Project Name	Hungary-Szombathely: Combined (*)... Heat and Power (CHP)/Biomass Project
Region	Europe and Central Asia Region
Sector	Other Environment
Project ID	HUGE66879
Borrower(s)	District Heating Company Of Szombathely
Implementing Agency	Ministry Of Economy
Environment Category	A
Date PID Prepared	November 2, 1999
Projected Appraisal Date	May 3, 2000
Projected Board Date	September 18, 2000

1. Country and Sector Background

In former times, the philosophy governing heating development in the cities of Hungary was to provide most residential dwellings with district heat but to rely on individual boilers for most industrial applications. The district heating systems tended to minimize investment costs with resultant lack of controls and substantial inefficiencies. Consequently the systems were often very expensive to operate and subsidies were required to reconcile the ability of people to pay for essential heating and the cost of providing it through these systems.

The power sector was somewhat more efficient although excessive reliance may have been placed on high-cost domestic coals and a mixture of domestic gas and imported gas. Economic optimization of the sector would require pricing of these fuels at their long run marginal cost for both capacity expansion and dispatch purposes. Although some excellent long-run marginal cost studies have been completed in the last two recent years, they have not been fully adopted either for planning or tariff-making purposes.

Identification of the proper niche and buy-back rates for cogeneration based on district heating and consolidation of island heating systems is an essential building block of the future power sector development strategy. Current Hungarian policy gives the right of first refusal for purchase of independent power production to MVM, the major state-owned Hungarian utility and transmission grid owner, for all projects with electric capacity larger than 20 MW.

Hungary is now facing special challenges in the gas sector as domestic resources become depleted and reliance on imported gas or fuel oil increases. The use of gas for heating and for power generation must be optimized since the imbalance in seasonal demands requires substantial new investment in storage capacities. Winter gas demands are now eight times as high as summer demands. Storage capacity requirements are expected to increase by about 25 to 30 percent within the next four years. For these reasons, the Government of Hungary expects to limit new gas-fired electric generation to the most efficient technologies and does not expect major new gas power plants without cogeneration.

The historic pricing of fuels has not uniformly reflected economic costs and

certainly has not reflected the externalities associated with combustion of coal or heavy fuel oil. Tying the public interest in promotion of more efficient heat and power generation together with GEF grants for such a project would be a major step forward in rationalizing both heating and power sector development for both economic and environmental purposes.

2. Objectives

The main purpose of this project is to decrease harmful emissions of greenhouse gasses in ways that deliver economically competitive heat supplies to a major portion of the City of Szombathely and competitively priced electricity to the grid. Additional project objectives are: (i) to strengthen rural employment and incomes through increased beneficial usage of wood; and (ii) to demonstrate the technical feasibility of wood-firing for district heating coupled with electric production using gas motors.

3. Rationale for Bank's Involvement

Bank support provides economic discipline to the choice of the most desirable project from a public investment perspective and facilitates co-financing of a municipal project that would otherwise have a very difficult time in attracting sufficient capital. The combination of GEF financing and attractive World Bank loans makes the private investment component much more saleable. Bank involvement will also assure much wider dissemination of project lessons and results for the benefit of others that would like to initiate similar projects. Important policy reforms that are needed to make this type of project replicable are also highlighted by the Bank's participation. The clear contribution of GEF will be to provided sufficient monetary recognition of the value of the CO2 reductions which is sufficient to allow acceptable pricing combinations for the heat and electric outputs of the project.

4. Description

The major physical components of the project include a new gas-motor CHP with 20.0 MWe and 24.0 MWth capacities, a 7.5 MWth wood-fired boiler, segments of new district heat pipeline to connect existing island systems, controls for the gas-fired peaking boilers, gas and electric interconnections, biomass handling equipment, and additional civil works. The project would be built at the site of the existing Vizonto heating plant.
Indicative investment costs of the project's physical components are (US$ million):

Gas Motors -	14.0
Wood Boiler -	2.0
Gas Connection -	0.3
Gas Boiler Controls -	1.0
District Heating Pipeline -	4.6
Electric Connection -	1.8
Biomass Equipment -	0.5
Civil Works -	0.5
Engineering Costs and Contingencies -	3.3
TOTAL:	28.0

5. Financing

	Total (US$m)
Government	0
Ibrd	10
European Union	1
Government Of Austria	1.5
Local Contribution	2
Other Private Commercial Sources	11
Global Environment Facility	2.5
TOTAL:	28

