishment of building provided costs-efficient energy savings solution. Moreover, with AL DSM VE was able to introduce billing for heat based on apartment-by-apartment basis. Besides energy efficiency outcomes, AL DSM also strengthened the image of VE as customers' focused and innovative company.

Chart No. 5. Repartition of heat savings in 86* AL DSM buildings



* The same 79 buildings, but every number of blocked buildings is counted separately

However, it is necessary to mention barriers that blocked implementation of the AL DSM component. According to VE project team assessment, it was hardly possible to predict such barriers at the time when the project was launched. Firstly, the idea turned out to be not sufficient attractive (maybe it came too early?) to average homeowner despite the VE staff efforts to demonstrate the AL DSM benefits. To mention, VE had the special AL DSM project team consisting from 5 managers that were dealing only with AL DSM issues. Their functions included promotion, communication with homeowners and HOAs, sales of AL DSM and supervision of installation works. The team reported directly to the Commercial Director. The managers also worked in close cooperation with Finance Department as well as heat managers who served buildings in various parts of Vilnius. Secondly, HOAs in Vilnius are still very rare. According to the data of Association of Vilnius HOAs, around 17 % of residential buildings (new and old construction) were managed by HOAs in 2008. Only minority out of this figure is active and performs any activity. Thirdly, the process of reaching common agreement between homeowners is long. But contracting on the apartment-by-apartment basis is not technically and economically feasible. Finally, the legal regulation appeared to be contradictory and not supportive the smooth implementation of AL DSM. Pursuant to the Law on Home Owners Associations (in., 1995, Nr. 20-449), decisions concerning *management* and *use* of *common propriety* in residential buildings are adopted by a *qualified majority* (50%+1) of votes. However, in other legal acts installation of AL DSM is not considered to be subject to the procedures regulating common property. Hence, *unanimous agreement is required*. Pursuant to Article 4.75 of the Civil Code of the Republic of Lithuania, installation of AL DSM system in residential buildings is directly associated with

setting up of heat cost allocators and other equipment in particular apartments. Consequentially, it is treated that AL DSM equipment is mounted on heating units that belong to the homeowner *on the rights of private ownership.* Therefore, VE as well as any other suppliers who would propose to install such systems, prior to setting up AL DSM in flats, are to obtain *consent of each apartment* owner (100 %) in whose flat AL DSM is to be installed.

Court practice that is undergoing the process of formation over this issue is also not favorable. For example, civil case No. 2A-29-157/08 of Vilnius Regional Court (Vilniaus Energija *vs* B. Mikaliūnienė) ruled that AL DSM set up in the flat of an individual owner *is not* subject to common propriety use, therefore, the decision of HOAs (adopted by the majority of homeowners votes) to install AL DSM in the building was unlawful. In this case the consent of a specific flat owner had to be obtained. In another case No. 2-4686-803/2009 of the First District Court of Vilnius City some flat owners in Debesijos str 4. made a claim against VE. They seek to repeal decision of HOA taken by the majority of votes and to declare already signed AL DSM installation agreements null and void.

4. Evaluation of the performance of the World Bank

Relationships with the World Bank's (WB) team were effective and fruitful over the course of the project. Mr. Peter Johansen and Mr. Victor Loksha in particular were responsive and delivering professional support both in solving implementation issues as well as looking for the ways to put the project on the track. In VE's project team view, they responded adequately to factors that took place during the life cycle of the Project and could impact the outcomes of the Project. For example, in tight cooperation with the WB's team it was developed a scheme for the integration of AL DSM and building envelope components. Unfortunately, this idea did not receive timely support in Vilnius City Municipality.

It is worth mentioning cooperation with the Association of Vilnius HOAs (the President Juozas Antanaitis). The Association rendered support in promoting AL DSM among its members. For example, representatives of Association were participating in AL DSM presentation meetings with the inhabitants.

Appendix 1

Table 1. Economic and Technical Data of "Vilniaus energija"

