Document of
The World Bank

Report No: 30988

IMPLEMENTATION COMPLETION REPORT
(TF-23647 TF-28665)

ON A

LOAN/CREDIT/GRANT

IN THE AMOUNT OF US$ 25.0 MILLION

TO

POLAND

FOR A

Coal to Gas Conversion GEF

December 30, 2004

CURRENCY EQUIVALENTS

(Exchange Rate Effective Dec. 20, 2004)

Currency Unit	=	New Polish Zloty (PLN)
ZL 3.1135	=	US$ 1
US$ 1	=	.3211 ZL

FISCAL YEAR

January 1 December 31

ABBREVIATIONS AND ACRONYMS

BOR	Boiler Owner Representative
BOS	Bank Ochrony Srodowiska SA (Bank for Environmental Protection)
CAS	Country Assistance Strategy
CHP	Combined Heat and Power Plant
CO	Carbon Monoxide
CO2	Carbon dioxide
DHE	District Heating Enterprise
ECA	Europe and Central Asia Region
EcoFund	Polish Debt-to-Environment Swap
ERR	Economic Rate of Return
EU	European Union
FCCC	Framework Convention Climate Change
GEF	Global Environmental Facility
GET	Global Environmental Trust Fund
HOB	Heat-Only Boiler
IRR	Internal Rate of Return
MOF	Ministry of Finance
MOE	Ministry of Environment (formerly called Ministry of the Environment Protection, Natural Resources and Forestry)
NFEP	National Fund for Environment Protection and Water Management
NOK	Norwegian Kroner
OECD	Organization for Economic Cooperation and Development
PLN	Polish Zloty
SDR	Special Drawing Rights
SIEP	State Inspectorate of Environmental Protection
SO2	Sulphur dioxide
STAP	Scientific and Technical Advisory Panel
TAG	Technical Advisory Group
VIEP	Voivodship Inspectorates of Environment Protection
UNCED	United Nations Conference on Environment and Development

WEIGHTS AND MEASURES

(Metric and International Systems)

Gcal	Gigacalorie (one million kilocalories)
GJ	Gigajoule (0.034 tons of coal equivalent or 109 joule)
kcal	Kilocalorie (4187 joule)
kWh	Kilowatthour

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Country Director	Roger Grawe
Sector Manager	Henk Busz
Task Team Leader/Task Manager:	Elzbieta Sieminska

POLAND
Coal to Gas Conversion GEF

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Project ID: P008563	*Project Name:* Coal to Gas Conversion GEF
Team Leader: Elzbieta Sieminska	*TL Unit:* ECSPS
ICR Type: Core ICR	*Report Date: December 30, 2004*

1. Project Data

Name: Coal to Gas Conversion GEF
L/C/TF Number: TF-23647; TF-28665
Country/Department: POLAND
Region: Europe and Central Asia Region

Sector/subsector: District heating and energy efficiency services (92%); Banking (6%); Other industry (1%); Media (1%)
Theme: Climate change (P); Pollution management and environmental health (S); Municipal governance and institution building (S)

KEY DATES		*Original*	*Revised/Actual*
PCD:	02/12/1991	*Effective:*	06/16/1995	06/16/1995
Appraisal:	05/31/1993	*MTR:*	09/13/1999	04/09/2001
Approval:	11/11/1995	*Closing:*	12/31/2000	06/30/2004

Borrower/Implementing Agency: MOE/BK FOR ENVIR. PROTECEAT COMPANIES
Other Partners: NORWAY, GOV. OF

STAFF	Current	At Appraisal
Vice President:	Shigeo Katsu	Wilfried Thalwitz
Country Director:	Roger Grawe	Kemal Dervis
Sector Manager:	Henk Busz	Hans Apitz
Team Leader at ICR:	Elzbieta Sieminska	Rachid Benmessaoud
ICR Primary Author:	Justyna Giezynska	

2. Principal Performance Ratings

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

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

	QAG (if available)	ICR
Quality at Entry:		S
Project at Risk at Any Time:	No	

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

3.1 Original Objective:

The overall objective of the project was to contribute to carbon dioxide emissions reduction. The specific objectives of the project were to: (a) stimulate self-replicable technological and institutional changes that would promote coal-to-gas conversion in small and medium boilers and induce more energy-efficient practices in the architectural design and operation of new residential buildings and (b) demonstrate interfuel substitution and improve the overall energy efficiency throughout the heat supply chain.

The objective of the project was clear and important for the Government sector policy at the time of project design. It was a straightforward support to the Government policies adopted in the National Environmental Policy of 1991. This Policy, reviewed in 1995, endorses the articles of the Framework Convention on Climate Change and Kyoto Protocol, as well as contents of the documents of the UN Conference "Environment and Development" and, in particular, the AGENDA 21. Agenda 21 is a comprehensive plan of action to be taken globally, nationally and locally by organizations of the United Nations System, Governments, and Major Groups in every area in which humans have impact on the environment". http://www.un.org/esa/sustdev/documents/agenda21/index.htm. In its later stages, the project objective also indirectly assisted in the process of integration with the European Union because the project supported the provisions of the Polish Energy Act (passed in 1997 and amended in 2000) targeting the improvement of energy efficiency and fuel quality standards. In 2000, the Government passed *Guidelines on Poland's Energy Policy Through 2020*, which target reducing energy-related carbon dioxide emissions, improving energy efficiency and protecting the environment, through increased use of renewable energy as well. This long term energy strategy is based on the macroeconomic scenarios of Poland's development until 2020 and takes into account EU and OECD requirements. It contains several proposals, including: (i) a strategy of integrated management of energy and the environment where the environment is protected, not repaired. In it, sophisticated technologies of energy production reduce its use lowering the negative impact on the environment and improving the economic performance of the energy producer. Renewable energy and emission allowance trading (rather than fees and taxes only) are primal in this strategy; (ii) a strategy to improve energy efficiency aims to reduce energy use in all sectors of the economy, which would improve the energy and environment security and lower costs. The strategy promotes modern, highly effective technologies which would become standard with time. The 2002 assessment of these Guidelines implementation concluded that, while the general targets remain valid, goal formulation and monitoring of effects should be strengthened. Among the revised energy guidelines are the increase in effectiveness of consumption of energy and fuels and the development of renewable energy sources. Thus, the project objective is compatible with current Government goals as well. The most recent CAS Country Assistance Strategy for the Republic of Poland, November 13, 2002 confirms the importance of the objective recognizing that using hard coal as the main fuel for poorer households and small heating plants adversely affects the climate.

The objective was a challenge because of institutional conditions in Poland at the time of project inception. In 1995 when the grant was signed, Poland had no experience with similar undertakings. The objective was complex because it demanded the coordination of activities between parties involved, which had to learn how to cooperate on the grounds of a common undertaking and try to adjust their policies and practice accordingly. The parties included Government bodies such as Ministry of Finance (MOF), Ministry of Environment (MOE) (At the time of project design, the Ministry of the Environment was called the Ministry of the Environment Protection, Natural Resources and Forestry), National Fund for Environment Protection and Water Management (NFEP), State Inspectorate of Environmental Protection (SIEP), the Implementing Agency (Bank of Environmental Protection - BOS), the Boiler Owner Representative (BOR) and the beneficiaries (individual boiler owners and housing developers located all over Poland).

Additionally, there was a necessity to coordinate issues specific to environment protection, energy and housing. The objective was risky in assuming that changes proposed by the project would self-replicate only as result of the provided a demonstration.

Since the grant amount exceeded the sum of US$10 million, the project had to be associated with an existing World Bank loan. The Loan Agreement for the *Poland Environmental Management Project* (Loan 3190 – POL) was amended to incorporate the *Poland – Coal to Gas Conversion Project* financed by the Global Environmental Facility as a component of the *Poland Environmental Management Project.* In terms of thematic relation to other Bank activities, this pilot project was an intervention coordinated with other Bank projects. The *Environmental Management Project* particularly discussed the theoretical and practical approaches to environmental management and aimed at instructional and structural improvements which would facilitate sound organization of the sector. The *Energy Resource Development Project* aimed at the improvement of energy policy and sought assistance with natural gas production and energy sector restructuring; it also targeted environmental issues related to energy use. The *Heat Supply Restructuring Project* supported the sector restructuring, commercialization and privatization, aimed to improve the existing sector's assets, help conserve energy in the district heating sector and reduce negative impact on the environment by promoting energy-efficient equipment and the conversion from coal to gas. In the *Krakow Energy Efficiency Project* a certain amount of HOBs were converted to use gas or oil through the GEF grant. During the 10 years of project implementation, non-Bank activities supported the project objectives (see the Sustainability section).

3.2 Revised Objective:

The project objectives were not revised.

3.3 Original Components:

The project at appraisal had two components (Component One: **Investment** and Component Two: **Technical Assistance**). The components directly supported the objective because they addressed both the physical and the learning aspects of technological and institutional changes needed to reduce CO2 emissions while the substitution of coal by gas demonstrated the environmental benefits on local and global scales.

