



<b>1. Project Data:</b>		<b>Date Posted :</b> 01/29/2002	
<b>PROJ ID:</b> P045572		<b>Appraisal</b>	<b>Actual</b>
<b>Project Name :</b> Czech Republic - Kyjov Waste Heat Utilization Project	<b>Project Costs (US\$M)</b>	24.94	26.04
<b>Country:</b> Czech Republic	<b>Loan/Credit (US\$M)</b>	5.8	6.04
<b>Sector(s):</b> Board: ENV - District heating and energy efficiency services (55%), Power (43%), Central government administration (2%)	<b>Cofinancing (US\$M)</b>	18.62	19.44
<b>L/C Number:</b>			
	<b>Board Approval (FY)</b>		99
<b>Partners involved :</b> Teplarna Kyjov (TPK), State Environmental Fund (SEF) Hypovereinsbank (HVB), and City of Kyjov	<b>Closing Date</b>	06/30/2000	03/31/2001
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## 2. Project Objectives and Components

### a. Objectives

The *main project objective* was to decrease the emissions of greenhouse gases (GHG).

*Associated project objectives* were to (a) demonstrate gas-fired combined-cycle cogeneration in the Czech Republic, where this technology has not been widely used; (b) stimulate technological and institutional changes that would promote energy efficiency through developing combined-cycle heat and power systems for joint industrial and municipal purposes; (c) achieve local environmental benefits by reducing the share of coal and lignite in the fuel -mix for heat and power generation; and (d) demonstrate the possibility of cooperative efforts between the Czech Ministry of Environment (MoE) and the private sector in enhancing the environmental benefits from such a project .

### b. Components

The original components of the project consisted of five physical components and one component for project supervision and dissemination activities :

- (1) Construction of a gas-fired combined-cycle heat and power plant (CHP);
  - (2) Replacement and retrofitting of waste heat boilers at the Glass Factory (VMG);
  - (3) Construction and re-modeling of existing buildings at the VMG glass factory;
  - (4) Modernization and expansion of the district heat (DH) network of the City of Kyjov;
  - (5) Decommissioning of about 13 boiler houses in Kyjov and replacement by connection to the DH network and installation of substations with heat exchangers;
  - (6) Project supervision and dissemination activities, including training and public relations matters .
- During project implementation, minor modifications were made with respect to improvements in the design of the CHP system and waste heat boilers . Fifteen boilers, rather than 13 estimated at appraisal, were decommissioned .

### c. Comments on Project Cost, Financing and Dates

Project costs were US\$ 26.04 million, 4.4% above that estimated at appraisal (US\$ 24.94). Higher costs of the replacement and retrofitting of waste heat boilers, modernization and expansion of the DH network, and replacement of boilers were partly offset by cost savings in the modification of existing buildings at VMG . The project was financed by grants from GEF (US\$ 6.04 compared to US\$ 5.8 at appraisal); the City of Kyjov (US\$ .56 compared to US\$ .52 at appraisal); and co-financiers, including SEF, HVB, and the implementing company, TPK, (US\$ 19.44 compared to 18.62 at appraisal). The project closed on March 31, 2001, nine months later than expected .

## 3. Achievement of Relevant Objectives:

*Major project objective :*

**(1) Decrease the emissions of greenhouse gases (GHG):** The reduction in lifetime emissions of CO<sub>2</sub> achieved by the project are estimated at 2.66 million tons, 7% below the appraisal estimate of 2.87 million tons. This shortfall is largely due to less-than-expected efficiency of the gas turbines and the resulting increase in the consumption of natural gas by the plant. The estimate of reductions in lifetime emissions of CO<sub>2</sub> is based on the assumption that electricity produced by the CHP plant would displace electricity produced by lignite-fired power plants.

**Associated project objectives :**

**(2) Demonstrate gas-fired combined-cycle cogeneration in the Czech Republic, where this technology has not been widely used :** The ICR does not provide any information on the demonstration impact of the project. It may be too soon to tell.

**(3) Stimulate technological and institutional changes that would promote energy efficiency through developing combined-cycle heat and power systems for joint industrial and municipal purposes :** The project is a prototype for the institutional and technological changes necessary for the construction and operation of a CHP system for joint industrial and municipal purposes. However, the ICR does not provide information on any such changes made in other localities as a result of this project. Again, it may be too soon to tell.

**(4) Achieve local environmental benefits by reducing the share of coal and lignite in the fuel -mix for heat and power generation :** Improved energy efficiency and reduction in local air pollutants (especially NO<sub>x</sub>) are likely to be achieved through the decommissioning of 15 inefficient boilers and their replacement by connections to the DH network, higher energy efficiency and heat savings from modernization of the DH network, and the likely displacement of electricity production from lignite-fired power plants by electricity produced by the CHP plant. However, no substantiating evidence of these local environmental impacts is provided in the ICR.

**(5) Demonstrate the possibility of cooperative efforts between the Czech Ministry of Environment and the private sector in enhancing the environmental benefits from such a project :** The project demonstrated that shareholders (private and public) with diverging objectives could reach a compromise in the interest of realizing an attractive project with significant environmental benefits. The TPK, the implementing company, was established with both private and public shareholders, including a foreign strategic investor (EON of Germany), the South Moravian Power Company (JME), the South Moravian Gas Company (JMP), and the City of Kyjov. While the company was able to initially resolve pricing issues amongst its shareholders through contractual arrangements for the purchase and sale of gas and power, it is possible that these arrangements may fall through for reasons explained in Section 5 below.