	Unit	2002	2003	2004	2005	2006	2007	2008
Average heating season	hrs	4400	4400	4400	4400	4400	4400	4200
Heat load served by the DH system	MW	354,91	363,01	355,82	345,66	354,68	343,58	327,65
Heat load served during heating season (Oct-March)	MW	706,59	722,73	708,41	688,18	706,14	684,05	683,38
of which newly connected buildings	MW	18,6	42,7	62	44	50	69	75
Heat load disconnected (if any)	MW	1,2205	0,393	0,189	0,025	0,308	0,391	0,837
Heat supplied to the net	thous. MWh	3109	3180	3117	3028	3107	3009,8	2870,2
Heat sold (heat supplied net of losses)	thous. MWh	2452	2532	2498	2505	2669	2577,2	2476,1
Gas consumption by the DH system	Thous. m3	332792	371972	372829	371020	363501	330372	309669
Heavy Fuel Oil consumption by the DH system	ton	39085	15099	7373	2021	3573	8424	15505
Bio fuel (wood) consumption)	ton					51.269	103956	95797
peat	ton						23461	138,5
Gas price with VAT	LTL/thous. m3						805	1355
Gas price net of VAT	LTL/thous. m3	354	351	334	327	476	683	1149
Average heat tariff with VAT	LTL/MWh							
- *Inhabitants*	LTL/MWh	114,43	112,81	108,86	104,52	116,45	139,47	184,90
- *Organizations*	LTL/MWh	128,38	128,38	126,59	124,49	131,90	158,80	204,95
Average heat price net of VAT	LTL/MWh							
- *Inhabitants*	LTL/MWh	103,32	102,21	100,54	99,54	110,91	132,83	176,10
- *Organizations*	LTL/MWh	108,80	108,80	107,28	105,50	111,78	134,57	173,69
New building-level substations installed	Number	186	681	1047	366	23	2	1
Building-level substations (elevator type) modernized	Number	15	43	22	10	44	226	396
DH network losses	%	21	20	20	17	14	14,37	13,7
Degree days	DD/year			4298	4325	4197	3925	3814

Appendix 2

Table 2. Summary of Planned and Achieved Project Outcomes Indicators

No.	Key performance Indicators	End-of-Project Target Value 2008.12.31		Actual Value Achieved at Completion	Actual vs End -of-Project target in %	Comment
		Units	Value	Value		
	Global outcome indicator					
1.	1. GHG emission reduction	Million tonCO2	1.526	1.502	98	Estimated CO2 reduction **for VE part only** over 20 years
	Outcome indicators for each component					
	Replacement of group substations (GS) with BLS and upgrades of old-type BLS					
1.	*Modern BLS installed by VE*	*number of buildings*	*2733*	*3062*	*112*	
1.1.	BLS replacement with GS elimination	number of buildings	2262	2306	102	
1.2.	BLS (elevator type) upgrades	number of buildings	471	756	161	
	Apartment-level DSM					
3.	*Buildings equipped with AL DSM*	*number of building*	*550*	*79*	*14*	
3.1.	Apartments equipped with AL DSM	number of apartments	24000	4111	17	
3.2.	Floor area of apartments with AL DSM	m2	1,200,000	241,702	20	
4.	Heat consumption in MWh/year with AL DSM equipment installed in comparison with baseline consumption	MWh	not specified	27,009 MWh/year against 34,705 MWh/year	-	Estimate of heat consumption on average year (3292 DD) in buildings with AL DSM and without AL DSM
5.	Co-financing ratio for the VE component (for the apartment-level DSM only).	percent or multiple (times)	not specified	4:1	-	Calculated as the ratio of total amount of financing used (including GEF, VE's own sources, etc.) divided by amount of GEF funds used in Lt

Annex 8. Comments of Cofinanciers and Other Partners/Stakeholders

The World Bank team interviewed some of the participating commercial banks to gauge the level of interest in future involvement in housing renovation/energy efficiency projects in the residential sector in Lithuania. Written comments were also received from one of the banks. The following points transpired:

- The current financial crisis has forced many commercial banks to suspend their lending to the residential sector.
- Banks are prepared to join a building renovation scheme again – in Vilnius and/or at the national level – but the Lithuanian government would have to put in place a general concept on how banks should participate.
- The concept should include providing some guarantees to the banks, for example:
    - A *partial credit guarantee* of up to 50% of the amount of any defaulting loan of a homeowners' association
    - A *portfolio risk guarantee* under which the state would completely cover some percentage (maybe up to 2%) of all defaulting loans in any given portfolio of loans to homeowners
    - Some combination of the two options above
    - Any additional risk reduction measures would be appreciated.
- Banks are interested in getting access to loans on concessional terms for on-lending to homeowners; this has worked well under the GEF/VCM project and can be done the same way under a new scheme such as that proposed on the national level utilizing the EU funds.
- The equity share (down payment) coming from homeowners should be at least 10% and preferably 20-25%. This is seen by the banks as an important risk reduction measure.
- Banks would also appreciate if the Lithuanian government would introduce some form of "quality guarantee" for energy efficiency housing renovations. At present, there is no agency in Lithuania that would take responsibility for the quality of energy audits and the actual renovations made.

