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PROJECT APPRAISAL DOCUMENT
ON
PROPOSED LOANS
IN THE AMOUNT OF US\$ 34.2 MILLION EQUIVALENT
TO
TOPLOFIKACIA SOFIA AND
TOPLOFIKACIA PERNIK
FOR THE BULGARIA
DISTRICT HEATING PROJECT
May 22, 2003

**Infrastructure and Energy Sector Department
South Central Europe Country Unit
Europe and Central Asia Region**

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CURRENCY EQUIVALENTS

(Exchange Rate Effective January 6, 2003)

Currency Unit = Bulgarian Leva (BGN)

EUR 1.00 = US\$1.04665

EUR 1.00 = BGN 1.955142

US\$ 1.00 = BGN 1.86800

FISCAL YEAR

January 1 -- December 31

ABBREVIATIONS AND ACRONYMS

CAS	Country Assistance Strategy	MP	Monitoring Plan (for PCF)
CHP	Combined Heat and Power	MW	Megawatt
CQ	Consultant's Qualification	MWh	Megawatt hour
DH	District Heating	NS	National Shopping
DHC	District Heating Company	NCB	National Competitive Bidding
DSM	Demand Side Management	NBF	Not Bank Financed
EBP	Energy Benefit Program	NPV	Net Present Value
EBRD	European Bank for Reconstruction and Development	LCS	Least Cost Selection
ERPA	Emission Reduction Purchase Agreement	O&M	Operations and Maintenance
ERR	Economic Rate of Return	QCBS	Quality and Cost Based Selection
EU	European Union	PAS	Procurement Accredited Staff
FRR	Financial Rate of Return	PAL	Programmatic Adjustment Loan
HAC	Heat Accounting Companies	PCF	Prototype Carbon Fund
HOB	Heat Only Boiler	PIU	Project Implementation Unit
ICB	International Competitive Bidding	PSP	Private Sector Participation
IBRD	International Bank for Reconstruction and Development (World Bank)	SBD	Standard Bidding Documents
IS	International Shopping	SERC	State Energy Regulatory Commission
JV	Joint Venture	SOE	Statement of Expenditure
KIDS	Kozloduy International Decommissioning Support Fund (EU grant)	TA	Technical Assistance
MEER	Ministry of Energy and Energy Resources	USAID	United States Agency for International Development
MOF	Ministry of Finance	VAT	Value Added Tax

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BULGARIA
DISTRICT HEATING PROJECT

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MAP(S)
Bulgaria District Heating Project, IBRD 31748

BULGARIA
DISTRICT HEATING PROJECT

Project Appraisal Document

Europe and Central Asia Region
ECSIE

<p>Date: May 22, 2003 Sector Manager: Henk Busz Country Director: Andrew N. Vorkink Project ID: P008314 Lending Instrument: Specific Investment Loan (SIL)</p>	<p>Team Leader: Sudipto Sarkar Sector(s): District heating and energy efficiency services (100%) Theme(s): Other urban development (P)</p>
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Project Financing Data

Loan **Credit** **Grant** **Guarantee** **Other: Prototype Carbon Fund**

For Loans/Credits/Others:

Loan Currency: United States Dollar, Euro

Amount (US\$m): The Bank's loan, in Euros, to Sofia District Heating Company (DHC) will be for US\$27.2 million equivalent. Other sources of financing for the project in Sofia DHC will be: a) Sofia DHC - US\$ 27.5 million equivalent; b) European Bank for Reconstruction and Development (EBRD) - US\$ 31.4 million equivalent; and c) Kozloduy International Decommissioning Support Fund (KIDS; an EU grant) - US\$ 31.4 million equivalent.

The Bank's loan, in US Dollars, to Pernik DHC will be for US\$7.0 million. The contribution by Pernik DHC for their portion of the project will be US\$ 6.6 million.

In addition, an EU Phare grant of US\$ 1.6 million will be used to implement the project in Sofia and Pernik DHCs. In the table below, the EU Phare and KIDS grants are shown together in the category of Foreign Sources.

Funding has also been provided by United States Agency of International Development (USAID) for consultants to assist with private sector participation in the Sofia DHC. Due to the ongoing nature of the work, the full costs of the consultants are not yet known and as a result not reflected in the table below. Further, it is expected that the Prototype Carbon Fund (PCF) will purchase the emission reductions (ER) of greenhouse gases from Sofia and Pernik DHCs generated under the project. Studies are currently being conducted to determine the level of ER due to the project.

Borrower Rationale for Choice of Loan Terms Available on File: **Yes**

Proposed Terms (IBRD): Variable-Spread Loan (VSL)

Grace period (years): 5

Years to maturity: 17

Commitment fee: Standard (0.75%, less any waivers)

Front end fee (FEF) on Bank loan: 1.00%

Payment for FEF: Capitalize from Loan Proceeds

Financing Plan (US\$m):	Source	Local	Foreign	Total
BORROWER		27.10	7.00	34.10
IBRD		14.20	20.00	34.20
EUROPEAN BANK FOR RECONSTRUCTION AND DEVELOPMENT		16.40	15.00	31.40
FOREIGN SOURCES (UNIDENTIFIED)		8.00	25.00	33.00
Total:		65.70	67.00	132.70

Borrower: TOPLOFIKACIA SOFIA & TOPLOFIKACIA PERNIK

Guarantor: Republic of Bulgaria

Responsible agency: TOPLOFIKACIA SOFIA (BORROWER)

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Estimated Disbursements (Bank FY/US\$m):

FY	2004	2005	2006	2007	2008				
Annual	8.00	12.00	10.00	3.00	1.20				
Cumulative	8.00	20.00	30.00	33.00	34.20				

Project implementation period: 5 years; The above disbursements are for the Bank portion only

Expected effectiveness date: 10/01/2003 **Expected closing date:** 06/30/2008

A. Project Development Objective

1. Project development objective: (see Annex 1)

The project development objectives are to assist the Sofia and Pernik DHCs to: (i) improve the quality of their services; (ii) improve their financial viability; and (iii) increase environmentally friendly operations through energy conservation and pollution reduction measures.

2. Key performance indicators: (see Annex 1)

Improvement in Quality of Service will be measured through:

- *Increased connection percentage:* Better customer service is expected to increase the connection percentages in Sofia and Pernik, reversing the trend of disconnection from the district heating (DH) network. The current connection rate (ratio of households connected to all households that have access to the network) of 85% and 63% in Sofia and Pernik, respectively, is expected to increase to 90% and 69% in Sofia and Pernik, respectively.

Improvement in Financial Viability will be measured through:

- *Positive fiscal impact:* The net fiscal benefit of the project between 2002 and 2007 is around BGN 101 million. Improvements supported under the project will decrease the level of State assistance to the DHCs of Sofia and Pernik. No operating subsidies are expected after 2005 in the Sofia and Pernik DHCs. For both companies, in a without project scenario, the dependence on the State for subsidies would continue indefinitely.
- *Improvement in Working Ratio:* This ratio (operating expenditures over revenues) is an indication of the financial performance of the company. In 2002, the working ratios were 1.15 and 1.22 which are expected to decline to 0.88 and 0.89 at the end of 2007 in the Sofia and Pernik DHCs, respectively.
- *Increased bill collection rate:* The domestic bill collection rate (without arrears) is 80% in Sofia and 50% in Pernik. This is expected to increase to at least 85% in Sofia and 84% in Pernik by the end of 2007. Although, the current domestic bill collection rate is low, the two companies also sell industrial heat and electricity (100% collection). This increases the overall current bill collection rate to 84% and 89% in Sofia and Pernik, respectively.

Increase in Environmentally Friendly Operations will be measured through:

- *Reduction in network heat losses:* In 2002, network heat losses (total heat loss divided by production) were 16.7% and 31.8% for Sofia and Pernik DHCs respectively. Over the life of the project, the heat losses are expected to decrease to 10.4% in Sofia and 22.0% in Pernik.
- *Decrease in energy consumption:* The demand side management measures supported under the project will help to decrease the average household heat consumption. Current heat consumption of 12.7 and 14.9 MWh/year/household is expected to drop by 2007 to 10.6 and 12.1 MWh/year/household at a minimum, in Sofia and Pernik respectively.
- *Other environmental benefits:* (i) emissions of carbon dioxide, linked to improvements in energy efficiency, will be reduced by 2.7 million tons in Sofia and 186,000 tons in Pernik between 2003

and 2012; (ii) particulate emissions at Pernik for Boiler No. 5 will be reduced from the current level of 1,600 mg/m³ to 100 mg/m³; and (iii) network water losses will decrease by 45% for Sofia (from 3 million m³/year) and by 30% for Pernik (from 400,000 m³/year).

B. Strategic Context

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

Document number: 23927-BUL **Date of latest CAS discussion:** May 31, 2002

The Bank's Country Assistance Strategy is designed to support Bulgaria with reforms that will assist the country in meeting its EU Accession requirements. The reforms supported by the Bank will broadly include improvements in the business climate and acceleration of private sector led growth, especially in the provision of infrastructure services. In this context, the CAS explicitly outlines the preparation of this project to improve the service quality and financial performance of DH companies, promote energy efficiency and provide targeted assistance to the poor. Additionally, in its Country Program Framework, the CAS has an environmental development objective to support Bulgaria in maintaining headroom for tradable carbon under the Kyoto Protocol. Reduction of greenhouse gas emissions are expected to be purchased by the Prototype Carbon Fund (PCF) which will help enable Bulgaria to meet its requirements towards the Kyoto Protocol.

2. Main sector issues and Government strategy:

Background

District heating is the most economical way to provide heat to a high density urban area. It is the dominant form of space heating in major urban cities in Bulgaria. The sector generates approximately 11 GWh of heat energy and 1.8 GWh of electricity and represents about 25% of the energy consumption in the country. About 80% of this energy comes from natural gas with other sources being coal (12%) and mazut (8%).

The energy sector in Bulgaria is regulated by the State Energy Regulatory Commission (SERC). The commission is an independent body reporting to the Council of Ministers and has responsibilities for setting tariff guidelines and licensing of the companies working in the energy sector. The commission has 7 members, including a chairman, who are appointed by the Prime Minister for a fixed term of 5 years. The commission licenses all electricity production, district heating, and the transmission and distribution companies.

The price of electricity is relevant for the DHCs that use Combined Heat and Power (CHP) boilers. These companies sell their electricity to the national grid while the heat is sold to domestic and industrial consumers. According to the Energy and Energy Efficiency Law, the national power grid has to purchase electricity generated in the CHP plants at preferential rates of around BGN 80/MWh which is close to the electricity tariffs. This policy is in place to use CHPs to meet peak electricity demand and assist the district heating sector by allowing them to generate revenues from the sale of electricity. The contribution of CHP to the generation of electricity is, however, limited. Installed capacity for electricity generation by CHP plants is about 540 MW compared to a total installed capacity of 11,000 MW. The CHP plants fully recover their costs on the electricity generation and often cross-subsidize the DH operations. The level of cross-subsidization depends on the condition of the CHP plants and the fuel used. Cross-subsidy is seen as a temporary phenomenon and is expected to be phased-out as the district heating sector becomes self sustainable.

The gas sub-sector is dominated by Bulgargas, a vertically integrated State owned company formed in 1990. Gas penetration has been low with virtually no low pressure or household supply. Consequently, there is a uniform end-user price in Bulgaria. Prices are set by the SERC using cost-plus methodology, including an index to the price of heavy fuel oil. The current gas price is around US\$ 120/1000 m³.

Bulgaria also has large deposits of low quality brown coal with heating values of less than 2,000 kcal/kg. The annual production is around 30 million tons. The largest mine is in Maritsa. The other mines are located in Bobov Dol, Staniantsi, Beli Breg, Chukurovo, and Pernik. The mine in Pernik produces around 1.5 million tons of coal each year, most of which is used by the Pernik DHC. The cost of domestic coal is expected to be around \$ 30/tce in the medium to long term.

