

Environmental Action Programme Support Project  
Contract No DHR-C-00-95-00034-00  
United States Agency for International Development

ENVIRONMENTAL ACTION PROGRAMME SUPPORT PROJECT  
CZECH REPUBLIC  
FINAL REPORT

Submitted to  
U S Agency for International Development  
ENI/EEUD/ENR

Submitted by  
Chemomics International Inc

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## ACRONYMS

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Co <sub>x</sub>	Carbon oxides
EAPS	Environmental Action Programme Support
EU-PHARE	European Union-Environmental Assistance Program for the CEE
FPN	Foundation Project North
MOE	Ministry of the Environment
MUFIS	U S Municipal Finance Program
NGO	Nongovernmental organization
NO <sub>xs</sub>	Nitrogen oxides
NPOO	National Air Quality Program
PM	Suspended particulate matter
SO <sub>2</sub>	Sulfur dioxide
SFZP	Czech State Fund for the Environment
T/Y	Tons per year
USAID	United States Agency for International Development

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## EXECUTIVE SUMMARY

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While market reforms are helping relieve economic woes in the former Soviet Bloc countries, urban and industrial pollution and inefficient energy use continue to pose risks to public health and the environment. In the Czech Republic, Chemonics implemented the USAID Environmental Action Programme Support project (EAPS) from April 1996 to June 1997, when the program closed in anticipation of the country's graduation from USAID assistance. Historically, air pollution has been the country's most severe environmental problem. District heating plants have been pumping tons of noxious gases into the environment, using turn-of-the-century technology, low stacks, and highly polluting fuels, with a serious impact on human health and life expectancy. The EAPS approach was to strengthen both sides of the Czech Republic environmental equation—municipalities and the state environmental fund.

EAPS Czech Republic country program objectives included

- Building institutional capacity in environmental, technical, and financial project evaluation and in packaging environmental investments
- Facilitating financing of high-priority pollution prevention and abatement projects that enhance the performance and quality of municipal environmental services
- Increasing the role of local governments in environmental decisions affecting their communities
- Ensuring the sustainability of environmental initiatives by improving the ability of domestic funding sources, primarily the State Fund for the Environment (SFZP), to allocate resources

This final report details the process of achieving these objectives. **Section II** discusses project preparation, which resulted in a first-year success rate of 77 percent (13 financing applications developed with EAPS assistance were submitted and 10 were approved for funding), compared with the national average of 8 percent (1 application approval for every 12 submitted). Additionally, EAPS-assisted projects leveraged more than \$18 million in capital, for a rate of roughly 1.28, which represents an exceptional accomplishment for USAID in the region.

**Section III** discusses technical assistance provided to the state environmental fund, which resulted in a number of important market-focused reforms that will contribute to the fund's long-term solvency and continued ability to facilitate environmental improvement. Section III includes recommendations based on EAPS experience with the Czech Republic fund for activities that could be implemented with USAID assistance in other developing nations and transition economies.

**Section IV** summarizes the achievements of EAPS in the Czech Republic.

The annexes provide profiles of selected municipal projects, case studies of innovative projects, and additional information on the state fund's financial position

In summary, the EAPS country program in the Czech Republic made a significant contribution to efficiently allocating financial resources for environmental improvement and strengthening the capacity of municipalities to undertake successful environmental projects. Its efforts to increase cooperation between the SFZP and commercial financial institutions helped leverage more than \$18 million in financing for environmental projects. The lessons learned by the program will be useful in working with other state environmental funds.

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## SECTION I INTRODUCTION

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### A EAPS Background and Goals

While market reforms are helping relieve economic woes in the former Soviet Bloc countries, improvements in environmental quality are barely keeping pace. Urban and industrial pollution and inefficient energy use continue to pose risks to public health and the environment.

Recognizing the need for environmental safeguards in the region, ministers from Central and Eastern Europe, the NIS, and Western countries met in 1993 in Lucerne, Switzerland, to develop a joint environmental strategy. From that strategy, an action program was created to reverse decades of environmental abuse and neglect through targeted investment and technical assistance.

Chemonics is implementing the USAID Environmental Action Programme Support project (EAPS) in Central and Eastern Europe to support the Lucerne strategy and continue earlier related USAID activities to improve environmental management and economic development in the region. EAPS helps national and local governments identify, prioritize, and package proposals for environmental improvements and strengthen the lending and financial management practices of national environmental funds.