On the latter point, the following written suggestions were received:

- "..[T]he technical support issue is the most concerning one, as the supervision of the technical operations and maintenance must be enhanced. Such supervision should not be performed by the person, who is employed by the project administrator. The technical operations and maintenance must be performed by independent party with an appropriate education and approved by authorized institution.
- The public purchase of the contracts should be performed in centralized way
- We would suggest preparation of the standardized certificated technical projects, as the multi-apartment houses intended for modernization are the standard shape. We are of the opinion, that the project arrangement for each house individually is pointless.
- In Bank's opinion, some share of the technical support funds must be reserved for the campaign itself regarding the public information, as the media here emphasizes the cons instead of pros as it turns to modernization.
- Transparency, high standards of all issues and control of results have to be assured widely."

Annex 9. List of Supporting Documents

1) Vilnius Heat Demand Management Project. GEF TF No. 052278-LT. Implementation Completion and Results Report. Prepared by Ricard Tomaševic and Rasa Bartasiuniene. Financial Department, Vilnius City Municipality. April 30, 2009.

2) Vilnius Heat Demand Management Project. GEF TF No. 050314-LT. Implementation Completion and Results Report. Prepared by Projects Manager Zydrune Juodkiene. Approved by: Head of KAC-3 Andrius Kasinavicius and Commercial Director acting Vice-President Rimantas Germanas. Vilnius, May 7, 2009.

Annex 10. GEF Perspective

Introduction

This was a GEF project in the Climate Change focal area. The project was designed in compliance with the principles of GEF's Operational Program No. 5: Removal of Barriers to Energy Efficiency. The project was not blended with an IBRD loan and thus it was considered a self-standing GEF project. However, the level of Lithuanian and foreign co-financing of the project proved to be quite high as shown below.

The objective of the project was to reduce the emissions of greenhouse gases (GHG) 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 Vilnius City. This would be achieved by: (i) 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; (ii) 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; and (iii) implementing monitoring, evaluation, and information dissemination activities aimed at facilitating the replication of the project's experience.

Implementation Approach

The project was implemented largely as designed in accordance with the logical framework developed at appraisal. Key monitoring indicators focused on by the project team were: (i) GHG emission reduction relative to base case ("without project") scenario; (ii) the number of buildings with modern building-level substations (BLS) installed by VE; (iii) the number of buildings (and apartments) with apartment-level DSM (AL DSM) equipment installed by VE; (iv) the co-financing ratio for the VE implemented components (for the apartment-level DSM only); (v) the number of buildings (and apartments) having received financing from ECP Commercial Fund implemented by VCM; and (vi) the co-financing ratio for the VCM implemented components.
These indicators proved to be adequate, and the logical framework proved to be useful as a management and M&E tool.

The partnerships that were formed during project preparation were integral to its design and implementation. The key partnerships were:

(a) Partnership with Vilniaus Energija (VE), a private operator owned by a foreign investor, which took charge of district heat supply in Vilnius on April 1, 2002. Under the lease contract with the City, VE committed to undertake a long-term and capital-intensive investment program aimed at modernizing the district heating system in the City.
(b) Partnership with the Vilnius City Municipality (VCM) and its subsidiary company VST in the implementation of its Housing Renovation Program.

In addition, partnerships with the commercial banks emerged during project implementation. These were key to expanding the ECP and achieving the needed leverage effect.

The involvement of other stakeholders was generally adequate, with some notable limitations (see below under "Public Involvement").

Country Ownership/Drivenness

The Bank's Country Assistance Strategy for Lithuania in effect at appraisal was designed to deepen the reforms with a view to EU Accession, and build capacity in municipal and local institutions. The project largely focused on capacity building at the local level through commercialization of district heating in Vilnius and decreasing the cost of heat supply for the residents. The Project also helped reduce Lithuania's dependence on gas imports for heating needs. The ownership at the Vilnius City level was achieved by close integration of the project with the Housing Renovation Program implemented by the City and by a partnership with Vilniaus Energija, the private operator of the district heating system. The high level of co-financing contributed by these parties is testimony to a high degree of local ownership in the project's objectives.