While the district heating sector has been through a difficult time, actions taken by the Government are helping the sector to make a turn-around. Since 2000, there have been significant changes including: tariff increases which is helping to improve the financial situation of the DHCs; elimination of disconnections from the district heating system; an increase in demand side measures through metering of consumption, and rehabilitation of sub-stations. To support the turn-around and place the sector on a sustainable footing, the DHCs and the Government have to continue to address the key issues in the sector.

Sector Issues

Inadequate domestic tariffs. In spite of recent increases, domestic tariffs still do not cover operating costs and, in recent years, operating subsidies of US\$ 70 million per year have been paid to the DHCs. The cost of heat production is around 50 BGN/MWh whereas domestic tariffs are around 40 BGN/MWh (without Value Added Tax). Commercial tariffs are close to the cost of production. The domestic tariffs have not kept pace with costs due to affordability considerations. While tariffs have to increase to cost recovery levels an adequate social assistance program has also to be developed and such measures are being considered in the country.

Depletion of assets. Given the financial constraints of the DHCs, rehabilitation of the network was not affordable leading to an increase in heat losses. Routine maintenance and replacement of parts at deteriorated portions of the network have been delayed which has increased the cost of production and also affected the quality of service. For the sector to return to a viable footing, further asset depletion has to cease and portions of the network that have significant heat losses have to be replaced.

Inefficient operation of DHCs. The DHCs have not focused on efficient operations. There are twenty-one public DHCs in the country and these companies have not developed adequate incentives for management to undertake operations that would improve their financial position, reduce heat losses, and promote energy conservation. The role of the private sector in the operations of these DHCs has not been significant, although private companies are involved in the business of metering and billing consumers. The DHCs have benefited from subsidies in the past that have created no urgency to drastically improve the efficiency of operation in the sector. The State cannot afford these subsidies in the long term and as a result the DHCs will have to be more efficient in operations. This will facilitate the phase-out of subsidies as tariffs increase.

Inadequate consumer service. The needs of consumers have not been met and many consumers in the past have moved to other forms of heating, mainly electricity. Tariffs for electricity have always been higher than district heating and the switch to electricity in the past shows that consumers are willing to pay as long as they get good service. Currently, electricity tariffs are around 80 BGN/MWh, almost

double, compared to the district heating price per MWh. District Heating systems have been supply driven providing no opportunity for the consumer to control consumption or maintain temperatures at individual comfort levels. This inflexible technical design and an ambivalent attitude by the DHCs towards the provision of quality service has led consumers to fully (entire apartment) or partially (radiators within an apartment) disconnect from the system. Consumers who were disconnected from the system used electricity for heating and tried to benefit from the free-rider effect in which they could receive heat from hot water pipes running through their apartment or through common walls with neighboring apartments using DH services. To prevent the free-rider effect, consumers that were fully connected would often disconnect services to prevent heat being transferred to neighboring apartments that did not use DH services leading to a vicious cycle of disconnection.

Government Strategy

The Government has been considering various options to revive the sector. They adopted an Energy Strategy on May 11, 2002 which includes the recommendations made under the August 2000 District Heating Strategy. The major elements of the Government's strategy towards reforming the sector are as follows.

Gradual tariffs adjustments. Government has made plans to gradually increase tariffs, taking into consideration issues related to affordability. A maximum of 10% real annual price increase for household DH supply over the period 2002-2005 is planned. This is expected to allow phasing out of the operational subsidies to the DHCs by the end of this period so that full cost recovery and an acceptable return on capital is achieved. In nominal terms, between 1998 and the beginning of 2002, domestic tariffs were increased by about 94% while the inflation rate in the same period was around 30%. This reflects the initiative taken by the Government so far to put the DH sector on a financially sustainable path.

To eliminate the free-rider effect, a two component tariff was introduced in April 2002 that required consumers to pay separately for heat consumption and capacity charges. A consumer that is not connected to the system would still have to pay the capacity charge, ranging between 10% to 30% of the value of the heat delivered to an apartment building. The capacity charge would increase the revenues of the DHCs. Further, the connected consumers would only pay for their consumption and share of the capacity charge which would be distributed among all apartments in a building, including the ones not connected to the DH system. The Energy Law was amended in November 2001 to allow DHCs to terminate service to consumers that do not pay their bills for more than two months.

Introduction of the private sector. Institutional changes are necessary to make the sector more customer responsive and less dependent on the State. The Government plans to introduce the private sector both for operation of the sector and ownership of assets. The bidding process to introduce the private sector in multiple State owned DHCs will start as soon as the planning for this activity is over and standard bidding documents are prepared. The private operator would be required to deliver the district heating services and contractual incentives - penalties and bonuses - would be used to ensure quality service.

Demand side measures. Until recently DH consumers in Bulgaria were not able to measure and control individual consumption, and heat bills were apportioned on the basis of heated volume. To rectify this, the Government promoted the introduction of private heat accounting companies (HAC) to install cost allocators and heat regulators (thermostatic valves) in radiators. This allows consumption per radiator to be measured and the heat usage to be controlled. The HACs also provide a fee based service to measure

heat consumption and report the bill to both the consumer and the DHCs. The HACs serve apartment buildings if around 80% of the apartment owners choose to use their service. The cost of installing a cost allocator and a regulator is around BGN 40 - 60 per radiator and has been borne by the consumer to date. The rapid growth of HACs in Sofia and Pernik in the last two years demonstrates the willingness of consumers to invest in cost allocators and regulators to better control their consumption and promote energy conservation.

There are about 15 HAC companies nationwide. The HACs compete with each other to provide services to a building and, as a result, the quality of their service has improved. The current basis for regulation is through the contract between the HAC and the DHCs. However, given the important role that the HACs play in the installation of cost allocators and heat regulators, measurement of heat, and billing and interacting with consumers, it is important that their activities are further regulated to provide consistency in the service. The Government is considering regulating these companies through the State Energy Regulatory Commission.

In Sofia, a pilot was conducted to test the energy savings in four buildings over two heating seasons due to the effects of the cost allocators and heat regulators. The results show a 15% reduction in overall energy consumption. The bill collection also increased in the apartments by around 5%. The energy savings are consistent with the savings seen in other countries with similar equipment - 18% in Germany over 70,000 apartments. Savings, attributed to similar cost allocators and regulators, in other Eastern European countries range from 15 - 20%. Given the benefits of the cost allocators and heat regulators, the November 2001 amendment of the existing Energy Law requires that all apartments in high rise buildings should have these equipment by September 30, 2002.

At the end of 2002, about 90% of the consumers installed cost allocators and regulators which was a significant improvement in the sector since the consumers could now control and measure their consumption. There are two groups of people that have not yet installed the equipment. First, a group of consumers that are waiting to see the benefits of the equipment. Given the benefits of the equipment in terms of energy savings and proper cost allocation that are being publicized through users, it is expected that this group of consumers will install the equipment prior to the heating season starting in 2003. Second, the poor have not been able to purchase the equipment. To address this concern, the Government is planning to encourage the purchase of the equipment through the Energy Benefit Program (EBP) as done in the past.

The Government has also focused on replacing old sub-stations throughout the country. New sub-stations with better control and measuring devices save energy and allow better service levels since consumers can control temperatures at the sub-station level. With the old sub-stations, the amount of heat that entered into a building could not be controlled well, resulting in a supply, rather than demand, driven system. Under the Bank's Water Companies Modernization and Restructuring project, about 6,000 sub-stations were modernized throughout the country, representing about 25% of the sub-stations in the sector, and all DH substations in the country were equipped with heat meters. The business of HACs is also promoted through sub-station rehabilitation since these companies prefer to work with new sub-stations with accurate heat meters.

Social protection. A multi-agency working group has been formed in the Government to address the need to develop a comprehensive social assistance plan as energy tariffs increase. The working group proposes adjustments to the Energy Benefit Program (EBP) that helps the poor pay their heat bills. A two block tariff has also been introduced to secure lifeline consumption at lower price. The two block tariff creates an incentive to conserve energy and better measure consumption but is not specifically targeted to the poor. However, the two block tariff is a short term measure and will not be in effect for the heating season starting in 2004. At that time, the EBP is expected to be expanded to specifically target the poor. Other measures being planned by the Government on social protection are outlined in Section E.6.

Formation of homeowner's association. To promote interaction among apartment owners within a building and to eliminate the costs of maintaining the DH system within a building by a DHC, the Government is planning to provide incentives for the creation of a homeowner's association. Under a proposed legislation, the consumers in apartment buildings will have the option to form a homeowners association and benefit from a wholesale tariff. If such an association is formed, it will be the consumer for the DH company, rather than individual apartments. Consumers will still have the option to be individually connected to the DH company but they would have to pay retail tariffs which would be higher than the wholesale tariff offered to the homeowner's association. The incentive of a cheaper wholesale tariff would encourage apartment owners to form an association and collaborate amongst themselves to pay the heat bill for the entire building and consider energy efficiency measures in buildings. The bill for the building would be distributed among the apartments based on cost allocators.

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

The project is targeted at the sector issues described in section B2 in the following manner.

Improve financial position. The project requires that both DHCs prepare and follow a Financial Recovery Plan (FRP) that has to be acceptable to the Ministry of Finance (MOF), Ministry of Energy and Energy Resources (MEER), and the Bank. The FRPs outline clear measures the companies have to take, including raising tariffs, running operations efficiently, and reaching certain financial and operational targets leading to the progressive phase-out of operating subsidies. Institutional measures to support the FRPs include: renewed commitment to meet service standards through which the DHCs have issued contracts with customers; formation of new management boards (Sofia DHC only); better definition of the roles and responsibilities of managers and staff in the DHCs; installation of a new bill collection system (Sofia DHC only); increased emphasis on energy savings through additional training of staff; and capping of salaries and discussions of staff reduction with unions. Satisfactory implementation of the FRPs is a condition under the Bank loan which would help the two DHCs reach financial viability.

Better operation of DHCs. The FRPs will require that both companies meet operational targets. Steps to reduce costs through efficiency measures, increase consumers through better service, and improve the bill collection rate have been outlined in the FRPs of the two DHCs. The operations of both the companies will be supervised by the MOF and MEER which aim to reduce the operating subsidies. The proposed improvements under the project would lead to reduction in heat losses in the system, promote demand side measures through improvements in the sub-stations, and generate the environmental benefits due to reduction in air pollution and water use. Further, the project supports the public awareness campaign to promote energy efficiency measures.

Rehabilitation of assets. The steady depletion of assets over more than a decade has affected the efficiency of the network and the quality of service. As part of project preparation a Master Plan for the rehabilitation of Sofia and Pernik DHCs was carried out. The rehabilitation costs - including generation, transmission, and distribution - in Sofia and Pernik DHCs are estimated to be US\$ 400 million equivalent

and US\$ 30 million equivalent, respectively. The project will support a small but a critical portion of this rehabilitation need. Affordability was a key factor used to determine the amount of the loans to be provided by the Bank and European Bank of Reconstruction and Development (EBRD). High priority rehabilitation needs that directly improve operational efficiency and service provision are being addressed under the project.

Introduction of the private sector. The project supports the introduction of the private sector in the Sofia DHC for the provision of heating services so that operational efficiency and customer service increase. The private sector would be introduced through a management contract (Annex 2). Sofia DHC represents 60% of the sector and improvements of the company will make a significant impact to the sector and set an example for other DHCs to follow.