EAPS was launched in March 1995 and will continue until March 2000. In the first two years, EAPS ran country programs in Bulgaria, the Czech Republic, Lithuania, Poland, and Romania and maintained offices, professional staffs, and working associations with local subcontractors in those countries. EAPS also operated in Slovakia, but did not maintain a field team there. In the Czech Republic, the program closed at the end of June 1997 in anticipation of the country's graduation from USAID assistance. It was the first EAPS country program to close, followed in October 1997 by the Lithuania program.

### B EAPS in the Czech Republic

EAPS goals and strategies in the Czech Republic evolved from the findings of two earlier USAID projects, PRIDE and EP3 (both in 1994). The country program objectives included:

- Building institutional capacity in environmental, technical, and financial project evaluation and in packaging environmental investments
- Facilitating financing of high-priority pollution prevention and abatement projects that enhance the performance and quality of municipal environmental services
- Increasing the role of local governments in environmental decision making affecting their communities

- Ensuring the sustainability of environmental initiatives by improving the ability of domestic funding sources, primarily the State Fund for the Environment (SFZP), to allocate resources

These objectives were achieved, as demonstrated in Section II, Preparation of Environmental Projects, and Section III, Assistance to State Environmental Fund, and Annexes A and B, which give details on individual projects

### **B1 Project Start-Up**

Foundation Project North (FPN), a local nonprofit environmental organization, was chosen as the program's subcontractor. Lubomir Paroha, FPN director, was appointed country manager of the program. He assembled a team of local experts including Bretislav Klic as regional coordinator for Northern Moravia, Hana Smolkova as field administrator, and Michaela Panackova-Bechna as assistant field administrator for Northern Bohemia. Field offices were opened in Northern Bohemia and Northern Moravia, the country's most polluted regions, where EAPS concentrated its work. A field office was established in Prague in March 1996 to support technical assistance provided to the SFZP. John W. Haines, a U.S. banker and former director of the Trenton Business Assistance Corporation in New Jersey, was posted in Prague as EAPS senior financial advisor with the primary responsibility of providing technical assistance to the SFZP.

In early summer 1996, as program activities accelerated, staffing was reorganized to accommodate new needs. Mr. Paroha resumed his duties as FPN director and became part-time environmental technical advisor with the program. Mr. Klic assumed the responsibilities of country manager and Ms. Smolkova became regional coordinator for Northern Bohemia in addition to field administrator. Zuzana Kordikova, a part-time administrative assistant, was hired to assist Ms. Smolkova.

The EAPS team focused on strengthening two essential entities in the Czech Republic's long-term environmental improvement—municipalities and the SFZP. To attain EAPS objectives, the team emphasized training and assisting municipalities in project preparation and providing institutional support to the SFZP based on the fund's need to reduce its dependence on subsidies and leverage financial resources, improve credit policies, protect long-term solvency, and improve public accountability. Municipal projects for state funding targeted the reduction of harmful air emissions by replacing high-sulphur coal with cleaner-heating fuels. EAPS assisted municipalities in the country's two most polluted areas, the coal mining and heavy industry areas of Northern Bohemia and Northern Moravia. The team developed screening criteria for selecting projects for assistance. EAPS reliance on local experts created a network of highly qualified short-term environmental, financial, and technical specialists around the country that will be an important national resource in continuing environmental improvement.

### **B2 Environmental Conditions in the Czech Republic**

Historically, air pollution has been the country's most severe environmental problem, both in terms of pollutant quantity and air ambient quality. Solid fuels have accounted for 60 percent of the country's energy. In particular, district heating plants have pumped tons of noxious gases

into the environment using turn-of-the-century technology, low stacks, and highly polluting fuels. Although these plants provide a critical services to customers, their impact on the environment has affected human health and life expectancy.

Replacing aging equipment and converting to cleaner fuels had been a priority, but the capital required was largely out of reach. District heating plants, usually poorly managed and under government control, could not qualify for commercial loans. To bridge the gap, EAPS helped these and other institutions access new sources of capital, primarily funds from the SFZP, a primary source of environmental investment capital for environmental projects that cannot obtain commercial financing. EAPS helped the SFZP build its capacity to invest soundly and trained municipalities in developing successful applications for funding. To qualify for funding, district heating plants had to demonstrate their capacity to repay loans. EAPS helped them develop rate structures, introduce standard accounting procedures, and show plans for economic sustainability as part of the application process. EAPS also advised the state fund on becoming more market-oriented by moving into commercially backed loan guarantees to transfer investment risk and administration to commercial banks.

