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IMPLEMENTATION COMPLETION REPORT
(CPL-38900; TF-22696)

ON A

LOAN

IN THE AMOUNT OF US$ 14.0 MILLION EQUIVALENT

TO

THE REPUBLIC OF LATVIA

FOR A JELGAVA DISTRICT HEATING REHABILITATION PROJECT

DECEMBER 28, 2000

Energy Sector Unit
Europe and Central Asia Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective December 1, 2000)

Currency Unit = Lati (LVL)
0.63 LVL = US$ 1.00
US$ 1.59 = LVL 1.00

FISCAL YEAR
January 1 December 31

ABBREVIATIONS AND ACRONYMS

CAS	=	Country Assistance Strategy
CHP	=	Combined-Heat-and-Power
CO2	=	Carbon Dioxide
DH	=	District Heating
EBRD	=	European Bank for Reconstruction and Development
ERR	=	Economic Rate of Return
EU	=	European Union
FRR	=	Financial Rate of Return
FSU	=	Former Soviet Union
Gcal	=	Gigacalorie = 1000 Mcal
HOB	=	Heat-only-Boiler
ICB	=	International Competitive Bidding
JDHC	=	Jelgava District Heating Company
Mcal	=	Megacalorie (about 1.163 kilowatt-hours (kWh))
MRB	=	Municipal Regulatory Board
MW	=	Megawatt
MWh	=	Megawatt-hour
NCB	=	National Competitive Bidding
NOx	=	Nitride Oxides
NUTEK	=	Swedish Development Agency for Advancement of New Technologies
PIU	=	Project Implementation Unit
RAF	=	Riga Autobus Factory
SB	=	Supervisory Board
SO2	=	Sulphur Dioxide
Tcal	=	Teracalorie = 1000 Gcal

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LATVIA
JELGAVA DISTRICT HEATING REHABILITATION PROJECT

CONTENTS

Project ID: P008526	*Project Name:* JELGAVA DIST HEAT
Team Leader: Carolyn Gochenour	*TL Unit:* ECSEG
ICR Type: Core ICR	*Report Date: December 28, 2000*

1. Project Data

Name: JELGAVA DIST HEAT
L/C/TF Number: CPL-38900; TF-22696
Country/Department: LATVIA
Region: Europe and Central Asia Region
Sector/subsector: PY - Other Power & Energy Conversion

KEY DATES

			Original	*Revised/Actual*
PCD:	02/22/93	*Effective:*	12/13/95	12/13/95
Appraisal:	10/28/94	*MTR:*	07/08/98	07/08/98
Approval:	05/23/95	*Closing:*	06/30/2000	06/30/2000

Borrower/Implementing Agency: REPUBLIC OF LATVIA/JELGAVA DISTRICT HEATING COMPANY AND ENERGY DIVISION OF MINISTRY OF ECONOMY
Other Partners: PHRD, Governments of Sweden and Finland

STAFF	Current	At Appraisal
Vice President:	Johannes F. Linn	Wilfred Thalwitz
Country Manager:	Basil G. Kavalsky	Basil G. Kavalsky
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2. Principal Performance Ratings

(HS=Highly Satisfactory, S=Satisfactory, U=Unsatisfactory, HL=Highly Likely, L=Likely, UN=Unlikely, HUN=Highly Unlikely, HU=Highly Unsatisfactory, H=High, SU=Substantial, M=Modest, N=Negligible)

Outcome: S
Sustainability: L
Institutional Development Impact: SU
Bank Performance: S
Borrower Performance: S

	QAG (if available)	ICR
Quality at Entry:		S
Project at Risk at Any Time:	Yes	

3. Assessment of Development Objective and Design, and of Quality at Entry

3.1 Original Objective:
The Project's objectives were to:

(a) ***extend the life and increase the operating efficiency of the Jelgava district heating (DH) system*** through rehabilitation of assets and introduction of modern technologies and materials;

(b) ***improve environmental conditions in affected areas*** by improving the efficiency of fuel use, facilitating the elimination of low stack coal-fired boilers in residential areas, and reducing waste of water in DH systems;

(c) ***support the strengthening and restructuring of the Jelgava District Heating Company (JDHC)*** through consultancy and advisory services, training and provision of equipment and software; and

(d) ***act as a pilot project for DH system rehabilitation for other locations within Latvia***, transitioning from a Soviet-type constant flow system to western European technology.

The Project's objectives were clearly defined and in line with the Government's energy sector policy and strategy. The Government's strategy gave priority to energy conservation and environmental improvement in the public investment program with a focus on better understanding new technologies before embarking on large-scale investments. In line with this strategy, a number of municipalities had been approached as possible sites to be included in a DH rehabilitation program under the EU-Phare financed "Energy Sector Savings Strategy" study. The City of Jelgava was one of the sites selected under the study and proposed by the Government as a potential site for the the Project to the World Bank energy identification mission that visited Latvia in December 1992. The clear institutional and ownership structure for the provision of DH services in Jelgava made it a good candidate for a pilot project. Since JDHC's establishment in 1992 as a municipal enterprise, the City of Jelgava had been very supportive of JDHC both in terms of approving necessary tariff increases and providing financial assistance both for operational and investment needs. In addition, both the municipal government and the DH company had shown themselves willing to cooperate with both the Bank and the Government and to pursue an improvement strategy that would meet sectorial development objectives.

In addition, the City of Jelgava had already begun a limited rehabilitation project with funds from the Swedish Government under the NUTEK program and an EBRD Energy Emergency Loan. The NUTEK pilot project enabled JDHC to test out the introduction of new technology, especially the handling and installation of pre-insulated pipes. The funds from the EBRD loan were used to procure heat meters for public buildings owned by the City of Jelgava. Implementation of both the NUTEK program and the EBRD loan were succesfully completed in the fall of 1995.

The Project's objectives emphasized the need for environmental sustainability of the DH sector in line with the Government's sector strategy. Thus, the Project was designed to assist the municipality and its DH enterprise in addressing the major environmental issues which were imminent in the inherited system (such as asbestos and pollution from low stack coal- fired boilers), and to provide the needed assistance for the emerging environmental legislation of the country.

A Country Assistance Strategy (CAS) (Report 13424-LV), prepared shortly before the Project appraisal, reinforced the Government's priority for energy conservation through a relatively small and targeted first round lending operation that could lay the ground for larger repeated projects in the future. Specific support through the proposed Rehabilitation Project was foreseen to include technical assistance to introduce a new institutional and regulatory framework for the energy sector and investment financing for rehabilitating and restructuring district heating systems.

3.2 Revised Objective:

The original Project objectives were maintained throughout Project implementation.

3.3 Original Components:

The Project included: ***(a) rehabilitation of the Jelgava district heating system*** by (i) upgrading the system to a variable flow regime, (ii) increasing boiler efficiency, (iii) leakage abatment, (iv) installation of heat meters, (v) elimination of environmentally unsound, low stack coal-fired boilers, and (vi) strengthening

the maintenance function; and ***(b) institutional support*** for (i) policy reform; and (ii) project implementation and enterprise restructuring for the Jelgava District Heating Company (JDHC).

The original investment allocation was as follows: Jelgava district heating system physical rehabilitation program: US$ 15.3 million; and institutional support program: US$ 0.5 million, yielding a total project cost of US$ 15.8 million. Of this amount, the World Bank was to finance US$ 11.8 million. The remaining investment requirements were to be financed by the Swedish Government (US$ 0.5 million for the institutional support program); and the project agency (US$ 3.7 million for installation works, project design, administration, civil works, and taxes and duties). The interest during construction was to be covered by the World Bank loan (US$ 2.2 million) and by the project agency (US$ 0.2 million) (see Annex 2).

The Project was supported by a US$ 0.5 million PHRD grant, which was utilized to initiate Project preparation and included a Project feasibility study conducted by the Swedish consultants ÅF-syd, a tariff study by consultants Ekono Energy of Finland, a study for Regulatory Framework for Jelgava by consultant W. Mostart (Denmark), and a study trip for JDHC management to Poland.

The EU, in its efforts to support Latvia in reaching the requirements under the acquis communautaire, provided technical support and substantial funding to help bring about energy reforms. These efforts resulted in approval of the Law on Regulation of Enterpreneurship Activities in Energy Industries in September 1995, which delegated the district heating regulation function to municipalities. A Government DH sector policy was approved in September 1997 and reflected discussions with the Bank on Government policies and strategy. A new market-oriented umbrella law for the energy sector was approved by the Parliament in September 1998.

3.4 Revised Components:

No major revision of Project components was undertaken. The US$ 2.0 million of loan funds left unallocated and the US$ 0.1 million unused funds from the category of consultants' services were reallocated to allow a part of the installation works to be funded from the loan proceeds and to finance the costs of financial audits.

3.5 Quality at Entry:

General: There was no quality-at-entry review undertaken for this Project. However, the Project built on a number of energy sector and sound feasibility studies of the individual project components funded by bilateral sources (Denmark, Finland, Sweden) and undertaken under the guidance of World Bank staff. Moreover, there were a number of investment projects funded with support of the World Bank, EBRD and other multilateral and bilateral sources under implementation in Estonia at the time of appraisal, and the early lessons were taken into account in Latvia. Last but not least, the Project benefited significantly from the implementation experience from the DH projects in the Europe and Central Asia Region, notably the major Heat Supply Restructuring Project in Poland (Project Number P008576). The Project Team visited the Bank-financed DH projects in Gdansk and Gdynia as a part of Jelgava Project preparation. Early lessons on implementation, time requirements, organizational arrangements and unit costs for network rehabilitation were, to the extent possible, applied in this Project.