Component One: Investment
Cost: estimated US$39.82 million or 96.8 % of total cost
Description: Component One provided support to achieve physical output facilitating the reduction of CO2 emission. This component had two subcomponents:

> ***1. Coal-to-gas conversion subcomponent*** planned to support a conversion of 44 coal-fired boiler houses to gas-fired ones with a budget estimated at US$37.75 million and using the following technology: 6 small, packaged, gas-fired cogeneration schemes (estimated at US$25.02 million in total) and 38 high-efficiency condensing boilers (estimated at US$12.73 million in total). Each individual project design included (i) energy efficiency improvements of heat transmission and distribution system (related to the distribution and transfer systems) associated with the conversion, (ii) connection to gas supply network (main network fuels) and (iii) monitoring of project progress and environmental effects. The contractor for the environmental monitoring (selected through competitive bidding for the duration of the entire project to ensure unity of reporting) was to perform a pre- and post-conversion evaluation of the site and to assess the environmental effects of the completed conversion. The State Inspectorate of Environmental Protection (SIEP) was to supervise the contract through *voivodship,* an administrative region, and include the results in national databases.

2. Energy efficiency subcomponent (estimated at US$0.93 million) supported the installation of energy-efficient equipment in new residential buildings to encourage end-user energy efficiency through changing the habits of energy use. New residential building units and single-family homes were to be equipped with (i) increased insulation for walls, ceilings and windows, (ii) improved efficiency, automation and control of heat installation, and (iii) energy-efficient electric appliances, all above the standard described by Polish regulations. The residents were to receive information on energy conservation and efficient consumption behavior. The Energy Audit was designed to register the environmental effects resulting from the project activities.

Component Two: Technical Assistance
Cost: estimated US$1.46 million or 3.2 % of total cost
Description: Component Two was a soft-knowledge approach designed to strengthen project management and ensure quality, both of which would contribute to sustainability of project effects.

The design of the Technical Assistance component allowed the support of activities under Component One. It included (i) project organization and administration by BOS, (ii) project engineering and management services, (iii) consultancy services for individual project appraisal performed by STAP and TAG, supervision of implementation and a nationwide marketing of the GEF project concept by BOS and its branches around Poland, (iv) training and (v) monitoring.

3.4 Revised Components:
The components were not revised.

3.5 Quality at Entry:
Quality at Entry is rated **satisfactory**. Firstly, the project objective was consistent with Government priorities, CAS recommendations and World Bank safeguard policies. Secondly, the project design targeted global as well as local environmental concerns while facilitating achieving physical objectives. Thirdly, the Implementing Agency was predisposed to work on the project of this nature. Annex 8 explains in detail project origin, design and implementation.

Despite favoring conditions to begin project implementation, the initial Government inability to follow project operational requirements hampered project progress. The preparation, appraisal and negotiations were lenghty due to delayed responsiveness of the Polish authorities. On two occasions, Government delivered documents confirming its interest in the project few hours before the deadline. Although nominated by the Government already in March 1994, STAP did not start its operation until January 1996 because the Government wanted to appoint new members. (To start the activities within each individual project, STAP had to operate). In contrast, the Bank was actively involved in project preparation and extended to the Grant Recipient necessary help and expertise.

In general, project procedures were complex For example, the individual projects in the *Coal to Gas Conversion Subcomponent* had to follow 19 steps of mandatory actions from the design to the completion stage. and occasionally they were difficult to handle by the beneficiaries, their representative and the Implementing Agency. The complicated and at times overly bureaucratic procedures sometimes slowed down project progress but at other times proved necessary to keep a project of this size and scope in control. Monitoring and Evaluation (M&E) of the project environmental progress and achievements was firmly embedded in the project structure because the results of conversions and energy efficiency adjustments were to demonstrate a reduction in CO2 emissions. This fact is important because in the last few years, Poland has been regularly inventorying greenhouse gasses to monitor the progress in CO2

emissions reduction and report the results to the UN Convention on greenhouse gas emissions.

The two demonstration projects, funded under the preparation grant (PDF-B), represented a very important aspect of project design and were to serve as an indicator of final achievements. The Krakow Municipal District Heating Enterprise (a firm owned by *gmina*, the smallest administrative unit in Poland) was responsible for one project, involving a high efficiency condensing technology, and a university (funded by the state budget) was to carry out the other, involving the cogeneration technology. Both were located in Krakow and experience gained through their implementation was to serve as a nationwide replication model. Yet, the conditions of demonstration implementation differed substantially from the conditions under which non-demonstration projects were executed: (i) during project preparation one PIU (at the university) was established to manage both projects while BOS involvement was limited at that stage. (ii) Boiler Owner Representative for the demonstration projects did not consult for any other project owners. Neither of the subsequent consultants replicated the experience of the consultant from Krakow to build their strategy regarding individual projects; (iii) actual implementation of the demonstration project did not significantly precede the implementation of the non-pilot projects; (iv) the university demonstration project was cancelled having provided no demonstration. The withdrawal of the university has significantly lessened the demonstration effect of the pilot phase. Despite the cancellation of the project, it provided the methodology to prepare and assess project, the analytical base for the project design, the model for incremental analysis and grounds how to choose the technology. It was caused by the university's inability to fully engage in the preparations for the project launch, failure to secure counterpart funds and a change in fulfillment of GEF criteria (an extension of the district heating grid deprived the university of the eligibility for GEF funds). The university, presenting high technical expertise, was to demonstrate the use of ecologically friendly technology at an academic body working on technical improvements and innovations. The project design did not take into consideration that large public institutions, such as universities or hospitals are usually stagnant bureaucracies unresponsive to innovation and especially project-like thinking.

The key performance indicators were not introduced at the time of project preparation because logframe was not standard at the time of project design. However, at preparation of each individual project the targeted outcomes were set. Achievements of these outcomes was monitored through pre- and post-conversion measurement. The outcomes of the individual projects contributed to the overall outcome of the project. A flaw in project implementation shows in the fact that, when the project continued to experience significant delays and there was the necessity to adjust it to the extended deadline, a revised disbursement schedule became a measure of performance in addition to indicators illustrating outcome and physical output. A revised disbursement schedule helped in keeping project progress more on track yet monitoring of project progress was still difficult, which the PSR evidence confirms.

This project was a first climate change activity of the GEF incorporating elements of the Joint Implementation (JI) mechanism. The other pioneering project of this kind was designed for Mexico and helped to further develop it. The project was innovative because it searched for ways to transcribe the capacity to evaluate individual undertakings, learned within the project framework, onto financial intermediaries and energy utility companies, who in turn would ensure sustainability with their financial and technical resources. Moreover, the project used new and appropriate technologies while striving for the final effect of CO2 emissions reduction and individual project cost-effectiveness (cost-effectiveness of CO2 emission reduction was measured for the first time). The monitoring of project results, new in Poland, helped to set standards for monitoring efforts in general. Project design fostered ownership at the community level by the requirement that a significant percentage of the funds for each individual project would come from own sources of the investor. Such arrangement encouraged long-term thinking about the project purpose and its place in the company development.

4. Achievement of Objective and Outputs

4.1 Outcome/achievement of objective:

The project achieved its main objective, which was to reduce carbon dioxide emissions. In addition to the global objective of CO2 emission reduction and a local objective of SO2, NO2 and particulates emission reduction, the project proved that Poland is capable of entering into carbon trading scheme and now is a suitable country for carbon credit. At the time of project design, the components seemed adequate to the management and financial capacities of the Implementing Agency. However, at the time of implementation, project implementation required more effort than anticipated. Nonetheless, the components were completed and have the following outcome.

Component One: ***Energy efficiency subcomponent***

The energy efficiency improvements demonstrated that installing proper equipment influences (and ultimately changes) energy use patterns and reduces CO2 emissions. Apart from achieving the global goal of CO2 emissions reductions by 28%, the project accomplished local achievements. They are: (i) change in thinking about saving energy (firstly from the economic and secondly from the environmental point of view) and (ii) replicating the energy efficiency concept by promoting ecologically friendly housing investments. Today, housing developers and individual home and apartment owners are more eager to install energy saving technologies, represented in a wide choice and more affordable prices. (Interestingly, people of higher education display a greater willingness to pay for energy efficient equipment above the currently binding ecological standards). GEF contributed to this trend locally as the housing communities continued to develop their pro-ecological thinking and activities, which constitutes institutional change. The project assisted in the process of technological switch albeit it was not a cause of it.

4.2 Outputs by components:

1. Investment Component

(a) Coal-to-Gas Conversion Subcomponent: 29 conversions were completed at the cost of US$40.87 million, of this 5 CHP were plants and 24 were HOB. BOS summed up each individual project within 18 months of its completion date. The report contained a description of the site before the conversion and after the conversion along with its emission indicator assessing the reduction of emissions. The plants, constructed with state-of-the-art technology, received their operational certificates and are in use without major problems.

(b) Energy-Efficiency Subcomponent: at the cost of US$0.7 million, 777 new housing units (743 residential building units and 34 single family homes) were equipped with roof and basement floor insulation, mechanical ventilation, heat recovery units, external shutters, heaters and temperature controllers, in-home electrical appliances, solar batteries and other equipment.