Public Involvement

VE implemented components. The project activities implemented by VE to modernize the district heating system were sufficiently well publicized. Early on, a survey was undertaken to take customer views into account. The project was covered in television interviews, news articles, and a brochure was published describing the benefits of BLS technology. Later in the project, VE developed the customer relations further by deploying dedicated staff to promote both BLS and AL DSM and conducting an advertising campaign including billboards, posters, TV programs, etc. However, participation of the homeowners in the initial decision to introduce AL DSM as a project component was less apparent. Some possibilities for alternative project design might have been missed (such as using GEF funding to upgrade the elevator-type BLS to modern level; this upgrading was known to be in demand by homeowners but most of it had to wait until 2007 – 2008 to take place). The AL DSM technology had been piloted under an earlier project with encouraging results, but its assumed acceptance by the majority of the residents was not very well tested.

VCM implemented components. Public outreach undertaken by VCM to promote its Housing Renovation Program helped associate the benefits of the GEF-financed ECP with housing renovations and thus helped engage the HOAs. However, the HOAs were not fully informed of the synergies of the program with the VE implemented components.

Replication Approach

The ECP concept implemented under the project had several successful elements, such as high financial leverage, involvement of commercial banks and a private DH company in investments saving energy and improving the quality of heating services for the people. Some of these positive results of the Energy Conservation Program of Vilnius City have been noticed by the national level authorities. The Prime Minister of Lithuania has issued a decree to establish a working group to replicate the results of the Vilnius pilot program at the national level. The working group has recommended the following scheme. The EU structural funds (extended to Lithuania under a program called JESSICA - Joint European Support for Sustainable Investment in City Areas) will take over the role of the grant facility played by the GEF in Vilnius. The proposed implementation scheme is a scaled up (est. US$ 320 million, i.e. about 50 times larger) version of the Vilnius GEF project. The most notable similarities are: (i) the residential sector is the main target of the national level energy efficiency program; (ii) a grant facility is used to capitalize a revolving fund that serves as a source of low cost capital for local commercial banks participating in the scheme; (iii) the commercial banks participating as co-financiers contribute

additional lending from their own resources; (iv) the state provides a subsidy covering a substantial share of the investment costs of the program.

Financial Planning/ GEF Grant and Co-financing

One of the achievements of the project design stage was to make sure that VE had a sufficient amount of co-financing set aside for energy efficiency purposes consistent with the GEF grant objectives. The amount (LTL 20 million or about $6 million) was specified in VE's lease agreement with VCM. This allowed VE to co-finance the GEF component on a 4:1 basis.

To achieve a similarly impressive leveraging ratio under the VCM implemented components, new elements such as participation of commercial banks had to be introduced into the project design during implementation. During the implementation phase, this GEF project proved to be even more highly leveraged than it was designed to be, with funding from other sources dominating the financing package. Even if the non-GEF financed Building Level Substations subcomponent is excluded from the calculation, the leveraging ratio for the project as a whole ended up being about 5:1, meaning that one dollar of GEF has leveraged 4 dollars from other sources. This is an impressive leveraging ratio for a GEF project not blended with an IBRD loan.

VCM implemented components

Co financing (Type/ Source)	GEF Grant (mill US$)		Government (mill US$)		Other* (mill US$)		Total (mill US$)	
	Plan	Actual	Plan	Actual	Plan	Actual	Plan**	Actual
Grants	4,000,000.00	1,840,869.95	4,833,555.00	4,262,233.17			8,833,555.00	6,103,103.12
Loans					1,650,049.00	1,234,263.88	1,650,049.00	1,234,263.88
Equity					1,087,057.00	2,173,865.66	1,087,057.00	2,173,865.66
Other						1,023.70		1,023.70
Adjustments***								-4,542.44
Totals	4,000,000.00	1,840,869.95	4,833,555.00	4,262,233.17	2,737,106.00	3,409,153.24	11,570,661.00	9,507,713.92

VE implemented components (including the BLS Subcomponent)

Co financing (Type/ Source)	GEF Grant (mill US$)		Government (mill US$)		Other* (mill US$)		Total (mill US$)	
	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual
Grants	2,500,000.00	721,027.59					2,500,000.00	721,027.59
Loans								
Equity					33,600,000.00	35,905,891.93	33,600,000.00	35,905,891.93
Other								
Adjustments***								
Totals	2,500,000.00	721,027.59	0.00	0.00	33,600,000.00	35,905,891.93	36,100,000.00	36,626,919.52

TOTAL PROJECT

Co financing (Type/ Source)	GEF Grant (mill US$)		Government (mill US$)		Other* (mill US$)		Total (mill US$)	
	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual
Grants	6,500,000.00	2,561,897.54	4,833,555.00	4,262,233.17			11,333,555.00	6,824,130.71
Loans					1,650,049.00	1,234,263.88	1,650,049.00	1,234,263.88
Equity					34,687,057.00	38,079,757.59	34,687,057.00	38,079,757.59
Other						1,023.70		1,023.70
Adjust-ments***								-4,542.44
Totals	6,500,000.00	2,561,897.54	4,833,555.00	4,262,233.17	36,337,106.00	39,315,045.17	47,670,661.00	46,134,633.44

* Other refers to contributions mobilized for the project from other multilateral agencies, bilateral development cooperation agencies, NGOs, the private sector and or beneficiaries.
** The planned amounts in this table were updated during project implementation; they are not the original appraisal estimates.
*** Adjustments are due to foreign exchange differences and one invoice not paid.