C. Project Description Summary

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

Overall Investment Program

The overall investment program for the Sofia and Pernik DHCs totals US\$132.7 million equivalent. The overall financing plan is described below:

- Sofia DHC: The cost of the investment program is US\$ 117.5 million equivalent with the following financing: IBRD - US\$ 27.2 million equivalent; EBRD - US\$ 31.4 million equivalent; EU Kozloduy International Decommissioning Support Fund (KIDS) - US\$ 31.4 million equivalent; and Sofia DHC - US\$ 27.5 million equivalent.
- Pernik DHC: The cost of the investment program is US\$ 13.6 million with the following financing: IBRD - US\$ 7 million equivalent; Pernik DHC - US\$ 6.6 million equivalent.
- Project Implementation: Project implementation consulting costs for both the Sofia and Pernik DHCs will be financed through an EU Phare grant of US\$ 1.6 million equivalent.

Other grant resources, not reflected in the overall costs of the project, are: a) USAID financing for consultants to assist in selecting the private operator for Sofia DHC; and b) proposed funds from Prototype Carbon Fund (PCF) for the purchase of emission reductions (ER) of greenhouse gases due to the project in Sofia and Pernik DHCs. The amounts to be purchased by PCF will be determined after a study is completed to estimate the ER (see below).

Bank Supported Investments

Bank financing will be targeted at the following interventions that form a subset of the overall investment program (Annex 2).

Component 1 - Sofia DHC

A. Network Rehabilitation - Replacement and/ or installation of transmission pipelines. Replacement of thermal insulation on over ground pipelines. Replacement of valves and compensators in the transmission and distribution network. Installation of variable speed pumping system at the main heat sources.

B. Sub-station Rehabilitation - Replacement of sub-stations in the system.

- C. Technical Assistance - (a) Provision of technical assistance for the purposes of management and implementation of the project, including audit services and a public awareness campaign to promote energy conservation; (b) Provision of technical assistance to introduce the private sector for production and distribution of heat.

Component 2 - Pernik DHC

- A. Substation Rehabilitation - Replacement of sub-stations in the district heating system.
- B. Network Rehabilitation - Replacement of transmission pipelines. Replacement of valves and compensators in the transmission and distribution network and the network monitoring system. Installation of a variable speed pumping system at the main heat source.
- C. Generation Plant Rehabilitation - Replacement of the outdated electrostatic precipitator for a boiler in the lignite fired combined heat and power plant. Rehabilitation of the chemical water treatment plant. Rehabilitation of automation and control equipment for the coal conveyor system.
- D. Technical Assistance - Provision of technical assistance for the purposes of management and implementation of the project, including audit services and a public awareness campaign to promote energy conservation.

Bank Supported Investments - Project Costs by Component (US\$ million equivalent)

Component	Indicative Costs (US\$M)	% of Total	Bank-financing (US\$M)	% of Bank-financing
1A: Network rehabilitation	25.30	43.7	20.50	59.9
1B: Sub-station rehabilitation	2.00	3.5	2.00	5.8
1C: Technical Assistance	3.20	5.5	0.80	2.3
Sofia: Price and physical contingencies	6.20	10.7	3.60	10.5
Sofia: Total taxes and duties	7.20	12.4	0.00	0.0
Sofia: Front End Fee (1%)	0.30	0.5	0.30	0.9
2A: Sub Station rehabilitation	0.80	1.4	0.00	0.0
2B: Network rehabilitation	4.70	8.1	3.70	10.8
2C: Generation plant rehabilitation	3.40	5.9	2.40	7.0
2D: Technical Assistance	0.60	1.0	0.00	0.0
Pernik: Price and Physical Contingencies	1.50	2.6	0.80	2.3
Pernik: Total taxes and duties	2.60	4.5	0.00	0.0
Pernik: Front End Fee (1%)	0.10	0.2	0.10	0.3
		0.0		0.0
Total Project Costs	57.90	100.0	34.20	100.0
Interest during construction		0.0		0.0
Front-end fee		0.0	0.00	0.0
Total Financing Required	57.90	100.0	34.20	100.0

Investments Supported by Other Program Sponsors

In Sofia DHC, the financing from EBRD and the KIDS is to be used to replace approximately 30 kilometers of transmission pipelines, thermal insulation of over ground pipelines, and about 6,933 consumer heat substations. Sofia DHC will keep both the Bank and the EBRD (which also manages the KIDS grant) informed about the progress of the entire project on a regular basis.

Prototype Carbon Fund (PCF) Financing

The project will generate greenhouse gas (GHG) emission reductions (ER) which are expected to be purchased by the PCF. A control group methodology is being used to determine the ER under the project which would result from: improvements in sub-stations, preventing heat losses in pipes, switch from electricity to district heating, and energy conservation measures promoted by the project such as public awareness and increase of tariffs. The control group represents the without project scenario, and the difference found between the control and project groups would be used to determine the ER achieved by the project.

Bulgaria has already signed a PCF Umbrella Agreement with the Bank (a trustee for the PCF) which would make ER generated under the project eligible to be purchased by the PCF. A Baseline Study is currently being prepared that will estimate the ER. In addition, a Monitoring Plan will be developed to guide and facilitate all monitoring, recording and verification activities that are essential to confirm the ER and compliance of the project with the Kyoto Protocol. The Baseline Study and the Monitoring Plan will be confirmed through a Determination and Validation report. Thereafter, an Emissions Reductions Purchase Agreement (ERPA) would be signed between the Bank, as a trustee of the PCF, and the Sofia and Pernik DHCs. This agreement would be the basis for PCF to purchase the ER. Under the ERPA, Sofia and Pernik DHCs would be required to: monitor ER and other relevant parameters; ensure certification of actual ER by fully independent third parties; and conduct periodic auditing of the ER.

The ERPA is expected to be in place by December 2003. Prior to that, the Baseline Study, the Monitoring Plan, and the Determination and Validation reports will be made publicly available on the PCF's website (<http://www.prototypecarbonfund.org/splash.html>).

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

Policy Reforms. The Government is taking a comprehensive approach towards reforming the sector. Under the Guarantee Agreement of the project, the Government has agreed to implement the DH component of the Energy Strategy approved by the Council of Ministers on May 11, 2002 and the Parliament on July 17, 2002. This project will help to implement the DH component in the Energy Strategy. Implementation of this strategy is also a condition under the Bank's Programmatic Adjustment Loan (PAL) which will be a three part adjustment operation, each part corresponding to a loan of US\$ 150 million, supporting sectoral structural reforms in the country. For the PAL, through a Letter of Development Policy dated December 20, 2002, the Government agreed to the following:

- PAL 1 (FY '03) - Satisfactory implementation of the DH component of the Energy Strategy which would include: introduction of two-part tariffs to reduce the free-rider effect (fixed charge for all apartments in a building and a variable charge for the consumers connected to the DH system); increase of tariffs by 10%, prior to the heating season starting in Fall 2002; developing a schedule to raise household tariffs to cost recovery levels; and allowing disconnection of services to non-paying customers. These conditions have been satisfactorily met and this position of the PAL has been disbursed.

- PAL 2 (expected in FY '04) - Satisfactory implementation of the DH component of the Energy Strategy which would include: increase of tariffs by 10% before the heating season of 2003; adjustments to the Energy Benefit Program to assist the poor; strengthening the management of the DH companies; stimulating the formation of housing associations in multi-family dwellings; regulating the Heat Accounting Companies (HACs); and ensuring that all consumers are using cost allocators and heat regulators as per the legislation. The Government is currently working on activities.
- PAL 3 (expected in FY '05) - Satisfactory implementation of the DH component of the Energy Strategy which would include: adjustment of tariffs to fully meet cost recovery levels and eliminate subsidies; and introducing the private sector in the DHCs. Satisfactory implementation of these actions is a disbursement trigger for PAL 3.

Resolution of Payables in Sofia DHC. In November 2002, the DH company had a payable of around BGN 120 million, corresponding to about half the revenues of the company, to Bulgargas a State owned gas supplier. The appraisal of this project was subject to satisfactory resolution of this issue related to the payable. To this end, the Sofia DHC and Bulgargas reached an agreement on November 25, 2002 to resolve the matter in the following manner:

- BGN 60 million of the payable will be converted to long debt of Sofia DHC to Bulgargas; about BGN 15 million worth of pipe assets of Sofia DHC will be transferred over to Bulgargas; and for the rest of the payable around BGN 45 million worth of shares in the DHC would be purchased by the State. The proceeds of the share transaction will be used to pay Bulgargas. As part of the transaction, Sofia municipality reduced its share of registered capital by BGN 99 million, out of a total of BGN 161 million. Effectively this transaction made the State a 42% shareholder of the company. The board of the Sofia DHC was also changed to reflect the ownership of the company by the State. The board is now headed by a representative from the Ministry of Energy and Energy Resources (MEER) and has four other members: one from Ministry of Finance (MOF), one from Sofia DHC; and two from the Sofia municipality. This institutional change is significant and will ensure that the company receives optimal and declining support from the State that is necessary during the transitional years of the company that provides an important social function. The solution to the payable issue was accepted by the Sofia municipal council on November 28, 2002. On December 20, 2002 the Council of Ministers gave their approval to the MEER to purchase BGN 45 million worth of shares in Sofia DHC. Purchase of shares by the State is an effectiveness condition of the Bank loan to Sofia DHC.
- Sofia DHC will open an account through which it would pay its past and current debt to Bulgargas. Through the use of the account, Sofia DHC will be current on its payment of gas consumption as of December 31, 2002. In case of nonpayment by Sofia DHC, Bulgargas would have the right to terminate gas supply after a notice of 15 days. This provision in the agreement would not allow payables to accrue as in the past and create financial discipline within the Sofia DHC. Under the project, Sofia DHC will report to the Bank about the status of the account on a quarterly basis.

Management Operator in Sofia DHC. The Sofia municipality, recognizing the need to bring about institutional changes and improvement in management practices of the DHC, voted in September 2001 to introduce a private operator for the provision of services. The project, through funding from the USAID, is supporting the municipality to select an operator. Consultants have assessed the current regulatory framework, the financial position of the DHC, and the need to bring in the private sector rapidly. Based

on this analysis, a recommendation has been made by the consultants to introduce a management contract through which an operator would be responsible for the provision of heat. This recommendation is acceptable to the Advisory Committee comprising members from the DHC, the Sofia municipality, MOF, and MEER. The Bank, EBRD, and including USAID also provided comments on the work of the consultants. The decision to select an operator through a management contract was endorsed by the Sofia municipal council on December 18, 2002. Based on this decision, the bidding documents for the selection of the consultants are being drafted. Under the project, Sofia DHC will have to complete the selection process of the private operator by December 30, 2003 in a transparent and competitive manner.

Separation of Mines in Pernik DHC. In 2000, the Pernik District Heating company merged with the local mining operations. The expected result of the merger was that the company would be able to use the coal from the mining operation through transfer pricing. The merger also assumed that economies of scale would emerge and excess labor would be laid off and the company would be profitable. However, this did not happen. About 700 people worked in the district heating and electricity operations while 1,700 people were employed in the mines leading to a drop in the productivity of the company. With the mining operations, ratio of employee per GWh of sales was 2.1 in Pernik, compared to 0.4 in Sofia and 0.2 in Helsinki. In 2001, the joint company had an operating loss of BGN 6.5 million and received an operating subsidy of about BGN 1 million. To ensure financial viability of the Pernik DHC, separation of the loss making mine was a condition of appraisal for this project. To this end, the Government took a decision on September 13, 2002, to separate the mines from the Pernik DHC. The DH company now is back to its original status prior to 2000, responsible for the generation of heat and electricity and distribution of heat.

3. Benefits and target population:

The primary beneficiaries of the Bank's activities will be the consumers. The project will facilitate demand side management so that consumers will be able to better control and measure their heat consumption. It is expected that the average heat consumption per household will decrease as the use of cost allocators, regulators, and new sub-stations becomes more widespread. The environmental improvements of the project - energy savings, water savings, and reduction in air pollution - will benefit the economy.