2. Technical Assistance Component

This component financed all supporting activities within the Investment Component, as described in Original Component section. It included (i) project organization and administration by BOS, including External Financial Audit, (ii) the services of BOR, (iii) STAP and TAG consultancy services for individual projects, GEF project marketing and promotion related activities in BOS and its branches around Poland: (iv) training and (v) monitoring.

Internal Rate of Return

The market conditions prevailing at the time of project appraisal, including relative pricing of coal and gas,

the level of environmental fees and fines, and the electricity price for the cogeneration technology, did not provide a sufficient incentive framework for boiler owners to convert to gas. An IRR of 25% was designed to provide such incentive yet many boiler owners did not decide to convert even with the grant due to lack of counterpart funding. The grant amount for each individual project within the *Coal to Gas Conversion Subcomponent* was calculated at the time of signing the supply and installation contracts. By the recommendation of STAP and the decision of the Implementing Agency, the IRR for HOB was set at 25% and for CHP at 20% (the percentage of grant amount remained similar). The IRR could have been lower had the environmental fees and fines increased appropriately to reflect true damage to the environment and had they been enforced. Such decision kept the project costs from rising. The expected cost-effectiveness of incremental costs was between US$37 and US$67 per ton of CO2 reduced. Annex 3 shows grant amounts needed to achieve the set IRR for each individual coal to gas conversion project and each energy efficiency project. The CO2 reduction cost-effectiveness of incremental costs varies between US$10 and US$65 per ton of CO2 reduced for the heat-only-boiler projects and between US$9 and US$22 for CHP projects. For the *Energy Efficiency Subcomponent,* IRR was set at 11% and cost-effectiveness was expected to be about US$185 per ton of CO2 reduced. The actual CO2 reduction cost-effectiveness of incremental costs varies between US$10 and US$135 for energy efficiency projects.

4.3 Net Present Value/Economic rate of return:
N/A

4.4 Financial rate of return:
Not applicable as this is not a revenue-generating project.

4.5 Institutional development impact:
Institutional Development Impact
The project had an impact on several groups of project participants: individual beneficiaries (boiler owners and housing developers and owners), Boiler Owner Representative, the Implementing Agency and Government bodies. The overall institutional development of the country as a result of the project is assessed as **modest** because the multiple extensions decreased the impact of the project on the issues in question. Yet, financial issues arising during project implementation and solutions provided by the Implementing Agency and MOE undoubtedly resulted in gaining experience in financial resource management. Additionally, several methodologies were developed, such as the incremental analysis (it was positively received by IBRD/GEF and was later presented by the Norwegian Government as an element of JI arrangement) and the energy audit (it is currently used by VIEP in Poland).

Individual beneficiaries, whose institutional development is **high**, comprise a differentiated group of investors who experienced the project financial and environmental benefits to a varying degree. Participation in the project exposed this group to a project-type activity, bidding procedures and proposal preparation, cooperation with international contractors, fund-raising experience, and implementation of world-standard technology. These elements combined, together with a generally developed sense of ownership, now allow the beneficiaries to assume a different perspective should they choose to partake in similar undertakings again. Management units, which the investors created to maintain the project activities, often spurred the creation of permanent divisions working on projects, using international aid, providing advanced IT management or marketing. Today these enterprises obtain quality certificates. Employees who have moved on transplant their knowledge elsewhere. Although some projects were subject to problems while working with contractors or had to face unforeseen technical circumstances, the majority completed the task to a positive result. Some investors extended their pro-ecological activity to inform the area inhabitants about environmental and other undertakings.

Boiler Owner Representative learned a tremendous amount about its own capabilities and possibilities through the participation in the project (The reference is made only to the second BOR; the first one was not available for comment). Its greatest gain is the exposure to project-like activity, which for this company opened the doors to other similar undertakings and participation in complicated tender procedures. Employees who worked on the project went on to transfer their experience to other sectors of the company. The institutional development of BOR is **substantial**.

The specialists employed at GEF Office within *the Implementing Agency* greatly expanded their professional knowledge about project management in general, project financial management, or international procurement methods which showed in the fact that despite many low moments the project continued to progress and is crowned with success. The team was able to adjust to stringent international requirements. The project increased the BOS potential to use its human resources leaving it up to the Implementing Agency to use this potential after project closure. However, the GEF Office was placed outside the regular BOS operations and its staff was involved in issues only pertaining to GEF. This resulted in a specific separation of the team from the rest of the employees. With the end of the GEF project, two of the three remaining GEF Office employees moved onto other departments to learn a different function, while the third person searched for employment elsewhere. Thus, a decision taken by BOS authorities at the beginning of the project implementation resulted in human resource problem, which limits the dispersal of expertise gained over the years and is financially inefficient from the point of view of BOS employment policy. The institutional development in terms of BOS ability to make use of its human and financial resources is **low to modest**.

During the project implementation, *the Ministry of Environment* went through several restructuring efforts, which each time shifted the responsibility for the project to new Ministry staff. The employees belonging to a department to which the project was assigned at a given time were a temporary team in charge of the project. MOE did not take the opportunity to create a permanent team of experts who would be well versed in all aspects of GEF for future project opportunities. MOE appeared disorganized in their financial knowledge about the project, which is due to lack of a permanent project team and compounded with MOE unfamiliarity with similar undertakings and its bureaucratic structures. (This project appeared too large for the pipeline capacity of MOE and BOS and, at other moments, it seemed that there are too few projects to secure the GEF grant). The MOE institutional development in terms of its ability to manage projects such as this GEF project, use its human and financial resources is **low**.

5. Major Factors Affecting Implementation and Outcome

5.1 Factors outside the control of government or implementing agency:

a) Factors outside the government or implementing agency control:

Technical difficulties with two projects (unforeseen construction problems, a necessity to rewrite and repeat bids, unsolved issues between the investor and the contractor) and a cancellation of one project (due to change of site owner) were outside Government and Implementing Agency control and affected implementation and outcome. Because individual projects experienced lengthy procedural delays, sometimes compounded by awaiting Bank reply, project implementation had to be further postponed because of weather conditions (wintertime does not allow the commencement of construction). These difficulties were a major reason for project extensions, which reduced the cost-effectiveness of the project. The original closing date of the project was Dec. 31, 2000. The project was extended three times to a total extension time of 42 months, 3.5 years. Lack of counterpart funding (see section on factors under Government control) caused the first extension of December 1997, moving the original date from December 2000 to September 2002. The second extension date was June 2003. The Bank granted the third extension with a deadline of June 30, 2004 after the last project's bid was redesigned and went through re-bidding at Bank request. The Bank showed good will by not abandoning this individual project although it experienced severe delays and difficulties. The cooperation between Government, Implementing Agency and the Bank experienced only minor difficulties.

5.2 Factors generally subject to government control:

There were three factors subject to Government control, which shaped the project: (1) Grant Agreement came into effect in June 1995 (i.e. a year after signing of the Grant) and slowed the project start-up activities; (2) MOE appointed STAP with a one-year delay further preventing the project from progressing; actual project implementation begun in January 1996. MOE was unable to appoint the STAP members and to stand by its choice; and, (3) Public counterpart funding was not supplied, which was the most serious of the listed problems. Obtaining funding was a major obstacle for projects such as hospitals and universities, which were important from the social point of view. These bodies, financed by the state budget, had the largest needs and the least possibilities to secure counterpart funding. In result, the emphasis of the project shifted onto institutions with secure, available counterpart funding to eliminate delays. Thus publicly financed institutions could not participate in the project and the opportunity to demonstrate the use of environmentally friendly technology in the public sphere was lost again (the first unused chance was the cancelled technical university in Krakow demonstration project). Additionally, the lack of funding caused project's first extension: individual projects could not be approved without co-financing. To close the project in December 31, 2000, the GEF funds needed to be committed by January 1, 1998 and in December 1997 there was no hope to achieve such stage. (4) Changes in MOE functional responsibilities regarding project supervision adversely affected implementation and outcome. The fact that the project moved within MOE to several different departments without a proper knowledge sharing suggests that the Government ownership of the project was low. Two years passed before the project gained satisfactory PSR rating.

5.3 Factors generally subject to implementing agency control:

The Implementing Agency was generally committed, strengthened its professionalism and grew knowledgeable about the subject matter as the project progressed. Proper staffing was at first difficult due to shortage of appropriate individuals, which was a common problem in Poland at the beginning and in the middle of the 1990s. Employees occasionally used additional training and generally improved their capacity. The majority of staff did not change since the project inception thus their qualifications grew with the project. The Implementing Agency applied project management with care although there were periods when, due to changes in GEF Office management, supervision and decision-making suffered. The overall impact of BOS operations on the project was significant as BOS served as a liaison between the individual project owners, the BOR, MOE and the World Bank. The individual beneficiaries in most cases participated willingly and their input is rated satisfactory. There were, however, a few cases when the Implementing Agency had to use more than its resources to persuade project owners to cooperate, for

example resorting to applying pressure through MOE.