6. Implementation

The Ministry of Economy (former MOIT) is the lead Hungarian coordinating agency for this project. The ministry has expressed keen interest in developing an integrated power and environmental development strategy. Under the new government in Hungary, the energy sector is receiving increased emphasis both in terms of structure and pricing policy. This project will provide important precedents for other cogeneration projects tied to district heating in Hungary. The alliance with a strategic investor selected through tendering; the local electric distribution company (EDASZ) as a purchaser of power produced by the project; the municipal district heating company as the purchaser of the heat output; and the City as the local investor provides a new organizational model for such projects in Hungary. The Ministry of Economy can leverage this project through publicizing the role that GEF and EU grants (in combination with a World Bank loan) can play in correcting market prices for environmental externalities.

In search of a possible strategic partner, the municipality has issued a tender, based on a feasibility study financed from funds made available by the Austrian and Japanese Governments, and supervised by the World Bank. Five possible investors have been approached: RWE (Germany), MOL (Hungary), BTB (Germany), Bayernwerk (Germany) and EVN (Austria). Tenders are currently expected, and the City Council is prepared to make a final decision before the end of 1999.

The essential direct participants in the project are the City and its heating company, the heating islands that will be newly connected to the district heating network, EDASZ as a power purchaser, a strategic foreign investor, and the wood suppliers. Project alternatives have been developed in close cooperation with these entities although the strategic investor will only be named by the end of 1999. At this time the City has indicated their clear preference for Alternative 1 out of the three options considered in the Phase 2 feasibility study. Alternative 1 is the proposed project in this PCD. Final commitments to the project by all key parties are anticipated by the end of 1999.

The current proposals are for the City to provide a relatively small portion (about $2.0 million) of the capital investment either as a loan or on an equity basis. The strategic partner will be an equity investor with an investment of about $11 million. The remainder of the initial investment would be covered by a $2.5 million grant from GEF and a $10 million loan from the World Bank. The City will buy project heat outputs while EDASZ buys

project electric outputs on a contract basis. The proposed project offers 20.0 MWe. Project outputs can then be sold to the local distribution company without consideration of MVM. It is anticipated that the wood supply can be purchased on a long-term contract basis with companies with proven long-term reliability. A long-term contract for gas purchases will also be considered.

The option of alternative modalities for GEF grant administration have been considered for this project. Discussions with the Government on the prospects of GEF involvement in the project have now been underway for over three years. From inception, the discussions have focused on the GEF providing grant support for the project. It was on this basis that potential investors were requested to submit their bids. These are expected to be received and evaluated shortly. Changing the modality of GEF support retroactively is deemed inapropriate, as it would give investors mixed signals and could put the operation in jeopardy, which makes it a binding contraint to exploring non-grant financing options.

7. Sustainability

To fully achieve its objective as a climate change mitigation measure, the project must ensure that intial carbon reductions achieved at the beginning of project operation will continue throughout the life of the project. Most of the expected carbon reductions come from reduced electric generation from coal plants. Assurance that coal plants will be used less as a result of this project rely on the assumed economic dispatch of grid resources with and without the proposed project. Since the proposed electric generation is base and intermediate load, it is reasonable and probable that the most costly base and intermediate generation should be used less due to this project. Hungary uses gas and older coal units for intermediate generation. A relatively conservative assumption of 70% gas and 30% coal has been used in the incremental cost analysis.

The project does not rely on significant new market penertration, uses proven technology, builds on successful operation of a municipal district heating system using some gas motor cogeneration, and will have substantial backing from a strategic investor with substantial experience in heat and power project development. These features augur well for the success in the implementation of the project. The only reasons for changed modes of operation over the life of the project would relate to technical problems or different economic incentives than expected. If wood became more expensive than gas, or if the gas motors failed to produce as expected, the anticipated carbon reductions might not be the maintained over the project life. Similarly, reduced availability of gas or wood would have severe consequences for the project, but the project owners will have strong commercial incentives to insulate against these problems in the purchase contracts. The degree of exposure will be known prior to GEF disbursements based on review of the subject contracts.

To further ensure that the planned carbon reductions are achieved, three types of contingencies have been considered:

Failure to replace/overhaul the CHP gas motors at the end of their useful life with possible return to gas-fired heat generation but no co-generation of electricity;
Switching from biomass to gas-fired heat generation by converting the wood

boiler into a gas-fired heat-only boiler at a similar date;
Fluctuations of input (gas, wood) prices.