Component-specific leverage ratios

VCM implemented components

19% =GEF co-financing ratio
81% =contribution of sources other than GEF
4.16 =$ of co-financing attracted by every dollar of GEF
5.16 =leverage ratio

VE implemented components - including the BLS Subcomponent (non-GEF financed)

2% =GEF co-financing ratio
98% =contribution of sources other than GEF
49.80 =$ of co-financing attracted by every dollar of GEF
50.80 =leverage ratio

VE implemented components - excluding the BLS Subcomponent (non-GEF financed)

23% =GEF co-financing ratio
77% =contribution of sources other than GEF
3.28 =$ of co-financing attracted by every dollar of GEF
4.28 =leverage ratio

Project Total - including the BLS Subcomponent (non-GEF financed)

6% =GEF co-financing ratio
94% =contribution of sources other than GEF
17.01 =$ of co-financing attracted by every dollar of GEF
18.01 =leverage ratio

Project Total - excluding the BLS Subcomponent (non-GEF financed)

20% =GEF co-financing ratio
80% =contribution of sources other than GEF
3.92 =$ of co-financing attracted by every dollar of GEF
4.92 =leverage ratio

Cost Effectiveness

Based on the overall GHG emission reduction of 1,729 kton CO2 achieved by the project and the actual expenditure of the GEF grant of US$2.562 million, the unit abatement cost can be

estimated to be **1.4 US$/tCO2** (or 5.3 US$ per ton of carbon equivalent) instead of 2.29 US$/tCO2 (8.4 US$ per ton of carbon equivalent) expected at appraisal. It must be noted, however, that this figure is based on the overall amount of GHG reduction impact from the project. For specific components including AL DSM and the VCM-implemented building envelope investments, the unit abatement cost is quite different, as the table below shows.

	VE implemented components		VCM implemented components
	BLS Subcomponent	**AL DSM Subcomponent**	**Building Envelope Investments**
Capital costs invested, US$	33,541,209	3,085,710	8,740,088
Annual economic benefits (cost savings) in final project year (2008), US$	38,652,261	570,845	797,609
Economic NPV (@10% discount rate), US$	182,547,613	1,501,765	-2,112,144
IRR	65.5%	20.4%	3.9%
IRR with cashflows including GEF grant	65.5%	29.5%	8.5%
Annual GHG emission reduction in final project year (2008), tCO2	109,476	1,617	2,259
Total GHG estimated emission reduction till 2020, tCO2	1,728,709	25,439	31,627
Unit abatement cost, US$ per tCO2	Negative ("win-win")	Negative ("win-win")	66.8
GEF grant proceeds used, US$	None	721,028	1,840,870
GEF grant used per ton of GHG reduced, US$/tCO2	N/A	28.3	58.2

This was a GEF project in the Climate Change focal area. The project design had to comply with the principles of GEF's *OP No. 5: Removal of Barriers to Energy Efficiency*. Thus, it focused on areas that had potentially high economic returns but were facing implementation barriers. The ECP was designed as a joint barrier removal effort by VCM and VE. The project was conceived as an integral package. The subcomponent data, while useful, should not lead one to conclude that only the highest IRR or lowest unit abatement cost components were worth implementing.

Monitoring and Evaluation

The M&E arrangements for the project were based largely of the quarterly FMRs which covered mostly financial aspects of the operation. The monitoring of GHG emission reductions was conducted on an *ad hoc* basis, with most of the primary information coming from VE. The original project design also included an M&E component to quantify the GHG emission reductions and evaluate the financial performance of ECP Commercial Fund. However, VCM felt that GEF funding was not needed for the monitoring for three reasons: (i) VE made a very useful monitoring on their own; (ii) financial performance and most of the quantitative aspects of the ECP Commercial Fund could be judged on the basis of the financial monitoring reports (FMRs) produced by VCM; and (iii) there were obvious capacity constraints on VCM's part to procure and manage the consultancy services required for M&E as a separate project component.

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MAP

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