5.4 Costs and financing:

GEF and the Kingdom of Norway were the foreign cofinanciers, while local funding included NFEP, VFEP and own input of companies and *gminas*. The assumption was that the boiler owner (the investor) had to be able to cover the expenses associated with a change of an old coal boiler to a new coal boiler and GEF would cover the difference to change the old coal boiler to a new gas boiler. Thus, each project had a separate financing plan and the level of subsidy was calculated according to the model. The investor was responsible for the VAT. The procurement strategy was adjusted to each object and its locality. Each grant beneficiary (boiler owner or building developer) required training about Bank and GEF procedures, which elongated the necessary supervision time. Although almost all boiler owners were overwhelmed with the procurement procedures imposed by the project, these necessary procedures were adhered to. Before project implementation Public Procurement Law (PPL) became mandatory for the procurement of goods and services but the project was exempted from following this law upon receiving an exception to the Public Procurement Office.

The total cost of the project was estimated at US$48.32 million, of which foreign costs amounted to US$23.85 million (49% of total costs) while local costs were US$24.47 million (51% of total costs). The actual total costs were US$43.70 million. The changes in project costs resulted from the necessity to exchange three currencies to PLN combined with a higher than expected cost of cogeneration units and an increased cost of HOB. The project was seriously affected by shifts in the exchange rates because four currencies (SDR, USD, NOK and PLN) had to be considered. Dollar value was increasing and there was strong possibility that the subsidy calculated based on the model would not match the reality. As a result, the available GEF grant amount decreased from about US$26 million to about US$23 million. Project funds were shifted between the expenditure categories during project implementation. Funds, moved to cover higher than expected cost of conversion to gas technology and to support project administrative costs, came from the Technical Assistance and Unallocated Categories. The Bank allowed the reallocation between categories because the impact of exchange rate fluctuations on the GEF grant amount was significant. The condition for reallocation was the achievement of the objectives for the category in question prior to reallocation; the reallocated amount had to agree with project objectives.

BOS acted as the manager of GEF funds. The funds were managed unevenly for the entire duration of the project although the performance generally improved. The management fee for BOS was 1.5% of committed GEF funds, which proved insufficient to cover BOS expenses: without overstepping the financial limits set for the Implementing Agency, BOS added own resources to the project, mainly expressed in the performance of its regional offices and GEF Office employment requirements. One auditor performed the project audit throughout the project implementation period. Earlier audits contained a mistake resulting from an improper agreement between the parties: Polish funds were not included in the audit. The Bank did not notice the mistake for several auditing cycles but the problem was fixed without significant impact on the project implementation and outcome. Later audits were performed without problems.

6. Sustainability

6.1 Rationale for sustainability rating:

The sustainability of project results is **likely** if project beneficiaries continue to properly use the equipment installed under the project. To achieve sustainability, inhabitants of energy-efficient housing must continue to implement energy saving techniques, which is likely because they have already been exposed to energy-saving measures and have felt the economic benefit of the switch to the new technology. Despite

difficulties in implementation reported widely among boiler owners, it is very likely that the beneficiaries will continue the environmentally friendly practices because of the fact that the boiler houses already operate and coal technologies were replaced with gas technologies. (Due to these difficulties, the perception of the project changed among the beneficiaries in the course of it without canceling its importance). Coal prices are largely decontrolled, which opens the way to use other energy sources. Yet gas prices have been constantly on the rise, raising the cost of plant operation. Local energy suppliers are interested in using least cost options to provide heat and power to their customers. If boiler owners were not content with the object's cost-effectiveness, they would most likely search for an improvement option rather than revert to coal. However, if boiler owners using coal as energy source are faced with a choice whether to stay with coal or convert to gas, there is a high chance that they would pick a new coal boiler rather than a gas one: coal boilers are still cheaper in operation and, most importantly, cheaper to buy.

The professionals involved in energy generation on the scale targeted by this project are well aware of the global benefits of coal to gas conversion. Yet conversions on mass scale are not likely in the near future because the cost of such undertaking, especially of CHP, remains high from the Polish investor perspective.

On the national level, there have been several changes since project inception suggesting that phasing-in of gas technology is possible. The national emission standards are progressively tighter in enforcement (spectacular progress in this field is still to be achieved), which will force energy producers to eventually use ecologically friendly technologies. Additionally, although distant in time, maintaining a minimum coal production platform and the use of other energy sources are among Polish and European Union goals. The inseparability of energy production and environment protection has been recognized. Yet as regards to carbon dioxide emissions, Poland needs adjustments in administration, organization, methods and awareness to experience institutional changes supporting the environment.

Additionally, several credit and subsidy lines have been developed. EcoFund manages activities suitable for debt-for-environment swap such as limiting greenhouse gases emissions, phasing-out of energy generation technologies adversely affecting the ozone layer; energy saving and promotion of renewable sources of energy. EcoFund has committed over US$40 million to over a 100 projects aimed at reducing emissions of greenhouse gases and CFSs phase-out, which include energy efficiency projects and coal-to-gas conversion. It has also supported projects in the area of reducing SO2/NOX emissions. Between 1989 and 2000, the National Fund for Environmental Protection spent almost US$1 million on air protection funding in the form of loans, joint funding, credits and project subsidies. Its activities focus on reduction of energy consumption and emissions of sulphur dioxide and nitric oxides, improvement of heating systems and the use of alternative sources of energy. The Fund is also active in the area of environmental monitoring.

6.2 Transition arrangement to regular operations:

To achieve the coal to gas conversion on a truly national scale, additional funding is required to support the process, which began with this project and continued with other unrelated and unconnected projects. Various programs aiming to reduce carbon dioxide emissions that exist today would need to be more visible and coordinated to facilitate the conversions. Similarly, coordination is needed between various ministries to propose a coherent set of energy efficiency programs and related subsidies. Most importantly, the *Guidelines on Poland's Energy Policy Through 2020* and their assessment need to be implemented without further delay.

7. Bank and Borrower Performance

Bank

7.1 Lending:

Grant appropriateness ("Bank lending" for lending operations)

The grant giving performance is ***satisfactory***. This GEF grant was a support to the policies of the Grant Recipient in the field of global and local environment protection and energy; it was a new experience for the Polish Government. The Bank performed the role of the GEF Trustee and managed the grant. The Bank proposed a sophisticated project model, which proved difficult for the Grant Recipient to implement yet it was achievable. The project, consistent with Government priorities and Country Assistance Strategy and corresponding to the World Bank safeguard policies, was thoroughly prepared and its components adequately addressed the priority sector issues. The project was prepared with the professional assistance from the Bank expert team and its assistance was thorough during the preparation and appraisal. However, it seems that the Bank support to the PIU in Krakow for the demonstration stage could have been stronger. Also, the complexity of objective surpassed at times the Grant Recipient's implementation capacity. In effect, the Implementation Agency had to intensify its efforts to achieve the objective. The project experienced three extensions by 3.5 years in total; the objectives were not changed although the project's disbursement schedule was adjusted. The project greatly benefited when a Bank representative living in Poland became the task leader (2003) because the response time to possible problems shortened. BOS received appropriate guidance, although the Implementing Agency expressed a wish that there was more support.

7.2 Supervision:

The supervision performance by the Bank was ***satisfactory*** although not without flaws. The Grant Recipient sees the cooperation with the Bank as generally positive although uneven (there were periods of prolonged silence on the part of the Bank and sometimes addressing the frequent problems with implementation and development impact was slow). The annual or biannual visits of the task leader in Poland were not sufficient to spur the project progress, although the Bank supervision resources were regular over the life of the project. Supervision reporting of the project has been even and of high quality; formal documentation of supervision is nearly complete after 10 years of project implementation. On several occasions, however, the Bank asked the Implementing Agency for documents which should have been in the possession of the Bank and in fact were but could not be located. Audits were performed properly but a mistake had crept into the auditors' performance and was not identified until years had passed. The issue was resolved without major consequences. Later, the Bank, aware of financial management difficulties of BOS, paid particular attention to fiduciary aspects of the project to ensure appropriate financial management. In terms of expertise, the turnover of the Bank staff responsible for the project was low (there were two task team leaders during the 10 years of project implementation; the first one was the project leader for 9 years) and a stronger working relationship with the Grant Recipient was developed. The expert level of the Bank staff supervising the project was generally high, which is especially visible in the quality of project design.

7.3 Overall Bank performance:

The overall Bank performance is **satisfactory**.

Borrower

7.4 Preparation:

Grant Recipient performance: preparation stage

The performance of the Grant Recipient during the preparation stage was ***unsatisfactory***. Although the Grant Recipient was generally ready for discussions, it was unable to muster coherent action to push the project into implementation mode. The Grant Recipient ownership of the project was very low and showed in backups in preparation and clearance of documents necessary for project start-up and delays in appointing STAP. The performance of the Grant Recipient later improved.

7.5 Government implementation performance:

Grant Recipient performance: implementation stage

Government did not seem to have a clear view of the role the project was to play in sector development despite the fact that project activities fit the Government objectives. MOE allowed constant shifting of the responsibility for the project within its structures and did not transfer knowledge to the departments taking over project duties. Such frequent changes did not enable the continuity of the information flow and adversely affected the MOE implementation performance. At the same time, the choice of BOS as an Implementation Agency proved accurate despite some difficulties. MOE, desiring to complete the project, often resorted to BOS knowledge and expertise, continuously gained in the project implementation. Thus, Government Implementation Performance improved to the ***satisfactory*** level.