### **B3 Creation of National Air Quality Program**

The EAPS Czech Republic program began at a time of intense activity in the environmental sector. In 1991, the SFZP was established and tasked with financing unfinished water and air projects. The SFZP uses revenue from emissions charges and pollution fees and fines to make loans and grants to municipalities and industries for environmental purposes, mostly for air or water infrastructure projects. The SFZP has also benefitted from 6.1 billion Kč (koruna or crowns) from the Czech National Property Fund earmarked for air quality improvement and unrestricted capital of \$10.58 million from the United States. In fiscal 1996, the SFZP had revenues totaling approximately \$191 million (see Annex D for detailed financial information).

In 1994, the year following the Lucerne meeting, the Czech Parliament passed legislation establishing the National Air Quality Program (NPOO), a four-year, 6.1 billion Kč program to improve air ambient quality at the municipal level. Although relatively small, largely unregulated heating sources at the municipal level had the greatest impact on public health, accounting for 40 to 60 percent of all air pollution. EAPS target clients became municipal-level pollution sources dispersed throughout the country.

The NPOO required municipalities to develop complex, highly detailed air quality plans for infrastructure improvement as well as for small businesses and households, including household stove conversion and improvement or replacement of boilers. The primary objective was to reconstruct and replace sources of air pollution such as district heating plants, especially those using a large amount of brown coal-based fuels (50 megawatts and up), with cleaner sources of energy compatible with existing local systems. Key measures to be funded included construction of gas distribution systems and development of other energy sources such as solar energy. Interest-free loans for up to 70 percent of the project cost were available to individual projects through the SFZP, with a grace period of five years and total payback period of seven years.

Along with the high level of detail required for project proposals, applicants had to go through a time-consuming application process involving a number of decision makers, in which

decisions were often politicized and nontransparent. The process began with an application form passed from the state district office to the Ministry of Environment and then the NPOO. There, a first-round decision was made by the NPOO Council, comprised of 7 representatives of the ministries of environment, finance, economy, industry, health, and agriculture, 12 representatives of related parliamentary committees, and 1 representative of the association of municipalities. Projects that received first-round approval were required to submit detailed applications for a final decision by the SFZP Council.

This process, along with poor communication with banks and changes in SFZP operations had a negative effect on environmental projects approval, with only 1 in 12 financing packages approved. The introduction of the EAPS country program in 1995 proved to be a milestone in improving the working relationship of municipal borrowers and state and commercial lenders, resulting in a significant increase in approved financing, measurable environmental improvements, and more effective, responsible, and accountable local government.

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## SECTION II

### PREPARATION OF ENVIRONMENTAL PROJECTS

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#### A Establishing Guidelines

The rate of approval of municipal environmental proposals in the Czech Republic—8 percent—was extremely low. Clearly, receiving funding to improve environmental quality at the municipal level required significantly stronger proposals that were clearly targeted to funding priorities. After extensive study by technical experts and detailed research, the EAPS Czech team adopted guidelines for screening projects that provided a standard framework for working with municipalities and set a tone of openness and objectivity. In addition, thorough research, strong technical analysis, complete responses to the SFZP guidelines, and clear organization and presentation ensured that applications met and exceeded standards. The first-year success rate of 77 percent (13 financing applications developed with EAPS assistance were submitted and 10 were approved by the NPOO Council) is impressive compared with the national average of 8 percent (only 1 in 12 approved). Additionally, the EAPS team leveraged USAID assistance to mobilize environmental investment capital at a rate of 1 to 28.