The State will also benefit from the project since the measures taken under the project would reduce the fiscal burden. Without the project, the State would have to continue to support the DHCs which is fiscally not sustainable. The project is also helping to revive the sector which is helping the economy to not invest in other forms of heating which would be more expensive in the context of Sofia and Pernik, as analyzed by the Government through its District Heating Strategy (August 2000).

4. Institutional and implementation arrangements:

Bank Loans and Sovereign Guarantees. There are four legal documents for the project: a) Loan Agreement between the Bank and Sofia DHC where the loan will be denominated in Euros; b) Loan Agreement between the Bank and Pernik DHC where the loan will be denominated in US Dollars; c) Guarantee Agreement between the Bank and the Republic of Bulgaria for the loan to Sofia DHC; and d) Guarantee Agreement between the Bank and the Republic of Bulgaria for the loan to Pernik DHC.

Implementation Units. Each Borrower has established a Project Implementation Unit (PIU) that will be responsible for day to day project management and reporting on implementation progress. A Project Implementation Plan (PIP) will define the operations of the PIU. Each PIU has six members - A director and five staff members working technical, procurement, accounting, financial, administrative issues. The

PIUs have been responsible for preparing the project so far and are fully aware of the Bank procedures. The PIU members are drawn from different parts of the company and they will continue to serve in the PIU as well as carry out their current functions. This approach will integrate the implementation of this project with daily operations of the DHC. The directors of the PIU report to the managing directors of the DHCs. The PIUs are also supported by consultants who will help to implement the project. These consultants are also providing training to the PIU on technical, procurement, and financial management matters. The PIUs for Sofia and Pernik DHCs will be responsible for managing activities related to the PCF.

Financial management. The PIUs will be responsible for implementing the project's financial management system, in accordance with relevant Bank guidelines. Project funds from the Bank will flow either through the Special Accounts (SAs) which will be replenished on the basis of Statement of Expenditures (SOEs) or by direct payment on the basis of direct payment withdrawal applications. The PIUs will be in charge of operating the SAs, located in the Bulgarian National Bank. Counterpart contributions will be made by the DHCs from project accounts established in the two companies. The project accounts will be replenished on a periodic basis by the DHCs and will be reflected in the financial statements of the two companies.

D. Project Rationale

1. Project alternatives considered and reasons for rejection:

The following issues were considered during project preparation.

Project Locations. There are twenty one district heating companies in the country and any one of them have been chosen for assistance under the project. However, Sofia DHC was chosen since it represents about 60% of the DH sector in the country, corresponding to about 15% of total energy consumption in the country. Improvements in this company would result in significant improvement in the DH sector. Pernik was chosen as a representative sample of a fully State owned company. Improvements in the Pernik DHC will set an example for other State owned DHCs that need improvement. Further, the proximity of Pernik to Sofia would facilitate project implementation as the two DHCs could meet on a regular basis to exchange views on the project.

Alternative Form of Heating. The project could have supported other forms of heating. However, other forms of heating, namely electricity, coal, fuel wood and gas boilers, were considered as part of the District Heating Strategy. From the strategy, it was clear that district heating in urban areas through the existing infrastructure is the most economical option for Bulgaria. Alternative sources of heat - electricity, gas, coal or fuel wood - would be more costly for the economy and not affordable to the consumers. Thus, the emphasis of the project is to rehabilitate existing district heating assets as the most economically viable option in an urban setting.

Sofia DHC - Timing of Private Sector Participation (PSP). Ideally, the private sector should have been in place before the effectiveness of the loan to Sofia DHC. However, this option was not pursued since it would delay the rehabilitation of the network supported under the project. The network has not been rehabilitated for more than a decade and further delays will increase the operational losses for the Sofia DHC which in turn would increase the need to raise tariffs. To ensure that PSP is done on a timely manner, consultants to assist in the transaction have already been selected and the introduction of the private sector is a dated covenant under the Bank loan.

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

The Bank has been involved in the development of the DH sector in Bulgaria in a number of ways. This sector knowledge has been incorporated in the project design:

- Water Companies Modernization and Restructuring Project (closing date of December 31, 2002) – Through the district heating component of the loan, the Bank’s assistance has been provided to more than 15 DHCs throughout the country, including DH companies of Sofia and Pernik. About 6,000 sub-stations in the country, representing about 25% of the total stock, were rehabilitated leading to better demand side management and energy savings.
- Energy and Environment Review (November 2001) – This sector work highlighted the importance of addressing issues related to the DH sector, especially in the context of energy conservation leading to environmental benefits.
- District Heating Strategy (August 2000) – The Bank assisted in the preparation of the strategy which is a comprehensive program of the Government to revive the DH sector involving policy and institutional changes.
- Preparation of the PAL (2001 and 2002) – Under preparation of the PAL, the Bank has been working with the Government to develop an appropriate policy framework for the DH sector. This included the development of the DH component of the Energy Strategy that was later approved by the Council of Ministers (May 11, 2002) and the Parliament (July 17, 2002).
- Sofia City Development Strategy (2001 and 2002) – Through this analytical work, the Bank was able to better understand the operations of the municipal enterprises and was able to collect opinion of the public on the DH services.

Sector Issue	Project	Latest Supervision (PSR) Ratings (Bank-financed projects only)	
		Implementation Progress (IP)	Development Objective (DO)
Bank-financed 6,000 sub-stations for multiple district heating companies have been rehabilitated	Water Companies Restructuring and Modernization project (DH component)	S	S
Satisfactory implementation of the DH component of the Energy Strategy	Proposed Programmatic Adjustment Loan (PAL 1)	S	S
Other development agencies			

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

3. Lessons learned and reflected in the project design:

Willingness to reform should be demonstrated. Issues related to district heating can be complicated since they involve a number of matters related to the State budget, energy policy, and social benefits. Thus, it is important to reach an understanding on key issues prior to the project being implemented. This approach was followed in the resolution of the Bulgargas payable by Sofia DHC and the separation of the mine in the case of Pernik DHC. The satisfactory resolution of these matters indicates the willingness of the parties concerned to support the project.

Location of PIU. Ownership of the project would be diminished and implementation of the project would suffer if the Project Implementation Unit (PIU) was not located in the district heating company. In this project, the original plan was that there would be a centralized PIU, located in MEER, which would be the Borrower and responsible for daily management of the project. This plan was changed during project preparation. A Bank loan will be made to each DHC where a PIU has been created. The PIU staff are drawn from different sections of the DHC and they work part-time in the PIU which will help to integrate the project activities with the regular operations of the DHCs.

Need for demand side management. The sustainability of district heating projects is ensured if consumers receive good quality service at affordable prices. To address this issue, the project supports demand side management through the rehabilitation of the sub-stations which combined with the activities of the Heat Accounting Companies will provide the users the option to control heat consumption. The positive results of the demand side management measures started by the Government in 2001 are now emerging. As the results become more publicly available the interest of the consumers will increase to take on energy efficiency measures.

4. Indications of borrower commitment and ownership:

The Government of Bulgaria, the municipality of Sofia, and the district heating companies of Sofia and Pernik have expressed strong support for the proposed project and have indicated that the assistance provided under the project should be available before the heating season starting in Fall 2003. The project has also been endorsed by the Bulgarian Government. Key actions taken in the country which demonstrates the commitment to the project include:

- In August 2000, a District Heating Strategy was prepared which was approved by the Council of Ministers. The strategy outlined the importance to revive the sector and suggested specific actions. The project is in line with the strategy;
- In October 2001, the Council of Ministers decided to provide a State guarantee for the rehabilitation of the Sofia and Pernik district heating companies. The State guarantee will be provided for the proposed loans to be made by the Bank and the EBRD to the Sofia DHC and the Bank loan to the Pernik DHC;
- In November 2001, the amendments to the Energy Law were approved by the Parliament. These amendments support the District Heating Strategy and intend to strengthen the sector;
- In April 2002, regulations for tariff adjustment were drafted for a two component tariff. These regulations were adopted in April 2002;
- In July 2002, the Bulgarian Parliament approved the DH component of the Energy Strategy;
- In October 2002 a court decision confirmed separation of the Pernik DHC from the mining operations;
- In November 2002 the issue related to the payable from Sofia DHC to Bulgargas was satisfactorily resolved;
- In December 2002, the Sofia municipal council took a decision to introduce the private sector through a management contract for the provision of heat to the Sofia citizens with an aim to increase operational efficiency and improve customer service; and
- On December 20, 2002 the Government prepared a Letter of Development Policy for the Bank's Programmatic Adjustment Loan, confirming the implementation of district heating component of the Energy Strategy.

5. Value added of Bank support in this project:

The Bank has been working with the Bulgarian Government since the mid 1990s on energy and district heating issues through projects and sector analysis. The Bank has also worked with MEER and both the Sofia and Pernik DHC before in the context of the district heating component of the Water Companies Restructuring and Modernization project and the Sofia City Development strategy which makes it aware of issues that may arise under the project. The Bank will also be able to provide advice on the private sector participation in Sofia DHC based on its experience. The involvement of the Bank in the project will also facilitate the proposed ER purchase by PCF, since this facility is managed by the Bank, as a trustee of the PCF.

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

1. Economic (see Annex 4):

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

DHC	NPV (in 2001 BGN)	ERR
Sofia	BGN 146.0 million	23.5%
Pernik	BGN 9.5 million	18.3%

A cost benefit analysis was performed for the proposed investment program. In Sofia, the Bank, EBRD, and the EU KIDS grant was taken into account. The investment costs assumed for the calculations are: 192.4 and 22.1 million BGN for Sofia and Pernik, respectively (without taxes) taking into account the investments financed by the Bank, EBRD and the KIDS grant. The benefits of the project that have been quantified are: savings in heating fuel; savings on electricity substitution costs; savings in operations costs for pumping, maintenance and water. Social and environmental benefits have not been quantified. The economic rate of return for the proposed investments are 22.0% and 18.9% for Sofia and Pernik, respectively, justifying the project.

2. Financial (see Annex 4 and Annex 5):
NPV=US\$ million; FRR = % (see Annex 4)

DHC	NPV	FRR
Sofia	BGN 66.6 million	18%
Pernik	BGN 0.5 million	11%

The financial rates of return on an incremental basis for “with project” and “without project” scenarios are estimated at 18% and 11% for the Sofia and Pernik DHCs respectively. Assumptions are provided in Annex 5. A sensitivity analysis has been carried out for the key variables - revenues, gas/coal prices, and capital costs. The results indicate that the FRRs are robust and are not unduly influenced by changes in any single key variable.

Financial Issues

The financial situation of both DHCs deteriorated in the recent past due to: (i) loss of sales related to voluntary disconnections by consumers; (ii) low domestic tariffs, below the unit cost of heat production; (iii) low domestic bill collection rates; and (iv) rising operating expenses, including fuel costs. These factors led to an increase in: (i) cash operating deficits and the need to seek subsidies from the Government; and (ii) the accumulation of receivables from residential consumers and increase in payables, particularly to Bulgargas in the case of Sofia DHC).

Tariffs are proposed by the DHCs using guidelines set by the State Energy Regulatory Commission. In principle, the average tariff for each DHC is set on a cost-plus basis, and varies according to the type of fuel used by the DHC - coal, gas and fuel oil. However, this principle does not hold if domestic tariffs do not cover the unit cost of heat production and the DHC is dependent on the State for operating subsidies. In such a case, the Council of Ministers sets a ceiling on the domestic tariffs to ensure that tariffs are not unaffordable to the public as in the case of Sofia and Pernik DHCs. Currently, industrial tariffs and electricity tariffs are generally at cost recovery levels.

While the DH sector faced difficulties, the situation is improving with comprehensive policy actions being taken by the Government to implement the district heating component of the Energy Strategy, a steady increase in DH tariffs, and an emphasis on efficiency improvements. Financial projections indicate that the DHCs can become creditworthy provided that recent measures taken by the DHCs and the Government are sustained and the benefits of the project materialize.