7.6 Implementing Agency:

The choice of BOS as an Implementing Agency seemed natural and did not cause Bank objections. However, BOS experienced multiple difficulties in project implementation although in the end it was able to lead project activities with competent and committed staff. The Implementing Agency learned to comply with project agreements and covenants, which improved the degree to which the objectives were achieved. BOS had problems finding appropriate specialists, especially qualified accountants, yet the proper personnel had been found. BOS used the model developed by the Bank and created many own solutions to problems in the field. It learned to cooperate with many individual boiler owners all over the country and the Boiler Owner Representatives, where cooperation was not always easy and frequently required close supervision. When the services of the first BOR were no longer adequate for the project progress, BOS supervised the second BOR very carefully, with which BOR felt slightly overwhelmed. BOS performance was ***satisfactory***.

7.7 Overall Borrower performance:

The overall performance of the Borrower is ***satisfactory***.

8. Lessons Learned

- ***The success of a project targeting the environment could be better assured if Government had an integrated policy on financial and substance aid management.*** An isolated project such as this GEF undertaking would have stronger effects if it had been coordinated with other sources of funding.

- ***The Bank should make sure that the Beneficiary is truly aware of project requirements and able to carry them out.*** In 1994 when the project was discussed, Government may have *appeared* to understand the project and project-like activity yet its practical knowledge required more "hand-holding" than planned.

- ***Governments of countries in transition often have poorly set priorities***. The Polish government *seemed* to support project measures when the project was in the preparatory stages while its priority was to receive GEF funding as a means of international recognition as an ecologically-friendly state rather than to decrease CO2 emissions.

- ***Plans for project activities need to be based on actually available funding.*** Counterpart funding must be secured, not only promised. NFEP promised on multiple occasions that it would deliver the funds and for various reasons it could not. As a result, project achievements were diminished.

- ***Early transition countries often experience shortage of appropriate staff***. More training and assistance should be envisaged in projects involving sophisticated technical issues.

- ***A local office of a reputable international company does not necessarily have the needed skill.*** The experience with the first BOR shows that although the selected company was respected in the country of its origin, its representative was not able to provide desired support. Local accredited firms should be a first choice when designing and implementing a project.

- ***International experts should be considered as supplementary to the local ones.*** Countries as advanced in transition as Poland was in the second half of the 1990s have had time to develop a strong base of educated and experienced experts. The knowledge of local experts should be fully utilized to further strengthen the human and institutional potential of a country.

- ***Informing about project plans, progress and results adds to its success.*** Some boiler owners informed the population using their services about the participation in the GEF project thus strengthening local support for all activities associated with coal to gas conversion.

- ***A project could benefit from including an integrated ecological education element***. The population using the services of HOB or CHP should be informed about global and local environmental benefits of energy generated from gas to increase ecological awareness. Such element was built into the Energy Efficiency subcomponent.

- ***Delegating the decision-making to World Bank local offices allows better project implementation.*** Communication between the Bank and the Beneficiary is greatly simplified, the response time to problems is shorter and the Beneficiary is more likely to feel that the project matters are properly serviced. A local Bank staff became the project's Task Team Leader only in the last year of project operation.

- ***Multiplicity of sub-projects spread nationwide has to be appropriately adjusted to the implementation capacity of the Beneficiary.*** Although BOS used its local offices when working on the project, these offices received only a fraction of training given to the GEF office in Warsaw. Thus, their competence level regarding the subject matter was incomparably lower and resulted in the need to coordinate all activities centrally. The possibility to use local branches should be utilized to the fullest.

- ***Projects requiring the use of sophisticated technology are likely to need more preparatory and implementation effort and time***. Due to complicated technical requirements, tender procedures took longer than planned and all involved parties needed extended learning time.

- ***Project progress schedule has to account for learning time***. Learning time designated for each project activity needs to be estimated based on similar undertakings or the implementation capacity of the Beneficiary. If it cannot be determined, it should be estimated and given a safety margin.

- ***The requirement to use English at all levels of project preparation limits local access to the project and hinders project implementation.*** This requirement excluded some bidders and made implementation more difficult (for some time sworn translations of receipts were required, which was neither time- nor cost-effective). Perhaps English should not be required below the level of the Implementation Agency or consultants such as BOR.

- ***The requirement to have the bidding procedure open to companies from other countries sometimes prevented the participation of local firms***. Such procedure, especially in the case of small engine procurement, blocked the developing firms from strengthening their position on the market, effectively slowing their local and national expansion. The Public Procurement Law was already in operation and

in the future it should be taken into account. NCB, which considers local specifics allows to be flexible in the procurement procedures.

- ***Ownership structure affects project implementation as publicly owned and managed companies tend to be more rigid in operation than the private ones***. The example of the public technical university in Krakow depicts the former while a housing developer demonstrates the latter approach to a project-like activity.

- ***Obtaining funding is a major obstacle for such bodies as hospitals and universities, while they have the largest needs and the least possibilities to secure counterpart funding***. Often, such large publicly financed institutions were eliminated from the project due to their inability to aggressively search for funding and their low responsiveness to the requirements imposed by a project-like activity.

- ***Local level project ownership fosters sustainability of project effects***. The requirement that a significant percentage of the funds for each individual project should come from own resources of the investor encouraged long-term thinking about the project purpose and its place in the company and community development.

- ***Strengthening privatization processes and widely-understood entrepreneurship regardless of the political climate supports similar projects' sustainability and replicability.*** In the project, some small private companies were able to secure funding through their independent business activities to carry out more environment-friendly improvements.

9. Partner Comments

(a) Borrower/implementing agency:

Implementing Agency Comments – A Summary

The Implementing Agency assessed the project as having contributed to the improvement of the environment in Poland. It concluded that the objective of the Project has been achieved both for the Coal-to-Gas Conversion Subcomponent and for the Energy Efficiency one as the original grant amount was utilized in 98%. The success was due to the fact that the project started in a moment of growing demand for such investments and with time NFEP and other institutions also began financing such investments. In the process of project implementation, the beneficiaries had the opportunity to learn international financial procedures. At the same time implementing of these procedures were a cause of delays. The complexity of the project proved very difficult to handle by all sides involved. Since the project had to be extended, its impact was somewhat diffused while costs for the Implementing Agency rose. Perhaps with a better GEF office organizational arrangement the costs would have been lower, the project would have run more efficiently and the Implementing Agency would have benefitted more in terms of institutional impact. The Agency concluded that both the learning and technical aspects had an impact on project completion. Regardless of problems, the beneficiaries have definitely gained valuable knowlegde and experience.

(b) Cofinanciers:

(c) Other partners (NGOs/private sector):

10. Additional Information

Annex 1. Key Performance Indicators/Log Frame Matrix

NOTE: Logframe Matrix prompting the achievement of outputs and outcomes was not prepared. Instead, there was a disbursement schedule. Since a disbursement schedule alone does not reflect project accomplishments, the below tables summarize project results.

OUTCOMES

Outcomes/Impacts Expected		Outcomes/Impacts Achieved
Coal to Gas Conversion	Global benefit: 65% reduction of CO_2 emissions through the construction and use of gas-fired boilers. This reduction is in comparison with old existing boiler facilities.	The global achieved reduction of CO_2 is 128 Mg/a (tons per year). The average reduction achieved is 62%. 122 tons of CO_2 were ***not*** emitted from the time of operation inception until the calculation in August 2004. Annex 1a illustrates the reduction as related to technology used.
	Local benefit: virtual elimination of sulphur dioxide and particulates and significant reduction in nitrogen oxide emitted by the converted boilers.	Sulphur dioxide has been reduced by almost 100% on average in all converted plants (1 278 Mg/a in total). Particulates have been reduced by almost 100% on average as well (921 Mg/a in total). Nitrogen oxide emissions have been reduced by 69% (195 Mg/a in total).
	The marginal cost of the net CO_2 abatement is $USS37 per ton of CO_2 reduced for HOB and US$67 per ton of CO_2 reduced for CHP.	HOB: between US$10 and US$65 per ton of CO_2 reduced CHP: between US$9 and US$22 per ton of CO_2 reduced
	Change in consumption, fuel-use patterns and impacts on end users.	Gas instead of coal is used contributing to overall decrease in coal use. End-users, particularly, boiler owners are more aware about heat and power management.
Energy Efficiency	Global benefit: increasing energy efficiency in new residential buildings to reduce CO_2 emissions by 28%.	A reduction of 22% (847 055 kg/a) has been achieved.
	Local benefit: it was estimated by the Energy Auditor that in 777 units to be completed within this component there will be a total of 1 159 611 kg/a CO_2 reduced.	It was calculated that at the time of monitoring (for each object the monitoring was to take place for a year after completion), the total of 917 164 kg/a CO_2 was reduced. This means that the expected result has been achieved in 79%.
	The marginal cost of the net CO_2 abatement is about $US187 per ton of CO_2 reduced.	Energy efficiency improvements: US$10 and US$135.
	Change in consumption, fuel-use patterns and impacts on end users.	Supplied energy is used with greater caution in 777 households affected by the energy efficiency improvements. Although this number is not significant on national scale, it is important on local scale.