The team determined that projects receiving technical assistance would meet the following guidelines:

- Be located in areas where either sulfur dioxide (SO<sub>2</sub>) or suspended particulate matter (PM) annual ambient averages exceed World Health Organization recommended standards
- Fit into the country's air quality program, a national priority
- Address small sources of pollution (low-stack emissions), the source of 40 to 60 percent of all pollution
- Focus on smaller towns and municipalities in Northern Moravia and Northern Bohemia that could not easily help themselves, where EAPS assistance would have a substantial impact

Lessons Learned
<b>Guidelines</b> <ul style="list-style-type: none"><li>• Establishing screening guidelines sets a tone of openness and objectivity and encourages applicants to submit excellent proposals</li><li>• Focusing on smaller towns and municipalities maximizes the impact of limited resources</li></ul>

In addition, the team decided to select projects in collaboration with state district offices, which evaluate and prioritize applications at the local level. This method of identification was chosen to expand municipal involvement in decision making and strengthen municipal skills in developing and implementing environmental projects.

#### B Program Summary

In the first year, EAPS provided assistance to municipalities to develop 16 investment proposals, 6 more than the work plan target of 10. Ten were approved by the SFZP governing

council for financing, as shown in Table II-1 below (Table II-2, on the following page, provides data on the costs and benefits of these projects ) In the second year, an additional six proposals that received EAPS assistance were approved and funded (For a detailed review of all EAPS-assisted projects, see Annexes A and B )

Lessons Learned
<b>Project Packaging</b>
<ul style="list-style-type: none"> <li>• The full involvement of municipalities strengthens projects improves municipal skills and expands local input in decision making</li> <li>• Active involvement of well-informed mayors contributes to winning proposals</li> <li>• Training in project packaging increases the likelihood of a successful financing application</li> <li>• To provide effective technical assistance to municipalities advisors should become involved in the early stage of planning offer broad range of technical expertise and widen financial options</li> <li>• Small projects with an immediate demonstrable impact on environmental quality help create local demand to improve the environment</li> </ul>

The first year of the EAPS Czech program (March 1995 to March 1996) focused on identifying, screening, and packaging municipal projects The second year (April 1996 to June 1997) continued the focus on project packaging, in addition, advisors worked on improving the ability of local government and state institutions to make environmental decisions and use municipal and commercial financial sources for environmental investments Building on the first year's experience and working relationships, the EAPS team became involved at an earlier stage in project planning The advisors offered a broader range of expertise, extended the EAPS range of financing options to include more commercial bank support, and developed innovative alternative financing that opened up major new areas of opportunity

**Table II-1 Project Data, Year 1  
(Numbers of environmental projects)**

Projects Location	Assistance Provided	Submitted to Council	Approved by Council	Signed by Minister <sup>1</sup>
Northern Bohemia	7	6	6	4
Northern Moravia	9	7	4	3
Total Czech Republic	16	13	10	7

In addition to providing technical analysis and assistance, EAPS provided other services tailored to specific municipal needs For example, in Vratimov EAPS provided legal assistance in establishing the innovative Teplo-Vratimov joint venture between a steel mill and the town that now serves 32 percent of the city with economical, efficient waste heat In Krasna Lípa, EAPS provided 75 percent of the cost of engineering design services Some projects had not received funding approval when EAPS concluded However, in at least one case, in the town of Chomutov, the municipality began to implement the project with its own funds

<sup>1</sup> There is a substantial difference between the number of projects approved by the SFZP Council and projects signed by the minister The minister at that time often did not follow council recommendations

Table II-2 Costs and Benefits of Approved Projects

Project	Project Cost in mil Kč	NPOO Assistance in mil Kč	Reduction in Pollutants [t/y]		
			PM	SO <sub>2</sub>	No <sub>x</sub>
<b>Northern Bohemia</b>					
1 Chomutov	14 2	7 1	30	22 3	3 4
2 Bilina	7 8	3 1	12 1	30 2	4 1
3 Liberec	22 9	18 4	56 4	56	13 3
4 Krasna Lipa Gas Distribution System	30 3	24 3	51	72 8	16 6
5 Krasna Lipa Facilities Conversion	25 7	16	N/A*	N/A*	N/A*
Total Northern Bohemia	100 9	68 9	149 5	181 3	37 4
<b>Northern Moravia</b>					
1 Vratimov	80	N/A**	60 7	46 7	12 9
2 Orlova	5 3	2 1	64 7	29 7	4 9
3 Polanka	14	5 2	74 3	32 8	7 2
4 Petrovice	7 5	6	23 1	15 5	5 6
5 Svinov	6 4	3 29	7 6	3 7	8 5
Total Northern Moravia	113 2	16 59	230 4	128 6	22 1
Total Czech Republic	214 1	72 19	379 9	309 9	59 5