As part of the project, both DHCs have prepared Financial Recovery Plans to improve their financial situation and progressively phase-out subsidies from the central government. The key targets and assumptions in the FRPs are summarized in Annex 5 and the main indicators are provided below:

- Tariffs - Residential heat tariffs are below the unit cost of heat supplied by the Sofia and Pernik DHCs. In real terms (2001 BGN), domestic tariffs need to be raised to around BGN 50.0/MWh for the Sofia DHC and around BGN53.9/MWh for the Pernik DHC to cover unit costs. Government plans allow an annual nominal increase of up to 10% in domestic tariffs and unit cost levels should be met by 2006. For both DHCs, industrial heat and electricity tariffs are already at cost recovery levels but would need to be maintained in real terms.
- Working ratio – The ratio of operating expenses over cash collected including arrears is an indication of the efforts made in the company to run efficiently. This ratio has been improving since the sector reforms started and will be monitored to measure progress of the project. By the end of 2006, the ratio in both companies should be less than 0.9.
- Bill collection – Bill collection rate from residential consumers, especially in Pernik DHC, is low and has to increase to improve the financial position of the companies and to reduce the dependence on cash collected from the sale of industrial heat and electricity. However, the current combined bill collection rate with arrears, including heat to domestic residents and industry and sale of electricity is around 104% and 92% in Sofia and Pernik, respectively. The recent overall bill collection rate is high since the collection of arrears has gone up as both DHCs have become aggressive in pursuing customers through the court system for past bills. Further, the recent change in the legislation allows DHCs to disconnect non-paying customers which has created incentives for consumers to pay on time. Another reason for the high overall bill collection rate is the prompt payment from the national electricity company to the DHCs. This is particularly significant for Pernik where about 70% of the revenues are generated from electricity sales.

Parameter	Key Financial Indicators			
	Sofia DHC		Pernik DHC	
	2003	2006	2003	2006
Domestic heat tariff (in 2001 BGN/MWh)	41.2	50.0	40.5	53.9
Industrial heat tariff (in 2001 BGN/MWh)	53.9	53.7	54.7	54.7
Working ratio	0.98	0.88	1.11	0.89
Overall bill collection rate, with arrears (%)	104%	100%	92%	95%
Domestic bill collection rate (%)	80%	85%	50%	84%

Under the project, on a semi-annual basis, both DHCs will present to the Bank their financial performance, including a financial forecast for the following two years to ensure that sufficient resources have been allocated in their annual budgets to cover their operating costs and the counterpart funding requirements and to determine progress under their respective FRPs. Tariffs will also be adjusted on an annual basis so that the two DHCs are able to meet their expenses and allow the phase-out of operating subsidies.

District heating companies in Bulgaria follow financial regulations, accounting and tax rules issued by the central government. These rules and regulations deviate at present in some significant aspects from international accounting standards (IAS) for similar revenue-earning entities. The financial statements of the Sofia DHC have been audited annually by an independent external audit firm that has re-classified and adjusted the statements in line with IAS. Annual audits will continue during project implementation. Financial statements for the Pernik DHC have been reviewed by local government auditors in line with local regulations, and will be audited by independent, external auditors during project implementation.

Fiscal Impact:

The project will have a positive fiscal impact and during its implementation period it is expected to generate a net fiscal benefit of around BGN 101 million between 2002 and 2007. The main sources of the fiscal impact are: (i) subsidies provided by the central budget; (ii) net VAT transfers; (iii) import duties; and (iv) profit tax. Details are provided in Annex 5.

Fiscal Impact (2002 to 2007)	Sofia DHC (million BGN)	Pernik DHC (million BGN)
With Project	32.7	4.9
Without Project	-59.1	-4.8
Net Fiscal Impact	91.8	9.7

3. Technical:

Detailed feasibility studies have been conducted for Sofia and Pernik and have been used as the basis for the design of investments. The proposed investments are technically viable, well tested, and not complicated. The following technical benefits are expected to materialize from the project:

- better service will promote revival of the district heating sector which is the most economical way to provide heat to an urban area. The investments will help retain existing customers and attract new consumers that currently use forms of energy that are more costly to the economy;
- demand side management measures will promote energy conservation at the household level. In Sofia, household consumption is expected to decline from 12.7 MWh to 10.6 MWh by December 2007. In Pernik consumption is predicted to drop from 14.9 MWh to 12.1 MWh by end of 2007;
- transmission heat losses will be reduced from 16.7% to 10.4% in Sofia; and 31.8% to 22.0% in Pernik;
- pumping costs will decrease by 35% and 30% for Sofia and Pernik, respectively;
- water losses will be reduced by 45% and 30% for Sofia and Pernik, respectively.
- repair and maintenance costs will decrease by about 5% a year; and
- particulate emissions from Pernik's boiler #5 will reduce from 1,600 mg/m³ to 100 mg/m³, in line with Bulgarian environmental standards.

4. Institutional:

4.1 Executing agencies:

Sofia and Pernik DHCs will execute the project through their Project Implementation Unit (PIU).

4.2 Project management:

The staff in the PIUs are competent in technical, financial and procurement issues and the human resource capacity of the two DHCs is adequate. In addition, the PIUs will be assisted by consultants who will help to implement the project and will assist in the preparation of bidding documents and train PIU staff on financial management, procurement, and disbursement procedures. This consultant is already in place working with both PIUs to prepare the bidding documents for the Bank project. The consultant is also helping the PIU in Sofia DHC to implement EBRD's portion of the project.

4.3 Procurement issues:

In March 2002, a procurement assessment was completed which concluded that the procurement risk of the project is high. However, since then the PIUs have become more familiar with the Bank procurement guidelines and have demonstrated that they can carry out Bank procurement (retroactive financing in Sofia DHC; and procurement carried out under the DH component of the Bank's Water Companies Restructuring and Modernization project). As a result the procurement risk may have been lowered since the assessment was completed. Nevertheless, to mitigate the risk, the following actions will be taken: all procurement packages will be subject to ex-post review; procurement supervision missions will take place once every six months; the PIUs project managers and the procurement specialists will receive procurement training; around the loan effectiveness period, a two-day procurement workshop will be held; and a computerized procurement monitoring system would be operational within six months of loan effectiveness.

Retroactive financing from the Bank loan will be provided to Sofia DHC under the project for the following activities:

- Installation of substation equipment under two National Competitive Bidding (NCB) process costing US \$2.1 million equivalent. The bidding process was satisfactory and works were completed by November 2002, leading to better demand side management of heat consumption in the heating season of 2002/2003.
- Public awareness campaign to establish baseline information on the opinion of consumers on the quality of DH services and to promote energy conservation. The process of selecting a consultant has started. The contract is expected to be signed in August 2003 and it is estimated that retroactive financing of US\$ 100,000 equivalent will be required from a total contract value of US\$ 500,000 equivalent.
- Procurement of a frequency converter for variable flow pumps in Zemliane heating plant through an International Competitive Bidding (ICB) to better control the flow of hot water in the DH system. The contract is expected to be signed in September 2003. Estimated cost for the contract is US\$ 700,000 equivalent with an estimated retroactive need of US\$ 200,000 equivalent.

4.4 Financial management issues:

The Country Financial Accountability Assessment (CFAA) for Bulgaria has started with an initial mission in December 2002. When finalized, the document will detail the issues on the financial management risks for the country and the implications for the World Bank operations. On a yearly basis the Bank conducts a Country Project Portfolio Review (CPPR) of all projects under implementation in Bulgaria. Common financial management issues identified in the reviews have been appropriately addressed in the project design.

The financial management arrangements of the project meet the requirements of the World Bank. On an annual basis, the audit reports for the two DHCs and the project financial statements will be provided to the Bank. The PIUs will implement the project's financial management system, in accordance with relevant Bank guidelines.

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

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

The project is classified as Category B, per the Bank's Operational Policy on Environmental Assessment (OP/BP 4.01), indicating that impacts are site specific and do not affect the environment in a significant manner. Environmental issues relate to construction activities and include dust, noise, minor traffic disruptions, and handling of hazardous waste.

The project's positive environmental benefits include fuel savings due to network efficiency gains; a reduction in the DHCs' water consumption as a result of the rehabilitation program; and a reduction in particulate emissions from Pernik DHC due to the installation of an electrostatic precipitator. Due to the project, the particulate emission is expected to reduce from 1600 to 100 mg/m³.

An Environmental Assessment (EA) was completed in June 1997 as part of the feasibility study for the rehabilitation of the Sofia and Pernik DHCs. An update of the EA was not necessary since the scope of work under the feasibility study was similar to the activities carried out under the project. Remedial measures to address environmental concerns raised in the EA have been incorporated in the Environmental Management Plan (EMP), which was prepared in late 2001, specifically for the project. The EMP was placed on the Bank's internet site on January 15, 2002 and was also published in local newspapers on February 20, 2002 to allow citizens to provide comments. Public meetings were also held to discuss the EMPs and no concerns were raised about the environmental issues related to the project (April 2, 2003 in Sofia DHC; March 28, 2003 in Pernik DHC).

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

The EMP adequately addresses the environmental concerns raised in the project. The EMP requires contractors responsible for works to undertake environmental remedial measures as part of their contract with the district heating companies. Specifically, contractors will: sprinkle water to reduce dust; conform with noise ordinances; seek permission for movements and routes from traffic authorities to prevent disruption of traffic; use specialized contractors for handling hazardous waste (mainly asbestos) if it is encountered during construction; and dispose of construction wastes in designated areas. The DHCs will supervise the work of the contractors as per the EMP.

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

Date of receipt of final draft: June 1997: Environmental Assessment completed as part of the feasibility study.

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

The environmental issues related to the project were made public through the Environmental Management Plan (EMP). The EMP was published in local newspapers and also was placed in the Bank's internet site. Public meetings were also held to discuss the EMPs. In these meetings no concerns about the environment were raised.

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

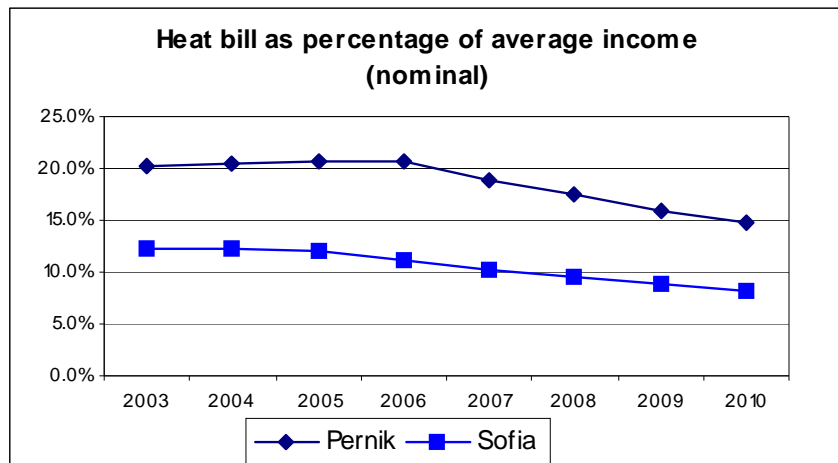
The EMP includes a monitoring plan that specifies the parameters to monitor, the frequency of the monitoring events, monitoring techniques and reporting structures. Institutional arrangements for the monitoring, in the EMP, are adequate. Sofia DHC and Pernik DHC will supervise the contractors that will conduct the monitoring. Satisfactory implementation of the EMP by the two DHCs is a condition under the Bank's loan.

6. Social:

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

The project will aim to improve district heating services for all which will be a key social development outcome. Better services will make consumers use DH services rather than electricity which is more expensive on a MWh basis. Surveys will be carried out in the early stages and towards the end of the project to determine the change in the opinion of the public regarding the DH service.