OUTPUTS

Outputs Expected	Outputs Achieved
Coal to Gas Conversion 44 gas-fired boiler houses: 6 cogeneration schemes (CHP) and 38 high efficiency condensing boilers (HOB)	29 gas-fired boiler houses: 5 CHP and 24 HOB
Energy Efficiency Installing (i) increased insulation for walls, ceilings and windows, (ii) improved efficiency, automation and control of heat installation, (iii) energy-efficient electric appliances and (iv) measuring results in 855 units.	777 units were constructed using the energy-saving technology

Annex 2. Project Costs and Financing

Annex 2a. Project Costs by Component (in US$ million equivalent)

Project Cost by Component	Appraisal Estimate US$ million	Actual/Latest Estimate US$ million	Percentage Of Appraisal
A. Investment Component	**38.68**	**39.74**	**103**
A.1 CtG Conversion Program	37.75	39.04	103
A.1.1 Cogeneration Systems	25.02	21.94	88
A.1.2 High Efficiency Boiler Systems	12.73	17.10	134
A.2 Energy Efficiency	0.93	0.70	75
B. Contractual Services	**0.40**	**0.26**	**65**
B.1 Environmental Monitoring	0.25	0.26	104
B.2 Marketing Plan	0.15	0.00*	0
C. Technical Assistance	**3.13**	**3.57**	**114**
C.1 Engineering and Project Management Services	2.07	1.97	95
C.2 BOS Management Fee	0.62	1.20	193
C.3 Technical Advisors	0.19	0.06	31
C.4 Energy Auditing Services	0.05	0.04	80
C.5 External Financial Auditing Services	0.06	0.10	166
C.6 Training and Other Consulting Services	0.14	0.20	143
D. Unallocated	**6.11**	**0.13**	**-**
TOTAL PROJECT COSTS	**48.32**	**43.70**	**90**

* the amount used for the Marketing Plan was less than $5,000

Annex 2b.1. Project Costs by Procurement Arrangements (Appraisal Estimate) (in US$ thousand equivalent)*

Expenditure Category	**Procurement Method****	**Total**
	ICB	**LIBLCB OTHER *****
GOODS, CIVIL WORKS AND MATERIALS		
Cogeneration Systems	29,099 (16,903)	29,099 (16,903)
High Efficiency Boiler Systems		14,762 (4,642)14,7 62 (4,642)
Energy Efficiency Equipment for New Residential Buildings		925 (925)925

		(925)
CONTACTUAL SERVICES		
Environmental Monitoring		230 (230)20 (20)250 (250)
Marketing Activities		140 (140)10 (10)150 (150)
TECHNICAL ASSISSTANCE		
BOS Management Fee		620 (620)620 (620)
Technical Advisors (STAP)		190 (190)190 (190)
Energy Auditing Services		50 (50)50 (50)
External Financial Auditing Services		60 (60)60 (60)
Training and Consulting Services		2,210 (2,210)2,210 (2,210)
TOTAL	**29,099 (16,903)**	**14,762 (4,642)370 (370)4,085 (4,085)48,316 (48,316)**

* Figures in brackets indicate amounts in US$ thousand equivalent to be financed from GET and Norwegian grants
** Procurement Method: ICB – International Competitive Bidding; LIB – Limited International Bidding; LCB – Local Competitive Bidding.
*** Includes:
(1) International and Local Shopping (aggregate amount US$0.93 million equivalent)
(2) Direct Contracting (aggregate amount US$0.03 million equivalent)
(3) Training and Consulting Services (aggregate amount US$3.13 million equivalent) awarded in accordance with Bank Guidelines for Use of Consultants.

Annex 2b.2. Project Costs by Procurement Arrangements (Actual/Latest Estimate) (in US$ thousand equivalent)*

Expenditure Category	Procurement Method**				Total
	ICB	LIB	LCB	OTHER***	
GOODS, CIVIL WORKS AND MATERIALS					
Cogeneration Systems	21,945 (21,945)				21,945 (21,945)
High Efficiency Boiler Systems	17,107 (17,107)				17,107 (17,107)
Energy Efficiency Equipment for New Residential Buildings				702 (702)	702 (702)
CONTACTUAL SERVICES					
Environmental Monitoring			244 (244)	20 (20)	264 (264)
Marketing Activities			0 (0)	5 (5)	5 (5)
TECHNICAL ASSISSTANCE					
BOS Management Fee				1,200 (1,200)	1,200 (1,200)
Technical Advisors (STAP)				63 (63)	63 (63)
Energy Auditing Services				39 (39)	39 (39)
External Financial Auditing Services				99 (99)	99 (99)
Training and Consulting Services				1,975 (1,975)	1,975 (1,975)
TOTAL	**39,052** **(39,052)**	**0** **(0)**	244 (244)	**4,103** **(4,103)**	**43,399** **(43,399)**

* Figures in brackets indicate amounts in US$ thousand equivalent to be financed from GET and Norwegian grants
** Procurement Method: ICB – International Competitive Bidding; LIB – Limited International Bidding; LCB – Local Competitive Bidding.
*** Includes:
(1) International and Local Shopping (aggregate amount US$0.93 million equivalent)
(2) Direct Contracting (aggregate amount US$0.03 million equivalent)
(3) Training and Consulting Services (aggregate amount US$3.13 million equivalent) awarded in accordance with Bank Guidelines for Use of Consultants.

Annex 2c. Project Financing by Component (in US$ million equivalent)

Component	Appraisal Estimate			Actual/Latest Estimate			Percentage of Appraisal (%)		
	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total
A. Investment Component	**21.21**	**17.47**	**38.68**	**17.32**	**22.42**	**39.74**	**82**	**128**	**103**
A.1 CtG Conversion Program	21.21	16.54	37.75	17.32	21.72	39.04	82	**131**	103
A.1.1 Cogeneration Systems	14.94	10.08	25.02	9.01	12.93	21.94	60	128	88
A.1.2 High Efficiency Boiler Systems	6.27	6.46*	12.73*	8.31	8.79*	17.10*	132	136	134
A.2 Energy Efficiency	-	0.93*	0.93*	- **	0.70	0.70	-	75	75
B. Contractual Services	**-**	**0.40**	**0.40**	**-**	**0.26**	**0.26**	**-**	65	**65**
B.1 Environmental Monitoring	-	0.25	0.25	-	0.26	0.26	-	104	104
B.2 Marketing Plan	-	0.15	0.15	-	0.00***	0.00***	-	0	0
C. Technical Assistance	**-**	**3.13**	**3.13**	**0.58**	**2.99**	**3.57**	-	95	**114**
C. 1 Engineering and Project Management Services	-	2.07	2.07	-	1.97	1.97	-	95	95
C.2 BOS Management Fee	-	0.62	0.62	0.58	0.62	1.20	-	100	193
C. 3 Technical Advisors	-	0.19	0.19	-	0.06	0.06	-	31	31
C.4 Energy Auditing Services	-	0.05	0.05	-	0.04	0.04	-	80	80
C. 5 External Financial Auditing Services	-	0.06	0.06	-	0.10	0.10	-	166	166

* includes cofinancing grant of $US1.0 million equivalent from the Kingdom of Norway
** The estimate did not include the cost of housing unit construction, which was $US3.38 million. The total cost of construction including energy efficiency improvements was US$4.08 million
*** the amount used for the Marketing Plan was less than $5,000

Annex 3. Economic Costs and Benefits

Summary of Financial Analysis and CO_2 Cost Effectiveness:

	Investment		CO_2
	Total Investment	GEF Grant	Cost Effectivenes
Heat-Only-Boiler projects	US$	US$	US$/t CO_2 reduced
1. Kraków 1 (Jana)	321,723	139,394	28.4
2. Leczyca 1	574,265	244,804	13.8
3. Sopot	338,800	129,599	16.2
4.Gdynia	165,675	71,553	17.0
5.Poznan 1 (Potw.)	420,614	189,940	25.9
6.Rawa Maz. 1 ("Zamk.")	1,189,858	640,248	26.5
7.Ciechanów	1,312,013	605,340	29.0
8. Elblag	1,034,247	585,352	29.5
9. Falenty	541,502	223,250	31.6
10. Piotrków Tryb.	1,357,485	778,095	55.3
11. Siemianowice Slaskie	2,706,202	1,364,373	64.2
12. Pruszcz Gd.1 (Obr.Pok.)	526,400	245,613	20.2
13. Rawa Maz. 2 ("Solidar.")	1,014,403	529,059	18.2
14. Poznan 2 (Hetmanska)	742,632	387,399	22.2
15. Wrzesnia	389,163	211,881	39.2
16. Koszalin	814,331	315,353	9.5
17. Piekary Slaskie	747,010	330,854	33.3
18. Pruszcz Gdanski 2	358,878	189,499	46.1
19. Janów Lubelski	406,300	160,369	12.9
20. Kraków 2	514,982	209,740	18.1
21. Wabrzezno	762,586	316,285	10.3
22. Leczyca 2	436,824	211,762	16.5
23. Prabuty	869,016	452,920	20.9
24. Pruszcz Gdanski 3	662,887	260,226	13.3
CHP-projects			
1. Ostrów Wielkopolski	4,799,940	2,934,303	8.6
2. Swiebodzice	7,139,873	4,139,006	21.8
3. Tarnów	4,080,507	2,255,672	9.5
4. Gdansk Matarnia	4,070,663	2,127,724	19.2
5. Wyszków	2,729,965	1,470,334	15.0
Energy Efficiency Projects			
1. Kontkiewicza 62 street, Czestochowa	1,096,858	65,296	130.0
2. Building “C”,	752,844	44,470	133.0
3. Building “B”,	752,844	44,470	135.0
4. “ACCORD” Kraków	1,111,315	22,012	22.8
5. “KOWALE B” “INVESTING” SA, Gdansk	3,896,987	254,904	108.1
6. Wroclaw ARCHICOM	2,296,282	24,758	26.0