At the time of project preparation and appraisal, the DH sector in Latvia, like in many other former centrally-planned economies, was characterized by high inefficiencies in its systems layouts and operations, high costs with primary energy inputs, i.e., gas and fuel-oil rapidly moving towards world market pricing, and high levels of water losses, as well as air pollution. In the Soviet period, heat tariffs had been extremely low. When fuel inputs (mostly gas and oil, but also to a limited degree coal) started to be sold at

world market prices in the early 1990's, the Latvian Government transferred the responsibility for the DH sector to municipalities. These municipalities had difficulties in balancing their roles as owners of the DH companies, which required them to raise tariffs to recover rising costs, with their roles as supporters of the interests of consumers, whose incomes did not rise at the same pace. The consumers had increasing difficulties paying and, in extreme circumstances, ceased to pay altogether, which increased the receivables of the DH companies significantly. This, compounded by the fact that the further needed increases of heat tariffs started to meet political opposition, led to a deteriorating financial situation of the DH companies. The Jelgava district heating system was in particularly poor shape due to its extremely poor technical condition including rampant corrosion caused by the high ground water levels and spring and fall floods of the Lielupe River. Avoiding a collapse of the system altogether was only possible through major rehabilitation, while simultaneously assisting the municipality to help raise tariffs to cost recovering levels for all customers.

Rehabilitation of the Jelgava District Heating System: This component was prepared by JDHC with the assistance of Swedish consultants (ÅF-Syd). According to the feasibility study, a rapid improvement in performance was to be realized after implementation of the investment components. However, the demand forecast was erroneous in the assumption that demand for heat would grow again from the low point of the 1992/93 winter during which time the heat supply was rationed. The study failed to consider the impact of tariff increases on demand and the competition from gas-fired mini-boilers. The Bank team, in close cooperation with the project agency, revised the high growth scenario significantly downwards (see Annex 3). On the other hand, assumptions regarding estimated implementation time and costs, as well as projected efficiency gains were largely realistic. The familiarity of the Bank team with ongoing investments in Estonia, Poland and similar projects elsewhere further facilitated appraisal and allowed for some correction of the study's short-comings. The quality at entry of these components is rated "Satisfactory."

Institutional Support Component: This component was designed to provide training in project management, efficiency improvements and environmental management, as well as consulting services for effective DH management, operations and maintenance of the system, including financial management, company restructuring, procurement and disbursement. It also included a component for the development of an organizational and regulatory framework needed under market-based rules with private sector involvement (Mostart/Ekono regulatory/tariff study, 1994). The component, together with Project investments, helped to prepare the DH company for commercialization through improvement of assets, operations and management systems. Funding for the component came largely from bilateral sources, including PHRD, the Governments of Finland and Sweden, and the DH company's own funds. The quality of entry at this component is considered "Satisfactory."

4. Achievement of Objective and Outputs

4.1 Outcome/achievement of objective:

The overall achievements of the Project objectives are judged to be "Satisfactory". The Project has substantially met the original objectives.

Extension of the life and increase in the operating efficiency: The Project has made excellent progress in extension of the life of the DH assets and in increasing operating efficiency during the period of implementation. Progress is likely to be sustained over the life of the investments.

The life expectancy of the whole network system increased from the estimated average of 5 years in 1994 to at least 30 years, and the repair cycle of the boiler heat transfer surfaces increased from 3-4 years to at least 8-10 years. JDHC was able to continue serving the customers with heat and hot water.

The Project has also made efficiency gains in heat production, transmission, distribution and consumption.

The specific fuel consumption of JDHC's boilers has been reduced by about 20% on average. The renovation of the transmission and distribution networks and installation of variable speed pumps has led to significant energy savings by reducing heat and pumping losses by about 45%. Very dramatic reductions in water losses amounting to a decrease of about 87% have been achieved due to network renovation and installation of new consumer substations. The renovated substations caused the specific heat consumption of buildings to be reduced by about 26-37% (depending on the service standard reference applied).

Improvement of environmental conditiosn in affected areas: The Project has been remarkable in reducing local air pollution, as well as emissions of greenhouse gases (CO_2) which are harmful in the context of climate change. The following table illustrates the reductions at Project completion (tons of pollutant/year):

Dust	SO2	NOx	CO2	Ash
47	685	56	40,226	415

Although the target values for pollutant reductions in tons per year were not identified at appraisal, the physical program of improvements was implemented as planned. The savings illustrate the significant improvement in the local environment as well as the reduction of greenhouse gas (GHG) emissions.

Strengthening and restructuring of the Jelgava District Heating Company: According to the original plan, the Project provided training in project management, efficiency improvements and environmental management, as well as consulting services initially for commercialization and restructuring of the Company, including elaboration of accounting, organizational, operational and maintenance manuals. The second stage of consulting included creating guidelines for establishing cost and profit centers, as well as training in procurement and disbursement. As a result of this component, JDHC strengthened and restructured its organization by undertaking improvements in its management and operations systems and by reorganizing its internal structure to a more consumer-oriented one, in line with the new market economy. A separate consumer services department, cost and profit center organization, as well as a bonus-based remuneration system were introduced in 1998. The organizational restructuring has contributed to improving system efficiency, by allowing better optimization of daily operations and by streamlining of functions and personnel. As a result, the staff of the company was reduced from about 309 in 1994 to about 202 in 2000. However, due to the weak financial position of the company, the planned conversion of JDHC to Joint Stock company was not possible during the project implementation period.

Training in project management was provided by consultant R. Sandstroem (Finland), training in management, efficiency improvements and procurement was provided by the implementation consultants FVB (Sweden), and training in disbursements by B. Lagerstedt (Sweden). The training has been successful as shown by the achievements made in the efficiency of the operations, and timely and unproblematic implementation of the Project by the Project Implementation Unit (PIU).

The company's maintenance function was improved by the introduction of a computerized maintenance database with the assistance of Komartek Oy (Finland) and provision of maintenance equipment, vehicles and tools.

The environmental management was improved by assistance provided by the specialized consultants Fenviron (UK). As a result of this assistance, asbestos standards for removal, transport, storage, and worker health in Latvia were developed. An asbestos removal, transport and disposal plan for JDHC was developed, and as a practical example of the application of the plan, the consultants participated and supervised the asbestos removal work related to the dismantling of the Kalnciema coal-fired boilers. The

specialized equipment for the asbestos removal work (protective apparel, negative-pressure-atmosphere equipment, heavy-duty washing machine, etc.) which were provided for JDHC under the consultancy and funded from the grant, remained JDHC's property for further use.

Acting as a pilot Project for DH system rehabilitation: The Project has been an important source of experience for other Latvian district heating companies struggling with similar problems as Jelgava. The Project has also been an important precursor for the much larger Riga District Heating Rehabilitation Project which has started implementation in Spring 2000. The unit costs and methodology of the implementation of project components have been available through the Jelgava Project and are now well known in Latvia, thus reducing risks and enabling good investment planning in subsequent projects. The Project also initiated a public debate on the regulatory aspects of district heating and gas/district heating competition in Latvia. The debate has greatly contributed to the public understanding of the issues involved, as well as to the formation of the new, market-oriented Energy Law of September 1998.

4.2 Outputs by components:

Rehabilitation of Jelgava District Heating System (Estimated Cost at Appraisal: US$ 15.3 million; Actual Cost: US$ 16.9 million)

Jelgava DH consumers on the left bank of the Lielupe River (about two thirds of the load) are served mainly by two integrated networks supplied by Ganibu and Rubniecibas boiler plants owned by JDHC. Both boiler plants have water preparation facilities, and hot water and steam boilers. The boilers can be fired on either heavy fuel oil or gas. The equipment of the boiler plants was rehabilitated under the Project.

Jelgava DH consumers on Lielupe River right bank (about one third of the load) are served with heat which JDHC purchases from the Joint Stock Company Jelgava Sugar Refinery's CHP plant. The Sugar Refinery's CHP is the only heat source of the right-bank network.

At Project appraisal in 1994, the Jelgava district heating system was in very poor condition, worse than most district heating systems in the Former Soviet Union (FSU) countries. The consultants' feasibility study of 1994 estimated that 75% of the network would need to be replaced within 5 years. The boiler tubes had to be replaced every 3-4 years. Without major investments, the Jelgava DH system would have physically collapsed in a few years.

The problems consisted of the following: (i) external corrosion of the networks caused by high ground water levels, (ii) internal corrosion of the networks and consumers' equipment caused by inadequate circulation water quality, (iii) corrosion of boilers caused by inadequate circulation water quality and sulfur corrosion of tubes due to too low surface temperatures in mazut operation, (iv) high heat losses in heat transmission caused by poor thermal insulation and leaks, (v) excess heat loss caused by inadequate temperature control at consumers and lack of heat meters, (vi) high circulation water pumping cost caused by constant flow operation regime, and (vii) minimal replacement of corroded sections and low level of maintenance since 1991 due to lack of funds.

The Project's rehabilitation component included: (a) abatement of leakage and corrosion; (b) increasing of boiler efficiency; (c) upgrading of the system to a variable flow regime; (d) installation of heat meters; (e) elimination of environmentally unsound, low stack coal-fired boilers; and (f) strengthening of the maintenance function.

Abatement of leakage and corrosion: The Project replaced about 58% of the original network. The sections which were prone to external corrosion were replaced with preinsulated pipe which is corrosion resistant towards external ground water. The investments helped to reduce leaks and thus the water losses

from an estimated 350,000 m3/year in 1995 to 44,000 m3/year in 2000. The steep decrease in the make-up water consumption which started in the early project years as a result of the replacement of leaking network sections helped to improve the circulating water quality and thus reduced the internal corrosion of the whole system. At the same time, the network heat losses were reduced from 79 Tcal in 1996 to about 44 Tcal in 2000.

*Increasing of boiler efficiency:*Boiler automation investments resulted in a heat production efficiency rise from 75% in 1995 to 89% in 2000 (91% with gas firing) at the two main production plants.

Upgrading of the system to a variable flow regime and insallation of heat meters: Installation of 354 individual automated consumer substations, automation and rehabilitation of 12 group substations, and equipping the consumers with heat meters allowed the system to be operated on variable flow instead of constant flow and reduced the specific heat consumption of the buildings from 178 Mcal/m2 in 1995 (actual value including forced rationing) to 132 Mcal/m2 in 2000. Investments in variable speed circulation pumps reduced the circulation pumps' electricity consumption from estimated 5,600 MWh in 1995 to about 2,300 MWh in 2000. At the same time, the service level has improved allowing adequate room temperature and domestic hot water throughout the year.

Elimination of environmentally unsound, low stack coal-fired boilers: The elimination of five coal -fired boiler houses and replacement of the boilers with new boilers firing gas (four boiler houses) and fuel oil (one boiler house) resulted in savings in operating expenses and in an annual reduction of 11.1 tons of dust, 92.0 tons of SO_2, 2.3 tons of NO_x, 3,500 tons of CO_2, and 409 tons of ash.