Compared to a no-project scenario, the proposed project will have a positive social affect since the tariffs will be more affordable. In a no project scenario, consumers will not conserve energy but tariffs will continue to rise to meet costs which in turn will make district heating bills more expensive compared to the project scenario. The graph below shows the combined effect of increased tariffs, incomes and decreased average consumption. Spending for heat is expected to stay stable at around 10-12% of annual household income in Sofia for the period by 2007, and to decrease on the longer run. In Pernik, spending for heat is expected to be 20% of annual household income in 2007 and 15% in 2010. For the poor, the consumption is much lower than the average - around 5 MWh per household which will make the district heating bills affordable.



Assumptions a) Per monthly capita income in 2003: Sofia BGN 157; Pernik BGN 96; b) Nominal income growth of 7%; c) Persons in a household: Sofia 2.5; Pernik 2.7; d) Annual household heat consumption: Sofia 11.8 MWh (2003), 10.6 MWh (2007); Pernik 13 MWh (2003); 12.1 MWh (2007).

Under the project, the Government will continue to make adjustments to the Energy Benefit Program (EBP) to ensure that the poor are able to receive district heating services. Under the EBP, about 25,000 families in the country receive DH subsidies (14,700 families in Sofia; and 1,200 families in Pernik) amounting to around 3 million BGN. For the 2002/2003 heating season the Government introduced changes in the EBP to mitigate the social impact of increased electricity and heating tariffs. Families whose monthly per capita income is less than the sum of BGN 45 (minimum energy need equivalent) and *differentiated minimum guaranteed income* are eligible for social assistance. The differentiated minimum guaranteed income is calculated on the basis of a guaranteed minimal income multiplied by a coefficient, depending on the type of family, defined by the Ministry of Labor and Social Policy. The maximum benefit a family can get is BGN 45 per month and the social assistance is paid directly to the DHC against a credit to the consumer. The program is administered by the Ministry of Labor and Social Policy. The Government will assess the situation in the summer of 2003, to expand the program for the heating season starting in Fall 2003.

In addition, the district heating component of the Energy Strategy envisages measures to assist the poor in receiving quality DH services. Satisfactory implementation of this strategy is a condition under the project and the Bank's PAL. In the past during the period of disconnections, the poor were the first to leave the district heating services although the price of electricity was double that of district heat. However, as district heating services become more demand responsive it is the poor who will come back to this service. To this end, the Government has taken a number of steps to ensure that the population, and especially the poor, suffers no undue hardships as tariffs increase. Some of the key measures are:

- allow consumers to pay the heat bills over a 12 month period. When the heat bill is paid on a monthly basis, during the five-month winter period, it consumes a substantial portion of the income of a poor household. When the cost will be spread over a year, the burden of the heating bills on the monthly income in the winter months will reduce.
- introduce a 2 block tariff for 2 years, starting in the heating season of 2002. Under this program, the consumption up to 250 kWh per month is paid for at the current prices by all customers who have no overdue payments to DHCs. The prices of the first block will remain unchanged throughout the entire period of transitional pricing which should end with the 2004/05 heating season. The prices of the second block will be increased as planned.
- regulate the activities of the Heat Accounting Companies. According to a representative survey carried out in Sofia in January 2002, the majority of the population expects a decrease in their heat bill as a result of the cost allocators and regulators. Preliminary results show that savings of around 15% can be achieved. The Government is considering measures to regulate the Heat Accounting Companies given that the activities of the companies directly affect the bills of the consumers.
- promote the need to conserve energy and provide examples on how demand side management leads to savings. In this context, substantial examples will be available prior to the heating season starting in Fall 2003, since the heating season of 2002 will be the first year when a significant portion of the population will be using the cost allocators and regulators.

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

In 1999, a survey was carried out for both Sofia and Pernik to determine the consumers' willingness and ability to pay for district heating services. A key element of the survey was to determine the consumer's view on the quality of service provided. In general, people expressed negative opinions about the DHC and complained about inadequate services and non-responsiveness towards consumers.

In early 2002, in the context of development of the Sofia City Development Strategy, consumers were surveyed about the quality of DH services. Compared to the 1999 survey, the citizens were more positive about DH services which is also reflected in the reduction in the rate of disconnection. In Mladost region, a district in Sofia, 64% of the surveyed population expressed their satisfaction with the services. In the same region, about 77% of the citizens believe that the bills will be reduced due to the introduction of the cost allocators and regulators. Citizens welcomed the use of cost allocators and regulators and expect that these devices will help to better control energy consumption and reduce the heat bills.

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

Rehabilitation of the district heating network was discussed with the stakeholders in Sofia and Pernik in 1999. Further during the development of the Sofia City Development Strategy more consultations were carried out between May 2001 and January 2002, with users and city officials. Further, as part of the project, consumer surveys will be carried out by the Sofia and Pernik DHCs to determine the level of satisfaction among consumers, including the poor. Two surveys are expected to be carried out - at the beginning and towards the end of the project - which would involve consultation with civil society.

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

The institutional arrangements are already in place and are described in detail in Section 6.1.

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

The expected social development outcome of the project is increased consumer satisfaction. The project will monitor: (i) the number of consumers that are being served by the two district heating companies. This indicator will be a proxy to measure the level of consumer satisfaction on the services provided by the district heating companies; and (ii) household energy consumption to determine the effectiveness of the demand side management measures to reduce heat consumption.

7. Safeguard Policies:

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

Policy	Triggered
Environmental Assessment (OP 4.01, BP 4.01, GP 4.01)	<input checked="" type="radio"/> Yes <input type="radio"/> No
Natural Habitats (OP 4.04, BP 4.04, GP 4.04)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Forestry (OP 4.36, GP 4.36)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Pest Management (OP 4.09)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Cultural Property (OPN 11.03)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Indigenous Peoples (OD 4.20)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Involuntary Resettlement (OP/BP 4.12)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Safety of Dams (OP 4.37, BP 4.37)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Projects in International Waters (OP 7.50, BP 7.50, GP 7.50)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Projects in Disputed Areas (OP 7.60, BP 7.60, GP 7.60)*	<input type="radio"/> Yes <input checked="" type="radio"/> No

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

The Environmental Management Plan, described above, identifies the environmental concerns and outlines a mitigation and monitoring plan to address the concerns. Satisfactory implementation of the Environmental Management Plan by the Sofia and Pernik DHCs is a condition under the Loan

Agreements.

F. Sustainability and Risks

1. Sustainability:

Factors critical to the sustainability of project benefits are:

- Continuous support from the Government to implement the district heating component of the Energy Strategy which outlines the development of a policy framework and steady increase in tariffs. To this end, commitment from the Government will be sought both under the project and the PAL.
- Continuous improvements in demand side measures such as installation of new sub-stations and allowing the consumers to regulate and measure consumption will ensure the revival of the sector. If consumers have more flexibility in the use of the district heating system they will not use electricity, which is more costly, as a means to heat an apartment.
- Timely implementation of the project is also critical so that the benefits are made public as soon as possible. This will help to improve the image of the sector which has suffered in the eyes of the public in the past. Further, the proposed efficiency improvements in the project would reduce losses (heat and water) and operating costs. This in turn will help to strengthen the financial position of the two companies.

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

The risks and associated mitigation measure are outlined below.

Risk	Risk Rating	Risk Mitigation Measure
From Outputs to Objective Tariffs will be unaffordable and the social assistance program will not be adequate	H	This risk is largely outside the control of the project since income levels are linked to the general economic conditions. However, the social assessment has shown that the district heating is affordable to most consumers and that the Government plans to constantly update the Energy Benefit Program to assist the poor to receive DH services.
Private sector participation in Sofia DHC for the provision of heat may not be timely	S	To avoid this risk, the Bank loan includes a dated covenant requiring Sofia DHC to complete the bidding process for selection of a private operator by December 30, 2003.
Financial Recovery Plans are not followed	S	The FRPs have been prepared in consultation with a number of officials and the current plans are realistic and have wide support from the State and local authorities. Satisfactory implementation of the plans are a condition for the Bank loan.
The demand side measures of the sector through new sub-station, cost allocators,	N	The benefits of new sub-stations in terms of energy savings are known to the DHCs and as a

and regulators are not timely		result this component is not expected to be implemented slowly. Further, the use of the cost allocators and regulators is expected to increase given the benefits to the consumer and the competitive services provided by the HACs.
From Components to Outputs Delays in policy reforms	M	Without the policy reform, the sustainability of the project will not be ensured. Thus, the project emphasizes a number of important steps to be taken by the Government under the Guarantee Agreement and under the Bank's PAL.
Delay in project implementation	S	This risk is being mitigated through: (i) establishment of a PIU with competent staff and providing them with proper training; (ii) ensuring the availability of counterpart funds at the beginning of each year; (iii) preparing all bidding documents by the end 2003; and (iv) establishment of a financial management system that will help to monitor project progress and take corrective actions when necessary.
Fuel prices may fluctuate	M	This risk is not high for Pernik since the price of coal is not expected to fluctuate. The risk is classified in the mid range in Sofia, in line with conclusions of the Energy Environment Review (Bank report, 2001). The best way to address the risk would be to promote energy conservation and reduce heat losses through measures proposed under the project. This risk will also be addressed by the financial covenants in the loan where tariffs have to be increased to meet costs.
Overall Risk Rating	H	The overall risk rating of the project is high given the need for sustained willingness to reform the sector and raise tariffs. However, Bulgaria's overall reform agenda and energy sector reforms are on track and it is expected that income levels will rise, household energy consumption will decline, management of the DHCs will be encouraged to perform differently based on conditions outlined in the FRP, and an adjusted Energy Benefit Program will be in place each year. These factors will contribute towards reducing the high risk rating of the project.

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

3. Possible Controversial Aspects:

Declining Operating Subsidies. The provision of operating subsidies in the initial years to the Sofia and Pernik DHCs could be controversial. However, it would be a decreasing subsidy program with no assistance from the State after 2005. In a 'without-project' scenario, the fiscal pressures will be much bigger as operating subsidies are expected to continue indefinitely. Further, the revival of the district heating sector in the country is the cheapest option for the economy to provide heat to the society in urban areas. A short term assistance from the State will yield long term benefits for the economy.

Ownership of the Sofia DHC by the State. It may seem contrary to the current discussions of decentralization and privatization in the energy sector for the State to take partial ownership of a municipal enterprise. However, this involvement by the State does not preclude future private sector entry. The involvement of the State was seen as necessary in the short to medium term to resolve the Bulgargas payable issue and better supervise the operations of Sofia DHC through a new board including members from MOF and MEER;

Formation of Joint Venture by Sofia DHC. Outside the scope of the project, Sofia DHC is planning to form a joint venture (JV) with a private company to produce heat and electricity through 2 new CHP plants with a total installed capacity of 254MW. The heat will be sold to the Sofia DHC while the National Electric Company would purchase electricity. A substantial part of the revenues of the JV are expected to be generated from the sale of electricity. The proposed two new CHP plants will be located in the Sofia and Sofia East locations that already have two CHP plants and may create confusion given its perceived overlap with the ongoing operations of Sofia DHC supported under the project. The proposed JV is distinct from the project since no existing generation, transmission, and distribution assets of Sofia DHC would be used for the JV. The Sofia DHC proposes to contribute land for the JV. Two options for the existing CHP plants in Sofia and Sofia East are being considered: a) these plants would be shut down since they have reached their economic life and replaced by the new CHP plants which would reduce the production costs; and b) the plants would be used only for peaking purposes after the CHP plants under the JV are operational. Provisions have been included in the Bank's Loan Agreement with Sofia DHC to ensure that the Bank is fully informed about the potential JV plans so that the arrangements are economic and competitive, not affecting the financial position of the Sofia DHC.