PM=particulate matter SO<sub>2</sub> = sulphur dioxide, No<sub>x</sub> = nitrogen oxides

\* Benefits from conversion of municipal facilities in Krasna Lipa are already included in benefits related to Krasna Lipa's gas distribution system

\*\* Interest rate on the commercial loan will be covered

The support EAPS provided to municipalities throughout the life of the project had the additional effect of strengthening effective, responsible, and accountable local government (see Table II-3 on the next page) In Rožnov and Dolní Poustevna, for example, joint financing schemes were worked out with EU-PHARE, U S Municipal Finance Program (MUFIS), and the SFZP, enabling municipalities to work collaboratively with officials and establish the basis for future cooperation The Tanex project provided a model for municipalities and small businesses to create financing packages to improve environmental practices Training provided to municipal officials, described on next page, strengthened transparent decision making and cooperation with state bank and commercial bank officials

**Table II-3 Institutional Strengthening, Year 2**

Project	Description	Institutional Impact
Ludgerovice municipality	Coal/gas conversion packaging for the loan	Improved municipal skills in seeking financing for environmental projects
Havřov municipality	Assessment of environmental policy	Improved municipal skills
Financial and Economic Model for Evaluation of municipal gas network	Computerized model Case studies Polanka and Krasna Lipa	Mobilized municipal financial sources
Rožnov, municipality	Feasibility study for a sewage system Water quality improvement	Strengthened cooperation between two USAID programs – MUFIS and EAPS
Opava municipality	Gas assets analysis	Improved municipal skills
Tanex Litomeřice leather plant	Feasibility study for conversion of tannery boiler house (coal/gas + cogeneration) Air quality improvement	Improved small business skills in seeking financing for environmental projects
Dolní Poustevna municipality	Feasibility study for municipal heating plant conversion (coal/gas, cogeneration) Reconstruction of obsolete district heating system Air quality improvement	Successfully implemented joint financing SFZP MUFIS EU PHARE
Jilove municipality	Environmental improvement of municipal heating plant Air quality improvement	Improved municipal skills
Technical assistance to state fund		Improved policies and procedures transparency in decision making cooperation with commercial institutions
Training activity for municipal and state officials	Focused on implementation of EAPS recommendations to state fund	Strengthened transparent decision making at municipal and state levels and cooperation with state fund and commercial institutions

### C Project Packaging Training at the Municipal Level

Training was an integral part of the EAPS approach. The team was asked to develop a training program for municipal officials on preparing proposals to obtain loans and grants from the SFZP. The training's primary objective was to disseminate the lessons EAPS learned during its first year on improving the quality of environmental investment proposal planning, analysis, decision making, and presentation to increase the likelihood of receiving financing. Training participants identified key problem areas in the loan application process and discussed problems during the training (Table II-4 on the next page)

**Table II-4 Key Problem Areas Identified by Training Participants**

<b>Problem Areas Related to Conceptual Issues</b>	
Process concept	Unclear
SFZP-MZP CR relationship	Unclear
Assignment of priorities	Lack of standard priority assignment methodology Politicized decision making processes
Territorial distribution of funds	Inequitable distribution of funds
Role of District Offices	Unclear role in assigning priorities Irrelevant to process
Role of Regional Offices of SFZP	Unclear role Inefficient
<b>Problem Areas Related to Implementation</b>	
Number of applications for support	Too many applications for SFZP support
Quality of applications for support	Too many applications that do not meet SFZP directives
Transparency of rules	SFZP rules nontransparent
Communication within the system	Weak insufficient communication among potential applicants District Offices and SFZP Inattention to applicants at SFZP offices Poor communication within SFZP, resulting in conflicting or inadequate information for applicant
Disbursement and repayment	Delays may threaten the completion of projects
Commercial funding sources	Little information on commercial sources Low use of commercial sources

The need for training arose from two related factors

- Poor communication between project developers, banks, and the SFZP, resulting in many applications failing to receive financing
- The need to learn new application procedures and processes

After a successful pilot session to test curriculum and approaches, the EAPS team presented two training sessions in late spring 1997, one in Northern Bohemia and one in Northern Moravia, to inform mayors on financing options and improve their ability to analyze their municipalities' financial situation. To support the latter objective, the team presented two computer models at the training to help applicants target proposals more appropriately