*Strengthening the maintenance function:*The maintenance function was strengthened by the provision of 6 maintenance vehicles equipped with maintenance tools and a computerized maintenance database software application including training.

Overall, the rehabilitation component was completed without major deviations from the appraisal plan and the outcome met or exceeded the expectations. In this regard, the Project is judged as "Highly Satisfactory."

Institutional SupportProgram for Project Agencies (Estimated Cost at Appraisal: US$ 0.5 million; Actual Cost: US$ 1.1 million)

The Institutional Support Program was designed to provide assistance to government ministries, Jelgava municipality and JDHC in the form of studies, implementation support, formal and on-the-job training, as well as technical assistance in procurement, project supervision and monitoring. The Latvian Ministry of Economy received support from London Economics (UK) in devising plans for energy enterprises to address accounts receivables and to improve collection rates, as well as in improving the performance of the Energy Regulatory Board. The Ministry of Environment and Regional Development and Latvian Committee for Standardization received assistance in developing asbestos standards by Fenviron (UK), based on the phased introduction of EU Directive 83/477 and then EU Directive 91/382. Jelgava municipality received assistance from Ekono Energy (Finland) and W. Mostart (Denmark) in developing an organizational and regulatory framework in Jelgava municipality, and DH tariff setting principles, respectively. JDHC received substantial assistance in restructuring their DH operations (Ekono Energy, Finland), support in implementation (FVB, Lagerstedt, Sweden), recommendations for effective management and operations of the systems (Sandstroem, Finland), and training, both on-the-job and through study trips to foreign DH companies (Poland, Finland, Sweden). This has contributed to strengthening the company and has helped to prepare it for restructuring and eventually, privatization. This component is judged "Satisfactory".

4.3 Net Present Value/Economic rate of return:

The Project has had significant economic benefits in all its components. The key benefits have been the extended life of the DH assets, reduced fuel costs, reduced water and electricity costs, improved efficiency of automated consumer substations, and improvement of environmental conditions in the affected areas. The ERRs for three cases are summarized in the following table (for details, see Annex 3):

Economic Rates of Return, Summary Table	ERRs
At appraisal	24%
At completion	29%
with international valuation of environmental benefits	37%

The benefits of the extended life of the DH assets are based on the assumption that (a) the DH network average life has been extended from about 5 years to 30 years and (b) the boilers' heat surfaces replacement cycle has been increased from 3.5 years to 8 years.

The benefits of reduced fuel costs in heat production and transmission are derived from (a) the boiler efficiency increase from 75% to 89% and (b) reduced heat losses in networks by about 45%.

In addition, water and electricty savings amounting to 306,000 m3/year of water and 3,500 MWh/year of electricity were assumed.

The benefits of the automated substations are derived from the reduction in the specific consumption of buildings due to (a) improved hydraulic balance of the network and (b) consumers' ability to reduce the heat intake. It was assumed that the heat rationing (inadequate room temperatures and intermittent domestic hot water supply) in 1993/94 would be eliminated during project implementation and that consumers would want a full service level (18°C even room temperature, domestic hot water always available) after the Project. At the completion of the Project, the measured specific consumption was 132 Mcal/m2 which was much lower than the expected figure of 210 Mcal/m2. The actual consumption figure includes also voluntary savings of heat from the full service level. It has been estimated that the specific consumption for the full service level in the present, modernized system would be about 160 Mcal/m2. The measured specific consumption at completion (132 Mcal/m2) indicates thus further savings of about 18% of the full service specific consumption level. The estimated full service level specific consumption of 160 Mcal/m2 is also lower than the original estimate of 210 Mcal/m2, due to a higher than expected impact of automation on the specific consumption. This indicates that the original system's hydraulic balance was worse than estimated by the consultants at appraisal. It appeared that the consumers had been removing control nozzles from the hydroelevators to boost their building's heat intake during rationing, and this had caused a major hydraulic imbalance in the system. The automated substations, which corrected the hydraulic balance, thus corrected a larger imbalance than was known at appraisal. The ERR, estimated at 24 % at appraisal, has been calculated for present system's full service level of 160 Mcal/m2 (ERR=29%). If the voluntary savings from the full service level are accounted for, the ERR would be about 30%.

Environmental benefits:

At appraisal, the environmental benefits were considered by valuing the dust emissions at US$ 50/ton and SO2 emissions at US$125/ton. No credit was given to the reduced CO2. A calculation has now been made by using the present international benchmarks for the valuation of these pollutants: SO2 US$ 265/ton; CO2 US$ 5.5/ton; and NOx US$ 180/ton; which yields an ERR of 37%.

4.4 Financial rate of return:

An FRR calculation for this Project was not made at the time of appraisal. A calculation has now been made which considers only the financial savings from the project investments without accounting for benefits from improvements in the service level and environmental benefits. This calculation yields 12% for the FRR.

Financial Performance of Jelgava District Heating Company (JDHC):

The improved financial performance of JDHC as estimated at appraisal did not materialize over the life of the Project and was poor throughout the implementation period. Summary financial indicators at appraisal and at Project completion are provided in Annex 1. Starting in 1994, the base year for the financial forecast, performance was vastly different from appraisal estimates with a net loss of over LVL 1 million (about 30% of revenues) as compared to an expected break-even performance. The main reason was that the operating subsidy required from the Municipality to make up the difference between the revenues based on the current heat tariff and actual expenditures did not materialize and resulted in a lack of funds. While the net loss was substantially reduced in 1995, the first year of project implementation, the need to write-off large levels of bad debts (originating mainly from bankruptcies) in 1996 and 1997 contributed to further net losses in these years. 1998 initially appeared to be a turning point as the first year with a recorded net profit, albeit a small one. However, this was not sustained and in 1999, JDHC registered a net loss once again. Throughout the period, JDHC maintained a negative net equity position with the exception of 1995.

A number of factors, which were largely unforeseen at appraisal, contributed to JDHC's poorer than expected financial performance. These included the following:

(a) During 1995, JDHC inherited an additional DH network (network of the Riga Autobus Factory which went bankrupt) on the right bank of the Lielupe River with worse conditions and substantially higher heat and water losses, and the network wasn't included in the project rehabilitation program. The network has only one heat source (a private company, the Sugar Factory) which was selling heat to JDHC at a bulk heat tariff higher than the cost of producing heat in JDHC's own, recently rehabilitated heat-only-boilers. JDHC has been unable to negotiate a lower bulk heat tariff from the Sugar Factory which produces heat in a more efficient, co-generation process with electricity.

(b) Heat demand dropped dramatically to only about 56% of appraisal estimates by 1999, largely as a result of municipal and state budgetary organizations disconnecting from the DH system and also due to residential consumers regulating the supply of heat to buildings which had renovated substation equipment.

(c) JDHC's significant past gas debts to Latvijas Gaze (see details in 5.2), which were transferred to the Ministry of Finance as part of the privatization of Latvijas Gaze, were settled and called for repayment over a 4-year period starting in 1999. The penalties on the gas debts added about 50% to the amount of the debt to be repaid (about Lats 4.1 million in total or more than 1 year's sales). Repayment roughly coincided with repayment of the principal and interest on the World Bank loan which fell due one year later, and JDHC could not pay both loans at the same time. The gas debts had not been considered in the financial forecast made at appraisal, although the gas debts were acknowledged and discussed during Loan negotiations.

The Bank team followed the difficult financial situation closely, and actively tried to find solutions to the problems. The Bank team urged JDHC to renegotiate the bulk heat purchase contract with the Sugar Refinery and, if necessary, to apply the regulatory powers which the law entrusted to the City Council to

review the bulk heat tariff. The Bank team also helped JDHC to obtain further grant funding for undertaking a study to evaluate the investment needs and feasibility of a Phase 2 project which would have recommended constructing a river crossing pipeline to the right bank network in order to allow greater quantities of heat to be purchased from the more efficient Sugar Refinery CHP plant. The feasibility study for the Phase 2 project was carried out by FVB consultants (Sweden), supported by Sida, but the weakening financial position of JDHC did not allow the required investments to be undertaken when the study was finalized (1999). The Bank team, therefore, tried to identify grant funding for the physical invesments needed for these additional items and was making good progress in its discussions with the Government of Denmark until the Kosovo crisis broke out and all available donor funds were diverted to that crisis.

To respond to the difficult financial situation, both Jelgava City Council and JDHC remained committed to finding all ways and means to improving JDHC's financial performance. Jelgava Municipality continually raised heat tariffs, and while the tariffs could not always be raised to full cost-recovery levels due to the declining local economy, the City Council pledged to provide the difference between tariffs and costs in the form of operating subsidies, although these were not fully forthcoming. JDHC was able to reduce its staff and operating costs through the efficiency gains from the project investments. JDHC also continued to improve its collection performance rate from an average of 86.5% during 1996, to 88.5% during 1997, 89.3% during 1998, 97.9% during 1999 and 103.8% during the first 9 months of 2000. However, these measures were not sufficient to turn the company's performance around.

In summer 2000, it apperared that a possible solution to the problems was finally at hand. In April 2000, Jelgava City Council initiated a tender to attract private investors in accordance with the recommendations of their consultant Ekono Energy (Finland) who had prepared options for improving the financial situation of the JDHC. This resulted in several proposals and expressions of interest from both local and international investors. The City Council determined that there was one serious offer which was being discussed with the potential investor.

During the negotiations with the investor, a small creditor (with a claim of Ls 2,000) of JDHC initiated a court proceeding against JDHC for non-payment on June 20, 2000, which resulted in a speedy court decision on June 21, 2000 that JDHC was insolvent (although JDHC had already settled its debt with this creditor). As a result, an Administrator for JDHC was appointed on June 26, 2000, and the private investor discontinued its discussions. The Administrator will manage the financial affairs of the company until a meeting of the creditors agrees on a solution. Currently the company continues to operate, and the 2000/01 heating season started on schedule without any technical problems in Jelgava.

A new tender for proposals from private investors has been conducted which has resulted in a number of offers that are now under consideration. However, a final decision on the privatization proposals for JDHC is not likely to be taken prior to the upcoming municipal elections in March 2001.