Separation of mines in Pernik. The separation of the mines in Pernik could lead to controversy regarding the social impact on the miners. As part of project preparation, an analysis was carried out and it was determined that Bank's social safeguard issues will not be triggered. In the short run, no social adverse effect is expected since the Pernik DHC has boilers that are designed to use coal from the Pernik mines. An interim coal purchase agreement, at competitive prices, has been signed between the DHC and the mining company and as a result the project would not create hardships to the miners. In the longer run, the Government plans to introduce a concessionaire for the mines. Since the timing and the nature of the private sector participation are not yet certain, the full social impact of a potential concession cannot be determined. The Bank's analysis also reviewed the existing Government's social policies regarding the privatization of mines and found them to be acceptable. Under the project, the Government would be required to carry out its own social policy regarding the miners in case of privatization of the mines.

Pending lawsuit against Pernik DHC. In early 2003, a lawsuit was filed against the Pernik DHC after the company separated its mining operation. Under the lawsuit, a claim has been made that the Pernik DHC has payables to a creditor. However, the Pernik DHC claims that the payables to the creditor are due from the mines and not the district heating operation. This matter was discussed during project preparation and the Bank decided to continue with the Pernik component under the project since the

claim made by the creditor has not been validated by the Bulgarian courts and also due to the strong support from the Government for the Pernik DHC, which is a State owned enterprise.

G. Main Loan Conditions

1. Effectiveness Condition

Sofia DHC

Sofia DHC provides evidence that the State has purchased BGN 45 million worth of shares in Sofia DHC in accordance with the decisions of the Sofia municipality and the Council of Ministers to resolve the issue of payables to Bulgargas.

Execution of contract with an independent auditor to audit the project accounts and the financial statements of the DHC for the year 2003.

Pernik DHC

Execution of contract with an independent auditor to audit the project accounts and the financial statements of the DHC for the year 2003.

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

Key conditions under the legal agreement include:

Sofia DHC

Sofia DHC will implement its Financial Recovery Plan (FRP) in a manner that is satisfactory to the Bank and will: a) increase tariffs on a regular basis to achieve financial self sufficiency; b) run operations efficiently; and c) meet the operational and financial targets.

Sofia DHC will complete the bidding process to select a private operator in a manner that is transparent and competitive. The operator should be selected by December 2003.

Sofia DHC will agree with the Bank on the planned use of assets of the company for the possible joint venture agreement to generate heat and electricity. The company will also have to demonstrate to the Bank that the terms and conditions of the joint venture are economic, competitive, and will not affect the financial situation of Sofia DHC.

Sofia DHC will keep the Bank informed on a quarterly basis about its payment to Bulgargas.

Pernik DHC

Pernik DHC will implement its Financial Recovery Plan (FRP) in a manner that is satisfactory to the Bank and will: a) increase tariffs on a regular basis to achieve financial self sufficiency; b) run operations efficiently; and c) meet the operational and financial targets.

Guarantee Agreement

The Government will take all measures to implement the district heating component of the Energy Strategy

The Government will enable the DHCs to progressively raise tariffs to levels that are necessary for full cost recovery and financial self sufficiency.

The Government will supervise the operations of the Sofia and Pernik DHCs in accordance with the Financial Recovery Plans and fund the operating deficits, as required.

The Government will take measures to adjust the Energy Benefit Program, as required, to ensure that the poor can afford district heating services.

H. Readiness for Implementation

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

NOTE - A Project Implementation Plan has been drafted.

I. Compliance with Bank Policies

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

Sudipto Sarkar
Team Leader

Henk Busz
Sector Manager

Andrew N. Vorkink
Country Director

Annex 1: Project Design Summary
BULGARIA: DISTRICT HEATING PROJECT

Hierarchy of Objectives	Key Performance Indicators	Data Collection Strategy	Critical Assumptions
<p>Sector-related CAS Goal:</p> <p>Contain energy consumption and bring about efficiency gains in supplying future demand. Support development of a comprehensive policy framework capable of attracting private investors.</p>	<p>Sector Indicators:</p> <p>Decreased public assistance in the DH sector</p> <p>Increased affordability of district heat supply</p> <p>Increase the role of private sector in DH</p>	<p>Sector/ country reports:</p> <p>Bank's supervision reports related to the Programmatic Adjustment Loan</p>	<p>(from Goal to Bank Mission)</p> <p>Political will to implement the DH strategy</p> <p>Increase in income levels that will support tariff increase</p> <p>Ability of the State budget to support the social assistance program for DH</p>
<p>Project Development Objective:</p> <p>The project development objectives are to assist the DH companies in Sofia and Pernik to:</p> <p>(i) improve the quality of DH services;</p> <p>(ii) improve the financial viability of the DH companies; and</p> <p>(iii) increase environmentally friendly operations in the DH companies.</p>	<p>Outcome / Impact Indicators:</p> <p>(i) Consumers express satisfaction about the DH services (through surveys)</p> <p>(ii) The DH companies are self-sufficient, no dependence on subsidies.</p> <p>(iii) Efficient environmental operations in place.</p>	<p>Project reports:</p> <p>Project supervision reports</p> <p>Semi-annual progress reports</p> <p>Audit and verification process reports (PCF)</p>	<p>(from Objective to Goal)</p> <p>Tariffs would be affordable and social assistance program should be adequate</p> <p>Private sector participation in Sofia DHC for the provision of heat is timely</p> <p>Financial Recovery Plans are followed</p> <p>The demand side measures of the sector through new sub-station, cost allocators, and regulators are timely</p>

Hierarchy of Objectives	Key Performance Indicators	Data Collection Strategy	Critical Assumptions
Output from each Component: Sofia DHC	Output Indicators:	Project reports:	(from Outputs to Objective)
Increased connection percentage	90% of consumers connected to DH system by end 2007.	Supervision reports Semi-annual progress reports	(for all components) No delay in policy reforms
Positive fiscal impact	Company operates without subsidies as of 2005	Supervision reports Annual progress reports	No delay in project implementation
Improvement in working ratio	Working ratio reduced from 1.15 to 0.88 between 2002 and 2006.	Supervision reports Semi-annual progress reports	Stable fuel price
Increased bill collection rate	Increase from 80% to 85% between 2002 and 2007.	Supervision reports Annual progress reports	
Reduction in network heat losses	Transmission losses reduced from 16.7% to 10.4% between 2002 and 2007.	Supervision reports Annual progress reports	
Decrease in energy consumption	Annual energy consumption decreased from 12.7 to 10.6 MWh/y/household in 2007	Supervision reports Annual progress reports	
Environmental benefits	Emissions of carbon dioxide reduced by 2.7 million tons between 2003 and 2012	Supervision reports Semi-annual progress reports	
	Network water losses reduce by 45% from 3 million m ³ /year.	Supervision reports Semi-annual progress reports	
Pernik DHC			(for all components)
Increased connection percentage	69% of consumers are connected to DH services by end 2007.	Supervision reports Semi-annual progress reports	No delay in policy reforms
Positive fiscal impact	Company operates without subsidies as of 2005	Supervision reports Annual progress reports	No delay in project implementation
Improvement in working ratio	Working ratio reduced from 1.22 to 0.89 between 2002 and 2006.	Supervision reports	Stable fuel prices
Increased bill collection rate	Increase from 50% to 84% between 2002 and 2007.	Semi-annual progress reports Supervision reports	
Reduction in network heat losses	Transmission losses reduced from 31.8% to 22.0% between 2002 and 2007.	Annual progress reports Supervision reports	
Decrease in energy	Annual energy consumption decreased from 14.9 to 12.1	Annual progress reports	

consumption	MWh/household in 2007.	Supervision reports	
Environmental benefits	Particulate reduction from 1600 to 100 mg/m3 between 2002 and 2007 for boiler #5. Network water losses reduce by 30% from 400,000 m3/y. Emissions of carbon dioxide reduce by 186,000 tons between 2003 and 2012.	Annual progress reports Air quality data Supervision reports Semi-annual progress reports	
Project Components / Sub-components: Sofia DHC	Inputs: (budget for each component) (Bank and DHC contribution only, excluding front end fee, price and physical contingencies, taxes and duties).	Project reports:	(from Components to Outputs) Timely project implementation
1A. Network rehabilitation	US\$ 25.3 million equivalent	Semi-annual progress reports	Timely hiring of the private Operator
1B. Sub-station rehabilitation	US\$ 2 million equivalent	Semi-annual progress reports	Use of public awareness campaign to improve services
1C. Technical Assistance	US\$ 3.2 million equivalent	Semi-annual progress reports	Effective use of other TA funds
Pernik DHC	(Bank and DHC contribution only, excluding front end fee, price and physical contingencies, taxes and duties).		Timely project implementation
2A. Sub-station rehabilitation	US\$ 0.8 million equivalent	Semi-annual progress reports	Use of public awareness campaign to improve services
2B. Network rehabilitation	US\$ 4.7 million equivalent	Semi-annual progress reports	Effective use of other TA funds
2C. Generation plant rehabilitation	US\$ 3.4 million equivalent	Semi-annual progress reports	
2D. Technical Assistance	US\$ 0.6 million equivalent	Semi-annual progress report	

Annex 2: Detailed Project Description

BULGARIA: DISTRICT HEATING PROJECT

The Overall Investment Program

The overall investment program supported by IBRD, EBRD, KIDS, EU Phare and the two district heating companies of Sofia and Pernik will finance critical rehabilitation needs. The cost of the investment program is US\$ 117.5 million for Sofia DHC and US\$13.6 million equivalent for Pernik DHC (Annex 3). Other grant resources, not reflected in the overall program investment costs are: a) USAID financing for consultants to assist in selecting a private operator for Sofia DHC; and b) proposed funds from the Prototype Carbon Fund (PCF) for the purchase of greenhouse gas emission reductions from the Sofia and Pernik DHCs.

The overall investment program is expected to improve the efficiency of the DHCs and encourage consumers currently using other forms of heat to switch back to district heating. This change will enhance the financial position of the two DHCs and contribute to greenhouse gas emission reductions. For both the Sofia DHC and Pernik DHC, the Bank and the Government will require the DHCs to follow Financial Recovery Plans which outlines the targets for improvement of the financial position of the two companies.

Project implementation consulting costs for both the Sofia DHC and Pernik DHC will be financed through an EU Phare grant of US\$1.6 million equivalent. The consultants will assist in the preparation of bidding documents, monitoring project progress, and training of PIU staff on project management, procurement, and financial management issues.

By Component:

Project Component 1 - US\$37.01 million

The above cost includes Bank and Borrower contributions, front end fees, price and physical contingencies, but do not include taxes and duties (Annex 3).

Sofia DHC

Sofia DHC has four large heat sources, two combined-heat and power plants CHP Sofia and CHP Sofia East, and two large heating plants Zemliane and Lyulin. In addition the heating company has seven small local boiler plants. The total installed capacity is 3,816 MWt of heat and 318 MWe electricity. Sofia and Sofia East account for about 64% of the heat production; Zemliane and Lyulin account for 28%; and seven small local heating plants account for the remaining 8% heat production. Annual heat production is about 6,000 GWh and electricity production about 830 GWh. Gas is the main fuel; mazut is used as reserve fuel and in some small boiler plants where the gas network is not available. The total length of the district heating network is about 830 km and there are about 14,500 substations, all equipped with heat meters. In Sofia about 300,000 apartments are heated by district heating.

The detailed description below refers to the Bank's portion of the project. The financing from EBRD, and the KIDs will support the replacement of around 30 kilometers of heat transmission pipes and rehabilitate 6,933 heat sub-stations.