1. Grant amount for each project is based on "no-objection' of the World Bank. It is not equal to the amount paid .
2. Grant amount for HOB and CHP projects include cost of BOR services.
3. Total investment costs of HOB and CHP projects were calculated using the exchange rate on the day of "turn-key" contract signing.
4. Total investment costs of "energy efficiency" projects were calculated using the exchange rate on the day of energy audit preparation.

Annex 4. Bank Inputs

(a) Missions:

Stage of Project Cycle	No. of Persons and Specialty (e.g. 2 Economists, 1 FMS, etc.)		Performance Rating	
Month/Year	Count	Specialty	Implementation Progress	Development Objective
Identification/Preparation				
10/24/1991				
03/10/1993				
Appraisal/Negotiation				
05/1993	*7*	Task Manager (1) , Research Assistant (1) , Architect Engineer (1), Boiler Engineer (1) District Heating Engineer (1), Environment Economist (1), Energy Economist (1)		
Supervision				
03/04/1997	*5*	TASK MANAGER (1); ARCH. ENG. CONSULTANT (1); ADVISER (1); ENV. CONSULTANT (1); ECONOMIST/CONSULTANT (1)	U	
11/19/1997	*3*	TASK MANAGER (1); GEF REGIONAL COOR. (1); OPERATIONS OFFICER (1)	S	

12/03/1998	*2*	MISSION LEADER (1); ARCHITECT ENG. CONS. (1)	S	
04/09/2000	*2*	TASK TEAM LEADER (1); PROCUREMENT SPECIALIST (1)	S	
04/09/2000	*4*	TASK LEADER (1); PROCUREMENT SPECIALIST (1); FIN. MANAGEMENT SPEC. (1); PROCUREMENT ANALYST (1)	S	
04/09/2000	*2*	PROCUREMENT SPECIALIST (1); FINANCIAL MANAGEMENT (1)	S	
ICR				

(b) Staff:

Stage of Project Cycle	Actual/Latest Estimate	
	No. Staff weeks	US$ ('000)
Identification/Preparation		
Appraisal/Negotiation		211,440
Supervision		631,300
ICR		
Total		842,740

Note: SAP does not provide a breakdown of staff time by weeks spent. It does not distinguish between Identification/Preparation and Appraisal/Negotiation, or between Supervision and ICR; therefore, all costs related to project preparation are shown under Appraisal/Negotiations entry above and all costs related to ICR are included in the entry for Supervision.

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

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

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

Annex 6. Ratings of Bank and Borrower Performance

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

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

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

Annex 7. List of Supporting Documents

BOARD DOCUMENTS
Country Assistance Strategy 1997 and 2002

PROJECT DOCUMENTS
Project Document, Report No.13054-POL, October 1994
Aide Memoires from Identification, Preparation, Appraisal and SPN Missions (1993 – 2004)
Project Status Reports (14 pcs):
(i) Initial Summary, August 1995
(ii) Update, June 1996
(iii) Site Visit, April 1997
(iv) Site Visit, December 1997
(v) Site Visit, August 1999
(vi) Update, February 2000
(vii) Update, November 2000
(viii) Site Visit, June 2001
(ix) Update, December 2001
(x) Site Visit, June 2002
(xi) Update, December 2002
(xii) Site Visit, June 2003
(xiii) Site Visit, December 2003
(xiv) Site Visit, May 2004

OTHER DOCUMENTS
- Global Environmental Facility Coal to Gas conversion Project. Preliminary report on proposals in Krakow. September 1992
- Coal to Gas Conversion Total Energy Housing Complexes in Cracow. Evaluation of Proposals and Recommendations, February 1993
- Letter of Agreement between the Kingdom of Norway and the Republic of Poland on Financial Cooperation for the Coal to Gas Boiler Covnversion Project
- Evaluation Report of the Norway-World Bank AIJ Programme: Lessons Learned from the Pilot Phase under UNFCCC
- Amendment to GET Grant Agreement
- Agreement between the Minister of Environment Protection, Natural Resources and Forestry and Bank Ochrony Srodowiska
- *World Bank Aprroval of Norwegian Joint Implementaion Project Preempts Climate Convention* – Greenpreace International article, 19 March 1993
- The Act on Public Procurement with explanatory notes
- Terms of Reference for BOR, Energy Auditor, Implementing Agency and other
- GEF criteria , individual project documentation and grant application forms
- Boiler Owner Representative Coal to Gas Conversion Project reports on individual boilers, midterm and final reports
- Documentation on loan extension
- Audit reports
- Project progress reports
- STAP meeting reports

- Final report on environmental monitoring performed at the modernized boiler plants within the scope pf the GEF Project
- Various correspondence
- Final results of air emissions monitoring (excel spreadsheets)

Additional Annex 8. Project Background, Design and Implementation

The initiative of the Global Environmental Facility (GEF) to promote and support coal to gas conversion in Poland corresponded well with a worldwide trend of the early 1990s to invest in pro-environmental activities and especially to reduce greenhouse gas emissions. At the time of project preparation, Poland emitted 36 million tons of CO2, 2.8 million tons of SO2 and 1.2 million tons of NO2 which were also a by-product of energy production. The energy sector was a vertically integrated, inefficient and heavily subsidized public monopoly. Energy consumers tended to overuse the energy and lacked willingness to pay. The environmental problems were serious. When the Polish government embarked on the energy sector reform (concurrently carrying out other important reforms), improvements in the environment became a priority. When adjusting the environmental regulations and their enforcement, Poland was aiming to harmonize with EU regulations although at the time of GEF assistance to Poland the country's perspective at joining the EU was distant.

In fact, Government gave priority to national and regional environmental concerns without neglecting the global aspects of emissions. Poland participated in the Intergovernmental Panel of Climate Change "The Intergovernmental Panel on Climate Change, established by World Meteorological Organization and United Nations Environment Program in 1988, assesses scientific, technical and socio- economic information relevant for the understanding of climate change, its potential impacts and options for adaptation and mitigation" (www.ipcc.ch). thus expressed its willingness to reduce greenhouse gasses, especially CO2 and methane. This strategy became binding because Poland ratified the Framework Convention on Climate Change (FCCC) in 1994. Furthermore, Poland was deeply involved with issues important for the Kyoto Protocol and also ratified the agreement.

The Kyoto Protocol reflects integrated thinking about the environment and emphasizes the protection of human living conditions including climate change and air quality. In it, programs on energy and the environment are interlinked. The Annex I Countries, to which Poland belongs, agreed to reduce or limit emissions according to the Kyoto Protocol targets. These targets define the amount of greenhouse gases the countries are allowed to emit in the 'commitment period' of 2008 to 2012, relative to the amount emitted in 1990. These targets represent either an emissions cut or a lower rate of emissions increase. To achieve its emission targets, an Annex I country is expected to use a 'Kyoto Mechanism' to reduce domestic greenhouse gas emissions. One of such mechanisms, used in this project, is a Joint Implementation (JI), which allows achieving emission targets through project investments in other Annex I countries reducing emissions. This GEF project was designed as an attempt to demonstrate such a mechanism and learn from it to develop a methodology and framework for the upcoming Kyoto practice, both for the Polish authorities and other governments. The principle of this mechanism is that the effect on the global environment is the same regardless of the greenhouse gas emissions source, so it is better to reduce emissions where the cost is lowest. It is assumed that the country hosting the project would directly benefit from it as well.