Despite JDHC's current financial difficulties, the company's performance could be turned around if it is able to (i) restructure its gas debts to the Ministry of Finance; (ii) negotiate a lower bulk heat tariff from the Sugar Refinery; and (iii) finalize the construction of a pipeline river crossing which would allow for greater quantities of heat to be purchased from the Sugar Factory to serve the DH networks on both banks of the Lielupe River. This is also the thrust of the requirements for private investor involvement. These options appear feasible in the near term which would lead to a resolution of the financial problems and restore the company's financial viability. For this reason, the financial sustainability of JDHC is judged to be likely.

Heat Tariffs:

Heat tariffs during 1995-98 were not increased to the levels envisioned at appraisal but were increased to a higher level during 1999 than originally envisioned. For the 1999/2000 heating season, Jelgava's average heat tariff was the fifth highest of Latvia's 23 district heating enterprises. However, as the specific consumption of the buildings connected to the DH system was reduced due to the Project investments, the estimated cost of heating a flat in Jelgava is now the fourth lowest of all the cities with district heating systems.

The fact that interest during construction was financed by the Bank Loan and capitalized into the principal had an adverse impact on the development of JDHC's heat tariffs. Since interest was not required to be paid out of revenues during project implementation, Jelgava City Council was able to keep heat tariffs lower during project implementation but then had to increase them sharply once the repayment of the loan commenced.

Although not required under the Project, in May 1999 Jelgava City Council approved a two-tier tariff for JDHC, allowing for a fixed capacity charge and a variable energy charge, a significant improvement over the single-tier tariff previously utilized. The switch to two-tier tariff system was introduced at the same time as a significant heat tariff increase. The new tariff structure, however, met with considerable resistance from a small share of consumers who created much negative publicity. The City Council and JDHC should have worked more with the inhabitants in advance to raise awareness of the benefits of the two-tier tariffs prior to their introduction.

Prior to the upcoming municipal elections to be held in March 2001, Jelgava City Council decided to transfer the retail tariff approval for the 2000/01 heating season from the Municipal Regulatory Board to the Energy Regulatory Board (ERB). The ERB reversed the tariff system from the two-tier tariff (achieved after a long and difficult political struggle) back to a one-tier tariff and reduced the level of heat tariffs at the same time, causing further financial difficulties for JDHC. The recently enacted (October 2000) Law on Regulation of Public Services now requires DH to be regulated only at the municipal level. However, the damage from reversing the two-tier tariff to a one-tier tariff has already been done.

4.5 Institutional development impact:

The Project has had a major impact on the DH sector throughout Latvia. Under the ***DH rehabilitation component,*** Jelgava received substantial investment support and technical assistance to improve their operations, management and financial practices. This has helped Jelgava to prepare for privatization of the DH company, which is already underway.

The Project has served as a pilot project for other Latvian cities with district heating systems and facilitated the initiation of the much larger Riga District Heating Rehabilitation Project. The ***institutional development component*** has been instrumental in bringing about these achievements by providing sector studies, assisting in implementation as well as by helping to improve management procedures and information systems. The Project has also demonstrated the need for improved sector regulation, and has fostered public debate on the gas/district heating competition. In this regard, the Project is judged "Satisfactory."

5. Major Factors Affecting Implementation and Outcome

5.1 Factors outside the control of government or implementing agency:

Industrial Bankruptcies: The decline of the local economy in Jelgava led to a decreasing number of

industrial enterprises. An especially big loss was the Riga Autobus Factory (RAF). As a consequence of the bankruptcy of RAF, the ownership of its heat network (11 km) and substations was transferred by the City Council to JDHC. The network and the substations were in bad technical condition. In 1999, Jelgava City Council was obliged to take over the housing area owned by Jelgava Region Railway Department, and the adjacent network (3 km) was also transferred to JDHC. This heat network and substations were also in bad technical condition. Improvement of these networks was not included in the original Rehabilitation Program, as these networks were not owned by JDHC. These arrangements have caused extra costs to the company.

5.2 Factors generally subject to government control:

Regulation of Gas Tariffs: Regulation of gas prices is the responsibility of the Energy Regulatory Board (ERB). Gas is underpriced for small consumers in Latvia, as gas prices for small consumers are at about the same level as gas prices for large consumers. Generally, in Western Europe, the cost of gas supply for small consumers is about 2-2.5 times that for large consumers. The present gas pricing policy creates unfair competition to DH from small gas-fired mini-boilers. This gas pricing policy is unsustainable and, if not corrected, could jeopardize the viability of all district heating systems in Latvia.

Gas Debt Rescheduling: During the 1992/93 heating season, the Government transferred the responsibility for the DH sector to municipalities and introduced an energy survival program for the country. The three points of the program were: (i) introduction of market prices for all fuels and other imported energy inputs; (ii) approval of heat and electricity tariffs at less than production costs; and (iii) provision of state subsidies to heat and power utilities to cover the difference between tariffs and production costs. The level of subsidies was inadequate to cover all costs of production and the delay in payment of subsidies, combined with high inflation, further exacerbated the financial situation of the utilities.

In 1995, the Government issued Regulation No. 323, intended to clear a part of the accumulated payment arrears for the period 1992-1994 for the major state debtors to JDHC (Psychiatric Hospital, Prisons, Railway hospital and kindergarten, and Agricultural Research Institute). The amount of the arrears to be cleared was LVL 221,063 (about US$ 400,000). This Regulation was not adhered to by the next government and subsequently, the amount was never paid to JDHC, although JDHC had to assume the the gas debt which had accrued for heating these buildings.

In the same year, the Government initiated rescheduling of JDHC's significant past gas debts, which were transferred to the Ministry of Finance as part of the privatization of Latvijas Gaze. The rescheduling called for repayment over a 4-year period starting in 1999. The penalties on the gas debts added about 50% to the amount of the debt to be repaid (about LVL 4.1 million in total). Repayment roughly coincided with repayment of the principal and interest on the World Bank loan which fell due one year later, and JDHC could not repay both loans at the same time.

It is questionable whether this debt should be the responsibility of the present DH consumers, as it was created by state policies under circumstances which neither Jelgava City Council, JDHC nor the consumers had any influence. The beneficiaries of the gas during the period 1992-1994 were those consumers which at that time were connected to the DH system. Those consumers included many who now have disconnected, including a number of state and municipal buildings, who would thus escape debt repayment. Therefore, it can be argued that it would be unfair to charge all of this debt to the present DH consumers. Given that the debt accumulated as a result of state policies, consideration could be given to eliminating the penalties and prolonging the repayment period and/or forgiving the debt altogether.

5.3 Factors generally subject to implementing agency control:

Overpriced Bulk Heat and a Major Conflict of Interest: Throughout the Project period, the bulk heat tariff of the Sugar Refinery CHP plant has been too high due to poor regulatory oversight by Jelgava City Council caused by a major conflict of interest. As background, the CHP plant at the Sugar Refinery was originally built to supply Jelgava's heating system, the RAF factory, and the sugar refining factory with heat. When in 1992 the plant was subject to privatization, it was offered to Jelgava municipality which was the main user of the heat. Jelgava did not, however, have the necessary funds available to purchase the CHP plant, and it was sold to the Jelgava Sugar Refinery. The Refinery has a license which is valid until 2017 to supply electricity to the national grid. The present electricity sales price which the plant receives from the national grid is about US$60/MWh, which is double the wholesale electricity price. This price is very advantageous and allows the plant to cover about 60-70% of its fuel cost with electricity sales. Therefore, the heat production cost at the plant is very low. As the Refinery's selling price of heat to Jelgava is higher than JDHC's HOB production cost, the profits from heat sales must be substantial. Only 20-30% of the CHP heat output is used for sugar production, during the period from October to December when the crop is processed.

The CHP plant has much excess capacity and could potentially supply most of Jelgava's heat demand, should the networks on the left and the right banks of Lielupe River be connected with a river crossing pipeline at an investment of about US$ 2 million.

Although at appraisal the optimistic load forecast led to the conclusion that the project would be viable without optimization of the heat production system with the CHP plant, it became evident during Project implementation that this might not be the case. The linear load density (heat amount consumed per network length), which at appraisal was estimated at about 4 Tcal/km, deteriorated to about 2.7 Tcal/km which was less than 3.0 Tcal/km generally regarded as the level below which cogeneration benefits would be needed to support the viability of the system.

The situation in regulation of the bulk heat tariffs which has arisen in Jelgava serves as a good example of how a conflict of interest can derail the optimal use of DH assets. The Law on Regulation of Entrepreneurship Activities in Energy Industries approved in September 1995 stipulated the delegation of district heating functions of the central Energy Regulatory Board to the municipalities. Jelgava City had established its first energy regulatory body already in March 1995, even before the law was passed, in the form of a Supervisory Board (SB) for JDHC. The SB consisted of 7 members representing the City Council members and consumers. The SB was to monitor the company and review the tariffs proposed by JDHC for approval by the City Council. In 1997, after the municipal elections, a new SB was approved consisting of 10 members including also representatives from Jelgava Sugar Refinery - the monopoly bulk heat supplier on the right bank of the Lielupe River (about 30% of JDHC sales). Such arrangements allowed the Sugar Refinery to get access to JDHC's technical and finanacial data. However, neither the Sugar Refinery's financial data nor bulk heat sales tariffs were reviewed or approved by the SB, although the law would have allowed for such a review.

In April 1999 the regulatory functions were transferred to the Municipal Regulatory Board (MRB) which consists of 8 members and regulates heat supply, water and sewerage as well as housing associations. The Chairman of the MRB, appointed by Jelgava City Council, is the Director of the Sugar Refinery.

The sugar lobby has been strong and influential in local politics, and no serious bulk heat price negotiations have thus far taken place. The situation with the negotiations has been especially difficult as the Director of the Sugar Refinery and the Chairman of the regulatory body have been the same person during much of the Project implementation period.