Of these possibilities, only the first one appears plausible. An unusual feature of this project with regard to sustainability of the carbon reductions is the relatively short normal life of the gas motors compared to other cogeneration plants. The project includes investment to replace/overhaul the gas-motor CHP after ten years of operation. The current assumption is that the gas motors will be replaced/overhauled because the incentive for the project facility to continue cogeneration will be strong enough based on the cost calculations done for the period starting in year 2010.

Conversion of the wood boiler into a gas boiler would be highly improbable since the life of the wood boiler is expected to be as much as 20 years. Having made a substantial long-term investment in the wood boiler, the project facility is unlikely to switch to a more expensive fuel. Besides, the conversion would require some additional investment, so even if the gas prices decrease, it is unlikely that they will fall enough to justify the conversion investment. Wood fuel is now at least 20% cheaper than gas, and the difference is expected to increase in the future.

The incremental risks of gas price fluctuation are also minor for this project because total gas use is not much different between the proposed and base cases (this makes it impractical to attempt to design a contingent financing scheme for the carbon reductions tied to gas prices; the gas prices have too little impact on the incremental costs to justify the complexities of such contingencies).

The biomass (wood) boiler operates in lieu of natural gas boilers. CO2 emissions per MWh of fuel input are 0.2 tons for gas and 0.0 tons for biomass. The zero emissions estimate for biomass is based on the assumption that biomass absorbs as much CO2 in growth as it releases when burned. Thus, in a timeless analysis, the net emissions from biomass fuel are are zero. However, from the environmental sustainability point of view, it is important that adequate arrangements are made for replacement timber crop. This will be addressed in the Categoy A Environmnetal Assessment recommended for the project.

Concerning financial sustainability, it should be noted that a commitment from the strategic investor with project development expertise is the surest indication that the project will be financially sustainable. The cost side of the project's cash-flow profile is reasonably well determined, so the key issue will be the terms of the heat and electric sales contracts. The financial sustainability of the project may have to be strengthened by indexing the heat prices to gas prices, which would reflect the actual alternative available to the consumers and make sure that the project costs do not escalate more rapidly than its revenues.

8. Lessons learned from past operations in the country/sector

The experience with the Szekesfehervar project has shown that, in district heating projects in Hungary, it is important to offer the municipal authorities (the City) a range of solutions and to recognize that they will be driven primarily by the delivered net cost of heat with strong

consideration given to the limitations on City financing capacities. The Cities are not well-prepared to develop large energy projects, and this role may be better played by private investors who are more experienced in this type of project development.

The proposed project in Szombathely is a seminal project linking biomass district heating and gas-fired co-generation in Hungary to maximize the reduction in CO2 emissions. The GEF grant is expected to play a significant role in attracting investors to a project that might otherwise be difficult to finance.

The lengthy preparation period for this project has revealed numerous procedural barriers which could be avoided or minimized in the future through successful demonstration and supportive national policies. One key lesson is that Cities hold the ultimate decision-making authority in municipal heating projects and they are not prepared to undertake major investment programs even if they are financable on favorable terms. Future project proposals should take care to minimize the needed investments and to follow the tendering process used here to include a strategic investor with experience in risk management and project development. Lengthy debates about the appropriate price for purchased power from cogeneration projects could be contained by clearer national policies on the appropriate basis and/or levels of prices for such purchases. Such policies should also address the need for back-up power and the appropriate charges for that power. It is hoped that clear models will be established through the two Hungarian projects as guides to the municipalities in resolving the complicated organizational and ownership issues.

The important technical features of the project are the relatively large size of the wood-fired boiler component coupled with the demonstration that gas motors can be attractive for base- and intermediate-load cogeneration. Finally, peak heating loads are covered with gas boilers which are the least expensive form of capacity and ideally suited to assure reliable operation of the system for heat.
Pricing precedents established for this project could also be the foundation for new policies that would promote co-generation projects that provide needed capacity at competitive prices to the grid. The wood pricing precedent is also a valuable indicator of the value of wood in this type of application.
The efficiency gains and scale economies from consolidation of insular heating systems are also demonstrated in the evaluation of this project.

9. Program of Targeted Intervention (PTI) N

10. Environment Aspects (including any public consultation)

Issues: The wood for the biomass boilers is supplied from a natural forest. Mainly for this reason, the project has been assigned the Category A for the purposes of environmental assessment. The assessment will examine the replacement crop arrangements. Local increase in NOx are also possible. However, the overall environmental impact of the project is expected to be positive due to the displacement of coal-generated electricity from the electric grid.

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Note: This is information on an evolving project. Certain components may not be necessarily included in the final project.

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