**4. Significant Outcomes/Impacts:**

(1) The project had a significant impact on the institutional arrangements governing electricity and heat production. Two new companies were established: Teplarna Kyjov (TPK), a private sector company to own and operate the CHP plant, and Teplo Kyjov, a City-owned company with potential for privatization, to reconstruct and operate the DH network. Teplo Kyjov evolved from the former DH department of the City of Kyjov.

**5. Significant Shortcomings (including non-compliance with safeguard policies):**

(1) The financial aspects of the project are dismal. Operating profits for TPK in 2002 are projected to be only 39.3% of that projected at project design. For that year, operating costs are expected to be 213% higher than originally projected. This is partly because a costly maintenance contract had to be negotiated even though the supply of spare parts and the provision of maintenance could have been included earlier in the competitive bidding for the turn-key contract for the CHP equipment. Also, inconsistent conditions for the guaranteed values of gas consumption by the turbines were found in the contracts among TPK, the general turn key contractor, and his sub-suppliers for the gas turbines. As a result, the efficiency of gas consumption by the turbines was lower than estimated at project design. Due to energy conservation measures taken by consumers, warm winters, some conversion to gas, and efficiency improvements in the DH network, heat demand and therefore heat revenues were much lower than expected.

(2) The contractual arrangements between the shareholders of TPK are leading to losses by TPK and JME and may be unsustainable. These arrangements are such that TPK is making a loss as it must sell electricity and heat to VMG at concessional prices. JME is also suffering large losses as it must buy electricity from TPK at price levels that are substantially higher than the current market price. However, a downward revision of the contractual electric tariff would lead to an even further deterioration in the TPK's financial position. Expected changes to the current energy pricing policy in the Czech Republic may provide some fiscal relief. Currently, electricity prices are kept very low reflecting social considerations and over-capacity, and cross-subsidies on gas are used to keep gas prices low for small consumers. EU accession will require the Czech Republic to address these price distortions. This may provide some financial relief through higher electricity prices for JME and removal of gas subsidies for residential consumers that might make district heating more competitive for TPK. TPK should also be able to improve its financial situation by renegotiating sales conditions with VMG.

6. Ratings:	ICR	OED Review	Reason for Disagreement /Comments
<b>Outcome:</b>	Satisfactory	Moderately Satisfactory	The outcome of the project has been rated 'Moderately Satisfactory' (a rating which does not appear in the ICR rating scale) because of the project's poor

			financial performance. Even when taking into account the GEF grant, the ex-post IRR of the project is only 7.8%, as opposed to 18.4% estimated at appraisal.
<b>Institutional Dev .:</b>	Substantial	Substantial	
<b>Sustainability :</b>	Likely	Likely	Recent actions by TPK shareholders demonstrate their commitment to improving the financial performance of the company. Nonetheless, it should be noted that significant uncertainty remains regarding TPK's long-term competitiveness in a future liberalized electricity market.
<b>Bank Performance :</b>	Highly Satisfactory	Satisfactory	Bank performance has been downgraded to 'Satisfactory' because, at appraisal, the Bank: (1) did not consider the risk of possible reductions in projected heat demand, despite the fact that prior Bank district heat projects in ECA have shown poor financial performance as a result of significant and often unexpected reductions in heat demand during project implementation; and (2) during project implementation, did not give adequate attention to arrangements for maintenance or the contract conditions for the efficiency of the gas turbines (see Section 5 above).
<b>Borrower Perf .:</b>	Highly Satisfactory	Satisfactory	The Borrower belatedly entered into an agreement for spare parts and maintenance resulting in significantly higher operating costs. It also paid inadequate attention to the conditions for the guaranteed values of gas consumption by the turbines in the contracts among TPK, the general turn key contractor, and his sub-suppliers for the gas turbines (see Section 5 above).
<b>Quality of ICR :</b>		Satisfactory	

**NOTE:** ICR rating values flagged with '\*' don't comply with OP/BP 13.55, but are listed for completeness.

#### **7. Lessons of Broad Applicability:**

- (1) Future heat loads need to be carefully assessed for CHP plants so that, for maximum efficiency, the electric generation capacity of CHP is only as large as the available heat load allows. Moreover, a sufficiently high heat load is needed for the cogeneration of electricity at a CHP plant to be competitive with other sources of electricity.
- (2) While stakeholders with diverging objectives can come together in joint ownership and risk-taking on an attractive project, the ensuing compromises on prices in contractual arrangements can lead to its undoing, particularly in a dynamic energy market being restructured. A rigorous assessment of likely future changes in the structure of the energy sector and energy prices must be undertaken at project design to better understand the risks that these changes might pose to the project.
- (3) Early testing of waste heat boilers should be undertaken as soon as possible to detect any technical problems arising from industrial processes. In this case, delays in the start-up of the waste heat boilers occurred as technical problems were encountered from the intake of huge amounts of particulate matter from the glass production furnaces into the boilers.

**8. Assessment Recommended?** ☐ Yes ☒ No

#### **9. Comments on Quality of ICR:**

The ICR provides a frank and thoughtful account of project implementation. However, it simply states that the associated project objectives [ (a) through (d) in Section 2 (a) above] were realized and does not sufficiently substantiate this claim.