Switching to Small Gas Boilers: In order to protect the district heating assets from unfair competition from gas, Jelgava City Council approved the Jelgava Heat Supply Concept at the beginning of 1998. The Heat Supply Concept defined DH as the preferable long-run heat source in the existing DH area. It was followed by approval of "Regulations on Disconnections from DH in Apartment Buildings in Jelgava" in the fall of 1998, and the nomination of a commission for evaluating the applications for disconnections. Jelgava City Council, however, only half-heartedly followed the Heat Supply Concept, as the Regulations on Disconnections did not apply to public buildings. As a consequence, JDHC lost a substantial number of consumers to gas heating. The consumer base erosion due to this reason is significant, representing about 23% of the heat sales in 2000. Ironically, the leaders in the disconnections are the municipality itself (29%) and the state (68%), with private buildings representing only a small fraction (3%). This has hurt the financial viability of the Project, and the example given by the municipality itself has also affected consumers' attitudes towards DH. The decline in demand, as compared to other Bank-supported DH projects, was more pronounced in Jelgava..

5.4 Costs and financing:

The total cost of the Project including the interest during construction was estimated at US$ 18.2 million equivalent at appraisal. A loan of US$ 14.0 million from the World Bank was to cover 77% of the total costs, with the balance to be covered by the City of Jelgava and JDHC in the amount of US$ 3.7 million, and grants from donors in the amount of US$ 0.5 million.

The cost estimates and financing plan as estimated at appraisal and at Project completion are included in Annex 2 "Project Costs and Financing." In the end, the final Project cost and sources of financing differed only slightly from the original estimates. The final total cost was US$ 20.1 million or about 10% more than the original estimate. The key factors which had an impact on the costs as estimated at appraisal included the following: (a) the unit cost of consumer substation rehabilitation and heat meters estimated at appraisal at US$15,200/building, proved to be considerably less expensive (US$ 9,100/building) due to competitive bidding and the large quantities per package, allowing a greater number of buildings to be converted (all buildings in the main network); (b) the average unit cost of the district heating network estimated at US$ 234,000/km (US$ 300,000/km for preinsulated transmission network sections), proved to be less expensive (US$ 199,500/km) due to competitive bidding and large quantities per package, allowing greater amount of the network to be rehabilitated; and (c) the costs of works proved to be almost twice as much as the appraisal estimate due to rapidly increasing labor costs. During implementation, it was discovered that some of the above ground piping was in worse condition than expected and required changing of the whole pipe instead of insulation only. This increased the total cost of the network rehabilitation component so that it exceeded the appraisal estimate by some 40% in spite of the savings in unit costs.

The key factors which had an impact on the financing plan as estimated at appraisal included the following: (a) the costs of works proved to be almost twice as much as the appraisal estimate due to rapidly increasing labor costs, for which reason the Loan Agreement was amended to allow JDHC to utilize about US$ 1.0 million from the loan proceeds for works; and (b) JDHC's own contribution (mainly to the increased works' cost) was US$ 1.5 million greater than estimated at appraisal. US$ 13.8 million of loan funds of the total of US$ 14 million were disbursed and the remaining US$ 0.2 million has been canceled.

6. Sustainability

6.1 Rationale for sustainability rating:

The investments under the Project led to asset life extension, efficiency gains and cost savings of JDHC. Moreover, the Project investments have helped to improve environmental performance, which in turn has assisted JDHC meeting international environmental standards. This is not only important in the local context for improved living conditions but also increases the value of assets for privatization.

In addition, consultant support, training and technical assistance for management system improvements helped JDHC to realize savings through improved management, technical operations and general housekeeping, allowing JDHC to further reduce costs. The improved management systems have allowed a better understanding of JDHC's strengths and weaknesses. In turn, the management has started to address the weaknesses and build on their strengths.

Despite JDHC's current financial difficulties, the company's performance could be turned around if it is able to (i) restructure its gas debts to the Ministry of Finance; (ii) and/or negotiate a lower bulk heat tariff from the Sugar Refinery; and (iii) finalize the construction of a pipeline river crossing which would allow for greater quantities of heat to be purchased from the Sugar Refinery to serve the DH networks on both banks of the Lielupe River. This is also the thrust of the requirements for private investor involvement. These options appear feasible in the near term which would lead to a resolution of the financial problems and restore the company's financial viability. For this reason, the financial sustainability of JDHC is judged to be likely.

If it had not been for the present financial problems, the Project Sustainability would have been rated "Highly Likely." However, given the still pending financial problems, which are expected to be overcome in the near future, the Project's sustainability is rated "Likely."

6.2 Transition arrangement to regular operations:
All the physical assets which are needed for a sustainable DH operation are now available in Jelgava: consumer base with new, automated substations, rehabilitated heat networks, rehabilitated HOBs, and a CHP plant which could supply most of the heat demand with cheap, cogenerated heat.

The main transitional arrangement to regular operations now concerns how to facilitate the use of the assets in an optimal way. This could be achieved by implementing the following: (a) the CHP plant should supply a much larger portion of Jelgava's base load at a much lower cost than JDHC's boiler plants, which should be possible by renegotiating the bulk heat tariff and constructing the river crossing pipeline to allow CHP heat to be transferred also to the main network; (b) the City Council should adhere to its long term least cost heat supply concept to restrict the consumer shift from DH to gas as long as the gas prices for small gas boilers are subsidized at the expense of district heating customers; and (c) the privatization of JDHC should be completed soonest, as the local politics and conflicts of interests have made the optimal use of the assets difficult.

7. Bank and Borrower Performance

Bank
7.1 Lending:
The Bank team was well equipped with early experiences from the implementation of the DH project in Poland and with a number of professionally done feasibility studies on the Latvian energy and heating sector.

The insistence of the Bank team to scale down overly-optimistic demand forecasts of the consultants was helpful and took into account the efficiency improvements on the supply side expected to result from the project investments. However, the reduced demand forecasts did not capture in full the impact of: (a) the

decline of the local economy which led to a decreasing number of industrial customers; an especially big loss was the Riga Autobus Factory, (b) the unexpected loss of municipal and state owned consumers, and (c) lower than expected specific consumption of the buildings equipped with automatic controls and heat meters.

7.2 Supervision:

General: Most of the bank team, including the task manager, changed from the appraisal to the supervision stage. Only the original project engineer continued to work on the project during implementation. This lack of continuity, however, did not have an adverse impact on supervision quality, as the new task manager was very familiar with district heating projects. The Latvian side expressed its particular appreciation for the guidance provided by the Bank team. Moreover, the Bank's Riga Office was very helpful in supporting the dialogue, arranging for missions and meetings and ably following-up on specific is ıes. It was also helpful for the continuity that the key Bank person at the Riga Office had participated the Project during the preparation phase in her previous capacity as an employee at the Ministry of Economy.

Implementation Support: The Project was closely supervised with two supervision missions per year, on average, totaling 9 missions over the life of the Project implementation period. These missions addressed performance to-date and outstanding issues as well as planning for next steps. The missions made a special point to meet each time with representatives of the central Government (Ministries of Finance and Economy), with the Mayor and City Council representatives as well as management and staff of JDHC. Concise but comprehensive mission reports about progress performance, issues encountered and further planning were a hallmark of this Project.

Bank Team's Response to the Emerging Financial Difficulties: The Bank team was proactive in trying to find solutions to the emerging financial problems which developed during the project period because of unforeseen external circumstances. The Bank team proposed a variety of measures which Jelgava City Council and JDHC pursued. The Bank team is still actively monitoring the situation with a view to finding an appropriate solution.

Mid-Term Review: The Mid-Term Review was conducted in July 1998. The review judged the overall physical performance of the Project satisfactory. In addition, the Review strongly recommended that a substantial heat tariff increase was needed to support the improvement of the financial situation of JDHC and to allow for the repayment of the gas debts. The project team also promoted the introduction of a two-tier tariff system for better ensuring that heat tariffs would adequately cover costs. As a result, in 1999, Jelgava City Council approved a major tariff increase and introduced the two-tier tariff.

7.3 Overall Bank performance:

In the light of above experiences, the performance of the Bank is rated as "Satisfactory."

Borrower

7.4 Preparation:

General: During Soviet times, the DH sector of Latvia was administered centrally out of Moscow (Ministry of Energy). After 1990, there was an eagerness to decentralize DH systems to the municipal level. A decentralized sector which would be able to operate without state subsidies was considered essential towards a sustained DH sector performance. The Government wanted to proceed with a relatively small and targeted first lending operation that would lay the foundation for larger projects in the future.

Project Preparation Performance: The strong motivation at all levels of Latvian counterparts during the

Project preparation helped to set common goals for the Project and its components. The Jelgava District Heating Rehabilitation Project was initially part of a larger project preparation effort which started 1992. The larger project was to include the introduction of domenstic fuel boilers in small municipalities, rehabilitation of hydropower plants, rehabilitation of gas receiving stations, rehabilitation of Riga's DH system, and a number of other DH rehabilitation projects. For various reasons, only the Jelgava component proceeded to the preparation phase.

7.5 Government implementation performance:

Implementation:The Ministry of Finance administered the on-lending of the Bank loan, and the Ministry of Economy provided support for the project issues. These government agencies consistently acted as facilitators for the implementation of the Project. The loss of state-owned consumers to gas heating could perhaps have been avoided with a stronger commitment of the Government to the Project's goals. Further, the Cabinet of Ministers' Decree No. 323 clearing the arrears of heat bills of the state owned buildings in the amount of LVL 221,063 (about US$ 400,000) (see Chapter 5.2) to JDHC was not adhered to, as the subsequent Government did not agree to it, contributing to the financial difficulties of JDHC.

7.6 Implementing Agency:

JDHC was eager to implement the Project and managed the implementation process well. The cooperation of the staff of the company was in all respects outstanding. The staff was highly motivated and this, combined with the support they received from the municipality and consultants, led to smooth implementation of the investment program.

The support of Jelgava City Council to the Project varied with local political trends. The Project would have benefited from a clearer and more pronounced heating strategy of the City and unbiased regulatory policy. The loss of municipal consumers from the consumer base has hurt the financial viability of the Project, and it could have perhaps been avoided by the municipality's clearer commitment to the Project's objectives in the implementation stage. Jelgava City Council could perhaps have used more effort in trying to prevent their own buildings and the state-owned buildings from abandoning the DH system.

7.7 Overall Borrower performance:

In the light of above experiences, the performance of the Government and Jelgava City Council is rated as "Marginally Satisfactory." The performance of JDHC was "Highly Satisfactory."