The global environmental benefit of the project was to be the reduction of CO2 emissions resulting from hard coal and lignite use (which in 1990 supplied 76% of Poland's primary energy consumption). Currently, Poland still is the leading energy consumer among Central European countries. Coal accounts for about 65% of the total consumption, which is less than 14 years ago but still high. Before Poland's democratization, the industry was heavily subsidized which resulted in uncontrolled use of coal as an energy source for heat and electricity even in the smallest units. The fuel share of oil constitutes about 24% of total consumption, while natural gas accounts for 11%. Comparing to the 1990 levels, in 2001 the consumption of hard coal, lignite and coke has decreased by 30%, 12% and 50%, respectively. At the same time the consumption of natural and nitrified natural gas has increased by 14% and 16%, respectively. In terms of availability of gas, in 1992 Poland's gas network had a limited capacity to serve large numbers of medium-size industrial consumers and households increasing its use. A program to restructure, privatize

and modernize the gas sector has been set up in 2002 and continues to be discussed and improved. It also pertains to the issue of gas availability and distribution. To provide gas customers with better access to gas and to tally gas sector development with the economy, network gas supplies should be provided to local communities; gas imports must meet the actual demand (including domestic gas production and reaching its development targets), and gas consumption should be increased by expanding local networks in line with requirement diversification. Yet the reforms of this sector have been slow although small and medium consumers account for 65% of the market. Thus, the project continues to address relevant issues although it spans almost 10 years. It has to be noted, however, that gas prices increased significantly from the time of project commencement in 1994 the cost of 1000m3 of gas as paid by the end user was about US$98 while now this cost is US$140. causing gas to be less popular as a renewable energy source.

In the early 1990s Poland was one of the largest producers of CO2 thus the reduction of CO2 emissions needed to be extensive. Since the beginning of the project, the focus of Polish environmental efforts has shifted to developing effective CO2 reduction strategies. Today, energy has to be produced more efficiently and in an environment-friendly way; renewable energy is used while attempting to diminish mining of hard coal and lignite. The new environmental policy has made energy less attractive to waste, which in practice meant price increase. Yet significantly reducing the number of coal mines and driving prices up to economic levels was not a sufficient incentive to switch to gas as a chief energy source. Financial support to investment was designed to constitute appropriate incentive.

One of the least expensive and most environmentally effective options to reduce CO2 emissions was and continues to be coal to gas conversion in small and medium boilers. In the *Coal-to-gas conversion subcomponent*, the project did not target boilers below 1 MWt because of the insignificance of their emissions or boilers above 15 MWt because their conversion, being very costly, continues to be an option politically impossible to implement due to the specific condition of the coal mining industry. The GEF funds, through the introduction of new technologies, were to encourage such transition. Although the Polish heat producers were familiar with the technology offered by the project, such technology was not implemented before for two reasons. (1) Such undertakings were not financially viable as the boiler owners could not generate enough cash from operations to invest because the Government did not allow real tariff increase (at the time of project appraisal, the inflation was already running at 20% level). The few available commercial loans were not financially attractive. (2) There was not enough public funding in the first half of the 1990s to support such tasks because the general climate for investment in new technology was extremely weak. Yet, as the project progressed, coal to gas conversion took place independently of the project due to increased availability of various financial resources and national and international support mechanisms and incentives to change the heavy predominance of coal.

The selection of individual projects followed a thoroughly prepared path of qualifications corresponding with GEF criteria and appropriate approvals to ensure quality and reduce the risk of withdrawal. The Scientific Technical Advisory Panel (STAP) supported the project with its expertise. It provided an independent opinion on technical aspects of the GEF eligibility of individual projects and its decision was final (STAP did not decide on project financing, which was BOS responsibility). Its positive opinion was necessary for starting activities within each project. Thus the STAP operation played a critical role for project progress and it was to be supported by Local Technical Advisory Panel (TAG) – local technical advisors and technical advisory group in the field. BOR was to assists with all project aspects although the Implementing Agency assumed this role to a much greater degree. BOR helped with the project from the conceptual phase to full operations. Its tasks were project definition and conceptual design, procurement strategy and assistance in bidding process and contract award and supervision of construction, and to prepare and update the manual based on Krakow experience. Despite the fact that some project owners were capable of managing project preparation without consulting services, the presence of a single Boiler

Owner Representative was justified by the fact that individual boiler owners had varying capacity to prepare the project according to the requirements.

The beginning of project operation was a difficult time for the *Energy Efficiency Subcomponent* implementation. The mid 1990s housing sector crisis disinterested potential investors from participation in energy efficiency programs. Many investors withdrew once they understood that the funds targeted energy saving technologies, not the investment itself. They found the WB procedures difficult, especially the requirement to have in the bidding procedure suppliers from at least three countries and that the payment would take place after investment completion. Nonetheless, the *Energy Efficiency Subcomponent* made excellent use of newest technologies. The candidates were selected using the GEF criteria. (Green Building Criteria were also considered as selection criteria as they favored eco-friendly conditions for construction. They included sensible use of land, consideration on density of housing and transport availability, building requirements and a specific choice of equipment. Yet, because the bids were designed to select the most cost-effective option among energy efficient equipment, Green Criteria were not followed).

The Energy Auditor was obliged to perform energy audit using results obtained each month for a year after the housing units were completed. Although the Energy Audit contract says that "the Beneficiary shall include in the agreement with future owners/tenants a condition enabling energy audit to carry out his duties", this element of the contract was neglected. The contract did not oblige the apartment buyer, i.e. the final recipient, to make energy use documentation available to the Energy Auditor and the house or apartment owners were not willing to share the information. This resulted in difficulty in completing the summary report of the Energy Auditor; approximately one third of the final report is estimated based on available information. Additionally, the final report was prepared two early to present useful information. The audit was performed when some of the units were still empty which significantly changes the audit results. The audit would have provided most reliable data had it been prepared 2 or 3 years after each unit was populated.

It must be mentioned, however, that according to the assessment of the energy policy the current state of thermal renovation and energy efficiency efforts are below expectations due to a complicated system of energy audits and verification. The over-expanded function of energy auditor and high costs of performing such audits diminish the bonuses of such activity. There has been, though, an improvement of effectiveness of fuel consumption through the promotion of gas technology.

Additional Annex 9. Borrower's contribution to the ICR (in the exact wording of the Borrower).

"GEF Project completion - BOS input to ICR

- **Assessment of the project objective, design, implementation and operation experience**

Improvement of the quality of environment in Poland is one of the main concerns of Polish government. Taking into account enormous financial needs in that respect any additional funds inflowing from international sources are very welcome.
The GEF Project contributed to the improvement of the Polish environment.

In accordance with the Agreement concluded on February 3rd, 1995 between BOS and Ministry of Environment BOS was appointed the Implementing Agency for GEF Project.
The purpose of the project is to is to provide financial support for investment activities in converting small and medium sized coal fired boiler houses to gas and in improvement of energy efficiency in new residential buildings.
The objective of the Project has been achieved both for "Coal-to-Gas Conversion" and for "Energy Efficiency" components. The original grant amount was utilized in 98%.
The implementation of the CtG component consisted of 29 individual project for the total value of USD 40.8 million of which 53% i.e. USD 21,6million was covered from GEF grant.
The implementation of energy efficiency component consisted of 13 individual projects supported by GEF Grant with the amount of USD 0,7 million.

The GEF Project started in a good moment when there was growing demand on such investments.
National Fund for Environmental Protection and Water Management and Voivodship Funds a couple years earlier started with financing similar individual projects.
GEF Grant helped in popularization of coal-to-gas conversion concept among the owners of small and medium sized boiler houses and delivered them funds without which realization of those projects would not be possible at that time.
The objectives of GEF Project were full met since the assumed environmental effects are achieved.

- **Evaluation of the borrower's performance during the evolution and implementation of the project, with special emphasis on lessons learned that may be relevant in the future**

Not all of the beneficiaries had earlier experience with international financial institutions procedures.
This is one of main reason of serious delays in realization of some of the projects. In several cases there was necessity of repeating tender procedure.
In some case technical problems caused need of additional works which postponed finalization of the projects.
Thanks to participation in the GEF Project investors became familiar with international procurement standards and how to apply for funding from international institutions.
Trainings and consulting serviced financed from GEF Grant improved beneficiaries technical and environmental knowledge.
The experience gained in the co-operation with The World Bank may be very helpful in achieving funding from EU Structural Funds.

- **Evaluation of the performance by the Bank, any co-financiers or other partners during the**

evolution and implementation of the project, including the effectiveness of their relationships, with special emphasis on lessons learned.

The GEF Project Office at Bank Ochrony Srodowiska S.A. performed the function of implementation unit for the Project since 1995. Originally The GEF Project was supposed to be completed by the end of the year 2000. The closing date had to be extended several times. It shows that the complicity of the implementation of this relatively large Project was underestimated. Also time needed for obtaining all the World Bank approvals in each individual case was underestimated.

The World Bank required that The GEF Project Office will be established at Bank Ochrony Srodowiska S.A. as a separate independent unit. BOS has been hiring for seven years six persons with very high qualifications (later this number was gradually reduced to 3 persons) dedicated to this Project only. In consequence cost of maintaining GEF Project Office was high than fee received by BOS (mainly because of extension of the Project completion by nearly 4 years). Almost ten years experience shows that placing The GEF Project Office within the BOS unit dealing with environmental projects would be more efficient, brought some added value to BOS and would contribute to more effective popularization on Projects objectives.

Bank Ochrony Srodowiska S.A. is preparing a web side introducing the objectives and achievements of GEF Project to share experience form projects implementation, with the purpose to encourage potential investors to implement innovative technologies despite of the high initial cost and to make effort to obtain co-financing from external organizations supporting development."