- **Component 1A: Network Rehabilitation.** The heat transmission and distribution network will be rehabilitated through the installation of pre-insulated pipes, modern ball and butterfly valves,

compensators and thermal insulation. About 30 km of pipes will be replaced (5% of the network) mainly in areas that use pipes that are laid in foam concrete channels and that are prone to high leaks and breaks. Network interconnection between the four heating zones will be strengthened to optimize the heat supply. The four supply sources are: Sofia (CHP), East Sofia (CHP), Lyulin (HOB), and Zemliane (HOB). Through interconnection it will be possible to maximize the use of the CHP boilers. The HOBs will be used for reserve and peaking capacity only. Further, the rehabilitation will support the transfer of the present constant flow operation to variable operation mode through improvements in the heat sources. This use of variable flow pumping will reduce operational costs.

- Component 1B: Substation Rehabilitation. 1,097 sub-substations will be assembled and installed. Most sub-station components have already been procured under an ongoing Bank project: Water Companies Modernization and Restructuring. Additional parts will be procured and the assembly of all the sub-stations was completed in November 2002.
- Component 1C: Technical Assistance. The component will comprise the following:
 - Sofia Private Sector Participation (PSP) Consulting Services: Consultants are expected to supplement the work of USAID financed consultants advising on the private sector participation transaction. Further, the Sofia DHC may use consultants to seek advice on the Heat Purchase Agreement arising from the proposed joint venture;
 - Financial Management System (FMS): Consultants will be hired to update the project's FMS;
 - Public Awareness Campaign: Consultants will be hired to conduct a public awareness campaign to highlight the plans of the Sofia DHC to provide better services, the need to conserve energy, and intention to introduce the private sector;
 - Design and Supervision: While the bidding documents of the project are being prepared separately, provisions have been made under the Loan to carry out additional designs, if necessary, and supervise construction;
 - Auditing Costs: Provisions have been made for the auditing costs related to the project; and
 - Incremental Operating Cost: The PIU's incremental cost related to the project will be supported under the Loan. These costs include, maintenance of the financial management system, purchase of office equipment, and use of short term consultants

Private Sector Participation (PSP)

In September, 2001 the Sofia Municipal Council decided to introduce the private sector for the production, transmission, and distribution of heat. The project, through support from USAID, is financing consultants who are assisting the Sofia municipality on the following: (a) Phase I: selecting the optimal private sector participation option taking into account economic, technical, financial, and legal issues; (b) Phase II - preparing bidding documents to select a private operator.

Phase I: This phase has been completed where the consultant carried out a market survey amongst companies with international experience in operating DH utilities. The consultants also considered various private participation options by taking into consideration issues such as: benefits to the consumers, regulatory and enforcement mechanisms, incentives for improving performance, investment needs, and potential risks from the municipality's and the operator's viewpoint. Based on the analysis,

the consultant's recommended that a management contract option be followed where an operator will be responsible for providing service but will not take any investment risk. This decision was endorsed by the Sofia municipal council on December 18, 2002.

Phase II: The pre-qualification process to select an operator has started and it is expected that the bidding documents would be prepared in the summer of 2003 and an operator would be selected by December 2003. Draft bidding documents have been prepared which are being reviewed by the various stakeholders. Key items in the bidding documents are:

- Service targets. Specific targets are being defined to reflect the technical performance and the quality of service that reaches the end user;
- Regulatory Structure. Reporting structures and other regulatory arrangements are being defined
- Investments Requirements. Requirements for long-term investment to meet the above service standards are being defined. The investment responsibility will lie with Sofia DHC.
- Financial framework. Financial information on the DHC, that will include projections (income statement, cash flow statement, and balance sheet) and the Financial Recovery Plans will be provided to the bidders.
- Labor policy and employment. The current labor policies and the preference of the municipality to address the labor issue will be made clear to bidders.
- Consumer Relations. The contract will require the operator to focus on consumer relations and in particular to ensure that the concerns of consumer are reflected in decisions taken by the operator.
- Relations between the operator and Heat Accountants. The Consultant will describe the arrangement between the operator and the Heat Accounting Companies.

Project Component 2 - US\$11.06 million

The above cost includes Bank and Borrower contributions, front end fees, price and physical contingencies, but do not include taxes and duties (Annex 3).

Pernik DHC

The district heating system in Pernik consists of a CHP plant that produces heat for district heating, and steam for industry and electricity. The total annual heat production is about 400 GWh and electricity production about 500 GWh. The plant has five steam boilers and three turbines with the total power production capacity of 105 MWe and the heat capacity is about 270 MWt. The fuel quality is poor. The local lignite has ash content about 60% and the average caloric value less than 2000 kcal/kg. Due to the poor quality of the fuel the plant has typically one of the steam boilers under major repair. One of the main boilers (boiler #5) has a very old and inefficient electrostatic precipitator that is planned to be replaced under the project. The total length of the district heating network is about 60 km and the number of substations about 700, all of which are equipped with heat meters.

- Component 2A : Sub-station Rehabilitation. The component will include the cost of assembly of 700 sub-stations for which most parts have been already procured under an ongoing Bank project: Water Companies Modernization and Restructuring Project. Additional components, such as heat exchangers and pumps for the sub-stations, will also be purchased under this component. On completion, all sub-stations in Pernik will be operating with modern control and monitoring equipment which will help to increase the efficiency of the system.
- Component 2B : Network Rehabilitation. The component will include replacement of about 10 km of the heat transmission pipes (15% of total system) with pre-insulated pipes. Rehabilitation of the heat transmission and distribution network will also be carried out through the installation of valves

and compensators. This component will also support the purchase of variable speed pumps and monitoring systems for the district heating network.

- Component 2C: Generation Plant Rehabilitation. The component will support the replacement of an old and outdated electrostatic precipitator (ESP) for a boiler in the lignite fired CHP plant. The replacement of the old ESP which has been in operation since 1960's will significantly reduce particulate emission and improve the air quality. The current particulate emission from the boiler is 1,600 mg/m³ and it does not meet Bulgarian environmental standard which has a limit of 100 mg/m³ for particulate emissions. With the new ESP, the emissions are expected to be reduced to 100 mg/m³. This component includes also improvement of the automation and control equipment for the coal conveyor system and rehabilitation of the chemical water treatment plant.
- Component 2D: Technical Assistance. The component will comprise the following:
 - Public Awareness Campaign: Consultants will be hired to conduct a public awareness campaign on the services provided by the DHC. The campaign will highlight the plans of the company to provide better service and the need to conserve energy;
 - Design and Supervision: Whilst the bidding documents of the project are being prepared separately, provisions have been made under the Loan to carry out additional designs, if necessary, and supervise construction;
 - Auditing Costs: Provisions have been made for the auditing costs related to the project;
 - Incremental Operating Cost: The PIU's incremental cost related to the project will be supported by the Pernik DHC. These costs include, maintenance of the financial management system, purchase of office equipment, and use of short term consultants; and
 - Financial Management System: Costs to update and maintain the financial management system for the project.

Annex 3: Estimated Project Costs
BULGARIA: DISTRICT HEATING PROJECT

The overall investment program for the Sofia and Pernik DHCs totals US\$132.7 million equivalent. The overall financing plan is described below:

- Sofia DHC: The cost of the investment program is US\$ 117.5 million equivalent with the following financing: IBRD - US\$ 27.2 million equivalent; EBRD - US\$ 31.4 million equivalent; EU Kozloduy International Decommissioning Support Fund (KIDS) - US\$ 31.4 million equivalent, managed by EBRD; and Sofia DHC - US\$ 27.5 million equivalent.
- Pernik DHC: The cost of the investment program is US\$ 13.6 million with the following financing: IBRD - US\$ 7 million equivalent; Pernik DHC - US\$ 6.6 million equivalent.
- Project Implementation: Project implementation consulting costs for both the Sofia and Pernik DHCs will be financed through an EU Phare grant of US\$ 1.6 million equivalent.

Other grant resources, not reflected in the overall costs of the project, are: a) USAID financing for consultants to assist in selecting the private operator for Sofia DHC; and b) proposed funds from Prototype Carbon Fund (PCF) for the purchase of emission reductions (ER) of greenhouse gases due to the project in Sofia and Pernik DHCs. The amounts to be purchased by PCF will be determined after a study is completed to estimate the ER. The tables below show the Bank's portion of the project.

SOFIA DISTRICT HEATING						
(in US\$1000 equivalent)						
COMPONENTS	COSTS			FINANCING		
	Local	Foreign	Total	Bank	Sofia DHC	Total
1A Network Rehabilitation						
Pipeline replacement	4,396	8,044	12,440	11,196	1,244	12,440
Compensators and valves	1,722	3,198	4,920	3,935	984	4,919
Thermal insulation of overground pipes	1,047	1,047	2,094	1,675	419	2,094
Variable flow pumping	1,172	4,689	5,861	3,763	2,098	5,861
TOTAL NETWORK	8,337	16,978	25,315	20,569	4,745	25,314
1B Substation Rehabilitation						
Installation of Regulators	994	994	1,988	1,989	0	1,988
TOTAL, SUBSTATIONS	994	994	1,988	1,989	0	1,988
1C Technical Assistance						
Incremental Operating Costs for PIU	209	0	209	0	209	209
Financial Management System	26	0	26	0	26	26
Financial Audits	105	0	105	0	105	105
Consultancy for private sector participation	157	366	523	419	105	524
Public awareness campaign	105	314	419	335	84	419
Design/supervision	1,927	0	1,927	0	1,927	1,927
TOTAL, TA	2,529	680	3,209	754	2,456	3,210
TOTAL, BASE COST	11,860	18,652	30,512	23,312	7,201	30,512
Physical and Price Contingencies	3,189	3,045	6,234	3,633	2,601	6,234
PROJECT COST BEFORE FEF	15,049	21,697	36,746	26,945	9,802	36,746
Front End Fee (1%)	0	269	269	269	0	269
PROJECT COST BEFORE DUTIES	15,049	21,966	37,015	27,214	9,802	37,015
Import duties (5% of CIF)	1,157	0	1,157	0	1,157	1,157
V.A.T.	6,050	0	6,050	0	6,050	6,050
TOTAL	22,256	21,966	44,222	27,214	17,009	44,222

PERNIK DISTRICT HEATING (in US\$1000)						
COMPONENTS	COSTS			FINANCING		
	Local	Foreign	Total	BANK	Pernik DHC	Total
2A Substation Rehabilitation						
Installation of substations equipment	750	0	750	0	0	750
TOTAL, SUBSTATIONS	750	0	750	0	750	750
2B Network Rehabilitation						
Re-insulated pipes	870	2,083	2,953	2,083	870	2,953
Compensators	30	155	185	155	30	185
Modernization of pumping stations	20	1,080	1,100	1,080	20	1,100
Monitoring system for DH network	100	400	500	400	100	500
TOTAL, NETWORK	1,020	3,718	4,738	3,718	1,020	4,738
2C Rehabilitation of Generation Plant						
Electrostatic precipitator for boiler# 5	930	2,170	3,100	2,170	930	3,100
Water treatment	80	100	180	126	54	180
Automation & control	40	100	140	112	28	140
TOTAL, HEAT SOURCES	1,050	2,370	3,420	2,408	1,012	3,420
2D Technical Assistance						
Incremental Operating Costs for PIU	50	0	50	0	50	50
Financial Management System	25	0	25	0	25	25
Financial Audits	80	0	80	0	80	80
Public awareness campaign	20	0	20	0	20	20
Design/supervision	388	0	388	0	388	388
TOTAL, TA	563	0	563	0	563	563
TOTAL, BASE COST	3,383	6,087	9,470	6,125	3,345	9,470
Physical and Price Contingencies	715	805	1,520	805	715	1,520
PROJECT COST BEFORE FEF	4,098	6,892	10,990	6,930	4,060	10,990
Front End Fee (1%)	0	70	70	70	0	70
PROJECT COST BEFORE DUTIES	4,098	6,962	11,060	7,000	4,060	11,060
Import duties (5% of CIF)	394	0	394	0	394	394
V.A.T.	2,214	0	2,214	0	2,214	2,214
TOTAL	6,706	6,962	13,668	7,000	6,668	13,668