8. Lessons Learned

General: Jelgava District Heating Rehabilitation Project represented a comprehensive approach towards technical rehabilitation of an Eastern European DH system. The physical condition of the Jelgava system was relatively worse than in other projects that the Bank had supported. The project size per capita was therefore high at US$268/inhabitant when compared with earlier World Bank supported projects in which the relative size had ranged between US$100-200/inhabitant. This was not seen, however, as a major threat, since the experiences from the earlier projects, especially in Poland, indicated that even larger project sizes would be sustainable as the economy of the project cities generally took an upward swing during the project implementation period. Unfortunately, this is still to happen in Jelgava. Contrary to many other World Bank project sites, Jelgava has been plagued by a worsening local economy, unemployment, and loss of industrial base. The most distressing loss to the city has been the loss of its largest employer, the Riga Autobus Factory (RAF). The Project has taught a number of valuable lessons which concern: (a) demand forecasts; (b) tariff and regulatory policies; (c) competition with gas; (d) evaluation of DH systems as whole; and (e) the need to resolve pending liabilities of the beneficiary before the commencement of implementation.

Demand Forecasts: Like many of the first projects of the early 1990's in the DH sectors of former centrally planned economies, the demand forecast of this Project was overly optimistic. The appraisal heat sales foecasts and actual sales are presented in Annex 3. The appraisal estimate for year 2000 heat sales was 307 Tcal, and the actual amount sold about 170 Tcal. The Consultants' estimates for year 2000 varied from 500 Tcal to 700 Tcal. This has been a common problem in other public utility sectors as well, for example, in water supply and waste water treatment projects. In the case of Jelgava, the DH supply was being rationed due to the inability to secure or pay for necessary fuel supplies. It was expected that the heat demand would grow when the rationing was gradually removed. The rationing also affected the hydraulic balance of the network, as many consumers had removed the control nozzles of the hydroelevators to boost their building's heat intake. The introduction of automation corrected a larger imbalance than had been estimated, and this led to smaller specific consumption than expected. In addition, a number of municipal, state and private consumers disconnected from DH during implementation.

Future DH projects should scrutinize demand projections and the factors which affect demand very carefully. In cities where DH is facing unfair competition from alternative heating options, consideration should be given to specifying areas where DH is the required heating option until the factors leading to the unfair competition are removed, in order to preserve DH demand. Greater efforts to identify new DH consumers should also be undertaken. Demand forecast analysis should also consider the results of social assessments which help to forecast consumers' reactions and responses to possible tariff increases and the ability to measure and regulate heat consumption.

Tariff and Regulatory Policies: Appropriate tariff policies play an important role in maintaining DH consumers and thus preserving the viability of DH systems. It has been shown through this Project, as well as in others, that DH tariffs which are too high in relation to other fuels (whether fairly priced or not) will lead to the loss of the customers which can afford investments in alternative heating. As the DH system is capital intensive and thus has relatively high fixed costs, a decline in demand increases the portion of fixed costs which the remaining customers have to carry and can lead to the system's loss in competitiveness. Gas prices, if not properly set to reflect the actual costs of supply to the various categories of consumers, such as large and small consumers, can create unfair competition with DH. Therefore, maintaining competitiveness with other heat providers should be a prime goal of regulators and incorporated in a DH tariff policy, and a clear and consistent regulatory policy based on long-term least-cost provision of heat should be adopted at the beginning of the Project. The municipalities should decide, whether they want to maintain the district heating systems and thereafter act accordingly, by utilizing the tools which the existing regulatory legislation gives them.

Competition with Gas: When designing DH projects, it is very important to properly assess risks associated with the potential for competition from gas or other alternatives to DH. JDHC lost a number of consumers to gas during the project implementation, especially municipal and state owned buildings. This has hurt the financial viability of the Project, and the example given by the municipality itself has also affected consumers' attitudes towards DH. As a result the decline in demand, as compared to other Bank supported DH projects, was more pronounced in Jelgava, and unfortunately was led by the project agencies themselves. A course of action and particular remedies which the City and the DH company can take to improve the situation have been elaborated, and are now being considered and pursued, including privatization of the DH system, but some of the losses, such as the lost consumers, may never be regained.

Evaluating the DH System as a Whole: The design of DH projects should consider how to optimize the whole DH system within a city, and not just the DH assets owned by a given DH company. In the case of

Jelgava, there were a number of owners and operators of DH assets, including mainly JDHC, the RAF, the Railway Authority and the Sugar Refinery. However, the Project only focused on investments in assets owned and operated by JDHC. This had led to an unoptimal operation of the DH system as a whole, especially as the Project did not consider how to more fully utilize the capacity of the more efficient Sugar Refinery CHP plant or how to share a part of the cogeneration benefits with the heat consumers. Future DH projects should seek to identify all ways and means to optimize the operation of the whole system up front, either through consolidation of assets into one enterprise or through contractual arrangements between the various enterprises with clearly specified terms and conditions. In the subsequent Riga District Heating Rehabilitation Project, a long-term bulk heat contract between the CHP producer and the DH enterprise is required as a condition for lending for the river crossing investments.

Resolving Pending Liabilities of the Beneficiary Before Implementation Commencement: The issue of the gas debt should have been more clearly addressed at the project appraisal stage. Had the repayment of this debt been factored into the financial analysis, the consequences of the repayment schedule on the DH tariffs and the financial viability of JDHC would have been obvious. At that time, JDHC would have been in a better position to negotiate the repayment terms of this debt. JDHC could have argued that this debt should not be loaded on the DH tariff payers, as it was created by the state policies under circumstances which neither Jelgava City, JDHC or the consumers could have any influence.

9. Partner Comments

(a) Borrower/implementing agency:

General: During a mission in November, 2000, representatives of central and local government and the DH company were provided a list of specific questions about their project components, objectives, scope, implementation performance and results achieved, and the draft ICR was discussed. The counterparts have provided verbal and written feedback which has been incorporated into the final ICR. The written comments are available on electronic file.

Some specific comments deserve explicit recognition as follows:

The Ministry of Finance expressed its opinion that the Project has not been financially successful. The tariff increases have not been sufficient to compensate the impact of the decreased heat sales. The Ministry hopes that the company will be privatized in order to renew its financial viability. They also indicate that it will be necessary to restructure the payment schedule of the gas debt to support the financial rehabilitation of the company.

Jelgava City Council representatives mentioned that Jelgava now has the most modern DH system in Latvia, and technically the project scores a 4 out of 5 with 5 being the best. They pointed out, however, that the Project investments included much pipe replacement which is expensive and brings less immediate financial returns. They also indicated that human memory is short with no one remembering the years before the project when the heating system broke down at least 6-7 times during the winter, but now everybody seems to take the reliable heating for granted. They indicated that the project design should have considered how to obtain heat from the cogeneration process at the CHP plant in order to bring heat ge neration costs down. They also highlighted that it would have been better if the interest during construction would not have been capitalized into the loan but rather paid during the project implementation period avoiding thus the sharp increase in the costs when the loan repayment began. Also, they admit that the tariff policy should have been based on an agreed formula which would have taken into account the fuel price and inflation adjustments automatically, rather than on approval of the absolute level of tariffs every year. They indicated that they have a good opinion of the Bank team and that the team acted as a broker

between Jelgava and the central government. They appreciated the genuine interest of the team in the Project, and the team's efforts to find solutions to problems.

JDHC expressed their satisfaction with the cooperation with the Bank team. All requests submitted to the Bank were addressed in a quick fashion, and the Bank team did as much for the project as they humanly could. The project has been a great learning experience to the Director, his implementation team and all staff. The heat substation savings should not have been given through lower tariffs to the consumers but rather retained to improve the company's financial position. The demand forecast was optimistic, but the Latvian Republic's own forecast was even more optimistic (GDP growth 6-7%/year). If the the sales would have materialized as planned, there would be no difficulties. Investment in the pipes was necessary.

(b) Cofinanciers:
N.A.

(c) Other partners (NGOs/private sector):
N.A.

10. Additional Information

Annex 1. Key Performance Indicators/Log Frame Matrix

Technical Monitoring Indicators as per JDHC last progress report of June 31, 2000	Jan-96	Dec-96 1)	Dec-97		Dec-98 2)		Dec-99 3)		Jun-00	
	Actual	Actual	Target	Actual	Target	Actual	Target	Actual	Target	Actual 4)
Project Completion Degree										
Length of 2 and 4 pipe network installed (km)	0.62	5.61	5.7	11.24	10.7	20.66	15.7	24.42	22	24.42
% of substation H/E and automation completed		19.2	25	61.6	50	100	75	100.3	100	100.3
% of production heat meters completed		82	100	100						
% of remaining items completed		9.3	25	50	50	95	75	97	100	98
Performance										
Specific consumption of buildings (Mcal/m2/year)	178	174	210	168	210	156	210	132	210	132
Seasonal efficiency of boiler plants	0.75	0.78	0.77	0.81	0.78	0.85	0.8	0.88	0.85	0.91
Seasonal network losses (Gcal/yr)	63,000	79,107	53,000	54,300	52,000	60,856	51,000	61,569	50,000	19,022
Electricity consumption of circulation pumps (% of heat supply)	2.00	2.00	1.30	1.60	1.20	1.30	1.10	1.25	1.00	1.27
Water losses in networks (% of supply flow)	2.00	1.50	1.20	0.77	1.10	0.53	1.00	0.49	1.00	0.30
Circulation water chemical analysis	Below standard	Below standard	Meets strd	Meets strd	Meets strd	Meets strd	Meets strd	Meets strd	Meets strd	Meets strd

1) During 1996, an additional 11 km of network from Riga's Autobus Factory was transferred to JDHC. This network was in much worse condition and therefore losses are higher than they would have been if only reported for JDHC main network only
2) Increase in heat losses during 1998 in comparison with 1997 can be explained by the fact that during the summer 1997 heat supply was interrupted for 5 months because of the works, but in 1998 only 2 months
3) Increase in heat losses during 1999 in comparison with 1998 can be explained by an additional 3.0 km of network which was transferred to JDHC from the Railway Department. This network was in bad condition.
4) Half year figure

Summary Financial Indicators at Appraisal (LVL '000)	Indicator	1993	1994a	1995	1996	1997	1998	1999	2000
Income Statements									
	Heat Sales (Tcal)	214.6	248.5	251.0	275.9	302.6	304.8	306.2	307.2
	Average Tariff (LVL/Gcal)	12.1	13.9	16.7	17.7	18.4	19.2	20.0	20.8
	Operating Revenues	2603	2466	4202	4895	5584	5848	6112	6376
	Operating Expenses	2995	4064	3977	4179	4550	4655	4796	4926
	Net Income	-15	0	123	372	480	505	539	608
Financial Performance Ratios									
	Operating Ratio (%)	113.5	117.3	94.7	85.4	81.5	79.6	78.5	77.3
	Profit Margin (%)	-0.6	0.0	2.9	7.6	8.6	8.6	8.8	9.5
	Debt Service Coverage (times)	6.6	8.4	8.3	4.9	4.0	3.6	3.5	1.7
	Interest Coverage (times)	6.6	8.4	8.3	5.8	4.3	3.8	3.7	3.2
	Receivables (days)	218	190	120	100	80	70	70	50

a Preliminary Results

Summary Actual Financial Indicators (LVL '000)			1994	1995	1996	1997	1998	1999
Income Statements	*Indicator*							
	Heat Sales (Tcal)		249	242	226	196	194	172
	Average Tariff (LVL/Gcal)		13.87	14.67	16.67	17.81	18.63	23.71
	Operating Revenues		3453	3551	3767	3490	3614	4079
	Operating Expenses		3994	4176	5722	4234	4125	4609
	Net Income		-1053	-223	-2867	-785	2.5	-424
Financial Performance Ratios								
	Operating Ratio (%)		1.16	1.18	1.52	1.21	1.14	1.13
	Profit Margin (%)		-0.31	-0.06	-0.76	-0.22	0.00	-0.10
	Debt Service Coverage (times)		-1.06	0.49	-0.50	2.98	3.79	0.87
	Interest Coverage (times)		-1.06	0.49	-0.50	2.98	3.79	1.58
	Receivables (days)		226	254	220	241	267	228

Annex 2. Project Costs and Financing

Project Cost by Component (in US$ million equivalent)

Project Cost By Component	Appraisal Estimate US$ million	Actual/Latest Estimate US$ million	Percentage of Appraisal
Network Rehabilitation	5.10	7.10	140
Conversion to Variable Flow (=Consumer Substations)	4.50	4.10	91
Boiler Rehabilitation & Automation	3.90	3.90	100
Boiler Elimination & Integration	0.50	1.00	191
Consumer Heat Meters	0.80	0.40	46
Maintenance Function Enhancement	0.50	0.40	78
Technical Assistance	0.50	1.10	
Other 1)		0.10	
Total Baseline Cost	15.80	18.10	
Total Project Costs	15.80	18.10	
Interest during construction	2.40	2.00	84.00
Total Financing Required	18.20	20.10	

1) Financial Audit

Project Costs by Procurement Arrangements (Appraisal Estimate) (US$ million equivalent)

Expenditure Category	Procurement Method[1] ICB	NCB	Other[2]	N.B.F.	Total Cost
1. Works	0.00	0.00	0.00	2.90	2.90
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
2. Goods	9.50	0.00	2.00	0.00	11.50
	(9.50)	(0.00)	(2.00)	(0.00)	(11.50)
3. Services	0.00	0.00	0.30	0.50	0.80
	(0.00)	(0.00)	(0.30)	(0.00)	(0.30)
4. Miscellaneous 1)	0.00	0.00	2.20	0.80	3.00
	(0.00)	(0.00)	(2.20)	(0.00)	(2.20)
5. Miscellaneous	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
6. Miscellaneous	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Total	9.50	0.00	4.50	4.20	18.20
	(9.50)	(0.00)	(4.50)	(0.00)	(14.00)

1) Includes interest during construction (Bank US$2.2m, Borrower US$0.2m) and Taxes and Duties (Borrower US$ 0.6m)

Project Costs by Procurement Arrangements (Actual/Latest Estimate) (US$ million equivalent)

Expenditure Category	Procurement Method[1] ICB	NCB	Other[2]	N.B.F.	Total Cost
1. Works	0.00	1.30	0.00	4.20	5.50
	(0.00)	(1.00)	(0.00)	(0.00)	(1.00)
2. Goods	8.00	0.00	3.00	0.20	11.20
	(7.90)	(0.00)	(2.80)	(0.00)	(10.70)
3. Services	0.00	0.00	0.10	1.30	1.40
	(0.00)	(0.00)	(0.10)	(0.00)	(0.10)
4. Miscellaneous 1)	0.00	0.00	2.00	0.00	2.00
	(0.00)	(0.00)	(2.00)	(0.00)	(2.00)
5. Miscellaneous	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
6. Miscellaneous	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Total	8.00	1.30	5.10	5.70	20.10
	(7.90)	(1.00)	(4.90)	(0.00)	(13.80)

1) Interest during construction

[1/] Figures in parenthesis are the amounts to be financed by the Bank Loan. All costs include contingencies.

[2/] Includes civil works and goods to be procured through national shopping, consulting services.

Project Financing by Component (in US$ million equivalent)

Component	Appraisal Estimate			Actual/Latest Estimate			Percentage of Appraisal		
	Bank	Govt.	CoF.	Bank	Govt.	CoF.	Bank	Govt.	CoF.
Network Rehabilitation	3.50	1.50		4.40	2.70		125.7	180.0	
Conversion to Variable Flow (=Consumer Substations)	3.60	0.90		3.20	0.90		88.9	100.0	
Boiler Rehabilitation&Automation	3.20	0.70		2.60	1.30		81.2	185.7	
Boiler Elimination&Integration	0.40	0.20		0.70	0.30		175.0	150.0	
Consumer Heat Meters	0.60	0.20		0.40	0.00		66.7	0.0	
Maintenance Function Enhancement	0.50	0.00		0.40	0.00		80.0	0.0	
Technical Assistance			0.50	0.10	0.00	1.00			200.0
Other 1)				0.10	0.00				
Interest During Construction	2.20	0.20		2.00			90.9	0.0	

1) Financial Audit

Annex 3: Economic Costs and Benefits

JDHC Heat Sales (Tcal/year)	1990	1993	1994	1995	1996	1997	1998	1999	2000
Actual Heat Sales 1)	361	214	249	242	226	196	194	172	170
Bank Team, Appraisal Estimate,1995		214	249	251	276	303	305	306	307
Consultants ÅF 1994, without savings measures				328	408	487	566	646	725
Consultants ÅF 1994, with savings measures				300	351	403	454	505	556

1) Year 2000 figure is an estimate

Economic Rate of Return as Appraised	1995	1996	1997	1998	1999	2000
Costs	-953	-4,091	-4,418	-2,427	-1,685	
Benefits						
1. Energy savings						
Reduction in network losses	9	55	134	197	234	250
Variable flow and metering (includes elecricity savings)	18	109	263	386	461	491
Boiler automation	7	44	107	157	188	200
2. Network life extension	158	614	1,007	759	613	643
3. Boiler life extension	33	205	495	729	869	927
4. Reduction of network water losses	2	12	28	42	50	53
5. Air pollution abatement		3	7	10	12	14
Total Benefits	225	1,041	2,041	2,280	2,428	2,578
Net Benefits	-728	-3,050	-2,377	-147	743	2,578
ERR **24 %**						

Assumptions:

Oil cost US$ 85/ton, Gas US$ 120/1000m3
Unit cost for preinsulated transmission network US$ 300,000
Unit cost for boiler capacity US$ 50,000/MW
Softened water cost US$ 0.49/m3
Savings in pollution: US$ 50/ton of particulates, US$ 125/ton of SO2

Economic Rate of Return at Construction		1995	1996	1997	1998	1999	2000
Costs (US$ 000)			-2,557	-5,967	-6,819	-1,534	-170
Benefits							
1. Energy savings							
Reduction in network losses			-197	320	171	144	362
Variable flow and metering (includes electricity savings)			153	341	493	829	1,074
Boiler automation			76	144	171	162	350
2. Network life extension			759	1,770	2,023	455	51
3. Boiler life extension			72	168	192	43	5
4. Reduction of network water losses			93	172	198	202	223
5. Air pollution abatement (as appraised)			3	7	10	12	14
5 a. Air pollution abatement (international valuation of environmental benefits)					211	281	422
Total Benefits (incl. 5.)			958	2,922	3,258	1,848	2,078
Total Benefits (incl. 5 a.)			955	2,915	3,459	2,117	2,486
Net Benefits with environmental benefits as appraised			-1,599	-3,045	-3,561	314	1,907
Net Benefits with international valuation of environmental benefits			-1,602	-3,052	-3,360	583	2,316
ERR with environmental benefits as appraised	**29%**						
ERR with international valuation of environmental benefits	**37%**						

Oil cost US$/ton net VAT	90.91	92.59	101.42	77.37	70.00	106.76
Gas cost US$/1000m3 net VAT	108.91	110.94	109.91	104.75	107.93	101.29
Unit cost (average) for network rehab. US$/km (including distr. Network)	199,549					
Unit cost (average) for boiler capacity repairs US$/MW	4,000					
Softened water cost (average) US$/m3	0.73					
Electricty cost (average) US$/MWh	54					
Heat incremental cost US$/Gcal	12.50	12.24	12.91	9.38	8.20	11.47
Oil cost LAT/ton net VAT	50.00	50.00	55.78	45.65	39.90	62.99
Gas cost LAT/10003 net VAT	59.90	59.91	60.45	61.80	61.52	59.76
US$/LAT	0.55	0.54	0.55	0.59	0.57	0.59
Makeupwater demand, m3/yr	350,000	222,396	114,163	78,580	72,649	44,479
Electricity consumption MWh	5,629	4,454	3,090	2,485	2,118	2,127
Electricty Savings US$		63	137	170	190	189

Annex 4. Bank Inputs

(a) Missions:

Stage of Project Cycle	No. of Persons and Specialty (e.g. 2 Economists, 1 FMS, etc.)		Performance Rating	
Month/Year	Count	Specialty	Implementation Progress	Development Objective
Identification/Preparation				
12/18/92	*1 each*	Task Manager Power Engineer Financial Analyst Environmental Specialist Hydropower Plant Optimization Specialist Natural Gas Specialist Power Systems Analyst DH Engineer Transmission and Dist. Engineer		
4/7/93	*1 each*	Task Manager DH Engineer District Heating Boiler Conversion Specialist Gas Specialist EBRD Representative		
6/27/93	*1 each*	Task Manager Gas Specialist DH Engineer		
9/30/93	*1 each*	Task Manager DH Engineer Financial Analyst Procurement Adviser		
12/2/93	*1 each*	Mission leader Financial Analyst		
Appraisal/Negotiation				
10/28/94	*1 each*	Task Manager DH Engineer Procurement Specialist Country Lawyer Environmental Specialist Power Engineer		
Supervision				
9/2/95	*1 each*	FINANCIAL ANALYST PROCUREMENT ENGINEER	S	S
2/15/96	*1 each*	TASK MANAGER ENGINEER ENERGY SPECIALIST FINANCIAL ANALYST	S	S

6/19/96	*1 each*	TASK MANAGER FINANCIAL ANALYST ENGINEER ENVIRONMENTAL SPECIALIAST ENERGY SPECIALIST	S	S
11/14/96	*1 each*	TASK MANAGER ENERGY SPECIALIST	S	S
5/12/97	*1 each*	TASK MANAGER ENERGY SPECIALIST	S	HS
10/24/97	*1 each*	TASK MANAGER ENGINEER ENERGY SPECIALIST	S	S
7/8/98	*1 each*	UPDATE	S	HS
5/11/99	*1 each*	PROGRAM TEAM LEADER DIST. HEATING ENGINEER ENERGY SPECIALIST	S	HS
ICR 7/15/00	*1 each*	Task Team Leader DH Engineer Energy Specialist		

Note: Missions before **3/23/94** were undertaken for preparation of a larger "Latvia Energy Rehabilitation Project", including hydro power, domestic fuel boilers, Riga district heating, and other district heating components. Of these components, only Jelgava District Heating Rehabilitation was implemented.

(b) Staff:

Stage of Project Cycle	Actual/Latest Estimate	
	No. Staff weeks	US$ (,000)
Identification/Preparation	127.2	420.8
Appraisal/Negotiation	31.8	92.3
Supervision	93.01	196.49
ICR	7.74	31.5
Total	259.75	749.09

Annex 5. Ratings for Achievement of Objectives/Outputs of Components

(H=High, SU=Substantial, M=Modest, N=Negligible, NA=Not Applicable)

	Rating
☒ *Macro policies*	○ *H* ○ *SU* ● *M* ○ *N* ○ *NA*
☒ *Sector Policies*	○ *H* ● *SU* ○ *M* ○ *N* ○ *NA*
☒ *Physical*	● *H* ○ *SU* ○ *M* ○ *N* ○ *NA*
☒ *Financial*	○ *H* ● *SU* ○ *M* ○ *N* ○ *NA*
☒ *Institutional Development*	○ *H* ● *SU* ○ *M* ○ *N* ○ *NA*
☒ *Environmental*	○ *H* ● *SU* ○ *M* ○ *N* ○ *NA*
Social	
☐ *Poverty Reduction*	○ *H* ○ *SU* ○ *M* ○ *N* ○ *NA*
☐ *Gender*	○ *H* ○ *SU* ○ *M* ○ *N* ○ *NA*
☐ *Other (Please specify)*	○ *H* ○ *SU* ○ *M* ○ *N* ○ *NA*
☒ *Private sector development*	● *H* ○ *SU* ○ *M* ○ *N* ○ *NA*
☒ *Public sector management*	● *H* ○ *SU* ○ *M* ○ *N* ○ *NA*
☐ *Other (Please specify)*	○ *H* ○ *SU* ○ *M* ○ *N* ○ *NA*

Annex 6. Ratings of Bank and Borrower Performance

(HS=Highly Satisfactory, S=Satisfactory, U=Unsatisfactory, HU=Highly Unsatisfactory)

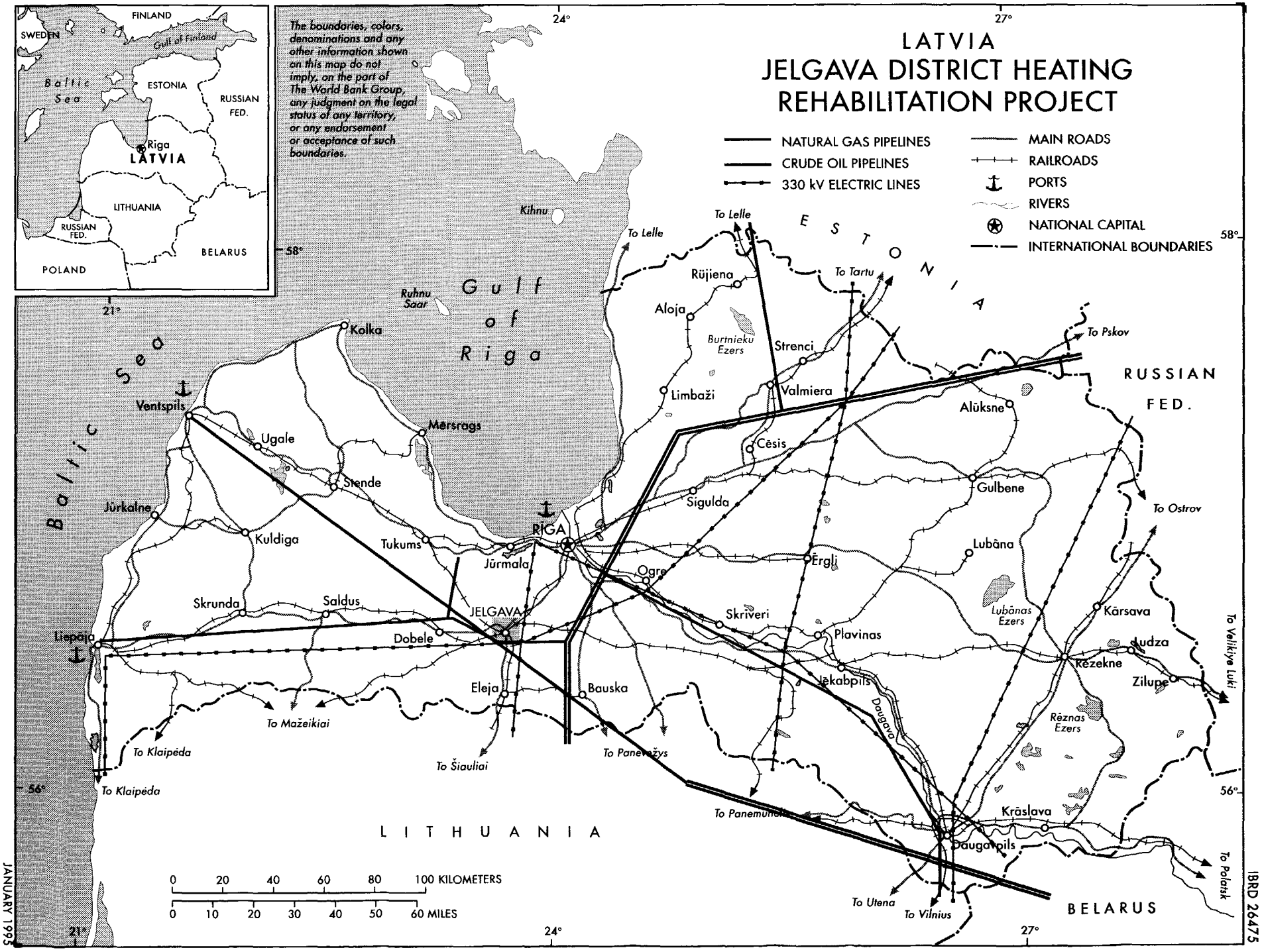
6.1 Bank performance	*Rating*
☒ *Lending*	○ *HS* ● *S* ○ *U* ○ *HU*
☒ *Supervision*	○ *HS* ● *S* ○ *U* ○ *HU*
☒ *Overall*	○ *HS* ● *S* ○ *U* ○ *HU*

6.2 Borrower performance	*Rating*
☒ *Preparation*	○ *HS* ● *S* ○ *U* ○ *HU*
☒ *Government implementation performance*	○ *HS* ● *S* ○ *U* ○ *HU*
☒ *Implementation agency performance*	○ *HS* ● *S* ○ *U* ○ *HU*
☒ *Overall*	○ *HS* ● *S* ○ *U* ○ *HU*

Annex 7. List of Supporting Documents

1. Semi-Annual Progress Reports
2. Performance Indicators
3. Annual Audit Reports
4. Economic Re-Evaluation
5. Financial Re-Evaluation

MAP SECTION


LATVIA
JELGAVA DISTRICT HEATING
REHABILITATION PROJECT
NATURAL GAS PIPELINES
CRUDE OIL PIPELINES
330 kV ELECTRIC LINES
MAIN ROADS
RAILROADS
PORTS
RIVERS
NATIONAL CAPITAL
INTERNATIONAL BOUNDARIES
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SWEDEN
Gulf of Finland
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ESTONIA
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Riga
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LITHUANIA
RUSSIAN FED.
BELARUS
POLAND
Gulf of Riga
Ruhnu Saar
Kihnu
Kolka
Ventspils
Ugale
Mērsrags
Stende
Jūrkalne
Kuldiga
Tukums
Jūrmala
RIGA
Ogre
Skrunda
Saldus
JELGAVA
Liepaja
Dobele
Eleja
Bauska
Rüjiena
Aloja
Burtnieku Ezers
Limbaži
Strenci
Valmiera
Cēsis
Sigulda
Ērgļi
Alūksne
Gulbene
Lubāna
Lubānas Ezers
Skrīveri
Plavinas
Jēkabpils
Daugava
Kārsava
Ludza
Rēzekne
Zilupe
Rēznas Ezers
Krāslava
Daugavpils
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To Tartu
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To Ostrov
To Velikiye Luki
To Polatsk
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To Klaipėda
To Šiauliai
To Panevėžys
To Panemūnė
To Utena
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