- **Financial Analysis Model** (developed by the Urban Institute) helps local governments define their needs and the amount they can reasonable borrow
- **Present Value of Gas Lines** (developed by Dr. Nejchelebza, Technical University, Ostrova) yields information necessary for negotiating the eventual sale of a gas line with a gas distributor

Both sessions were well attended by a diverse group, including mayors, district environmental officers, SFZP representatives, alternate funding sources such as MUFIS (which provides long-term credit at acceptable terms to improve municipal infrastructure), and representatives of banks with agreements with MUFIS

Participants were provided with a variety of materials Czech case studies, manuals, and diskettes for the computer models mentioned above, and information on EU-PHARE and MUFIS funding and conditions (the latter from MUFIS representatives and bank officers in the region who serve as funding contacts) The mayors said that the training would assist them in raising funds for environmental projects

#### D Capital Mobilized by EAPS for Financing Environmental Projects in the Czech Republic

EAPS achieved a leveraging ratio of roughly 1.28 in the Czech Republic Approximately \$650,000 was expended to assist specific environmental projects in obtaining funding, including projects listed below in Table II-5 Other projects were screened for assistance and rejected, while several others were not approved for financing or were withdrawn after receiving EAPS assistance Approximately \$18,268,000 in capital has been mobilized for these projects

**Table II-5 Funds Leveraged with EAPS Assistance**

EAPS Assisted Environmental Investment Projects	Financing Secured
Dolní Poustevna municipality gasification and conversion	\$1 500 000
Jilove municipality coal/gas conversion	\$1 400 000
Chomutov municipality coal/clean fuel alternatives conversion	\$580 000
Litoměřice Tanex Leather Plant coal/gas conversion	\$640 000
Liberec municipality gas fueled district heating system	\$916 000
Polanka municipality gasification and conversion	\$560 000
Svinov municipality coal/gas conversion	\$256 000
Bílina municipality gasification and conversion	\$312 000
Petrovice u Karvine municipality coal/gas conversion	\$300 000
Teplo Vratimov municipality waste heat utilization and cogeneration	\$3 000 000
Opava municipality, coal/gas conversion	\$1 880 000
Orlova municipality, coal/alternatives conversions	\$212 000
Ludgeřovice municipality coal/gas conversion	\$579 000
Krasna Lipa municipality (I & II) gasification and conversion	\$2 240,000
Duchov municipality coal/gas conversion	\$360 000
Rožnov municipality sewage system (water quality improvement)	\$3 533,000
<b>TOTAL</b>	<b>\$18 268 000</b>

Although not reflected in expenditures, EAPS has had a positive impact in related areas strengthening environmental investment These include improving environmental policy and SFZP operation, expanding transparency in decision making, improving municipal skills, mobilizing municipal financial sources, and increasing cooperation between the SFZP and commercial financial institutions

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**SECTION III**  
**ASSISTANCE TO STATE ENVIRONMENTAL FUND**

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**A Challenges of Planning SFZP Assistance**

A major component of the EAPS Czech Republic program was providing financial advisory services to the SFZP, the main source of financing for municipal environmental projects (76 percent of SFZP assistance in fiscal 1996 went to municipalities ) Of the Czech Republic's 6 300 municipalities, 90 percent have fewer than 2,000 inhabitants, with limited access to bank financing and no access to bond financing The SFZP assisted priority polluted areas with soft financing and grants

A number of major challenges faced EAPS as team members began to plan assistance to the fund

- A capital shortage relative to the demand for financing
- A large number of requests for small projects
- Solvency and sustainability risk from politicized, risky, and large credit decisions
- Limited recognition of the SFZP's potentially positive role in credit markets
- Limited cooperation with financial markets
- Poor public relations, public education, and public participation
- Slow pace and unpredictability of fiscal decentralization
- Limited financial management skills and accounting practices
- Slow response and adaptation to economic changes

From the beginning, demand for SFZP assistance far exceeded available revenues In one representative year, the SFZP received requests for more than 12 billion Kč in assistance but had just 6 6 billion Kč available Its other main source of revenue—fees and fines from pollution—was decreasing as pollution control improved

**B EAPS Assistance and Institutional Reforms**

Given these challenges, EAPS assistance to the SFZP centered on leveraging financial resources, protecting its long-term solvency, and improving public accountability EAPS was responsive and flexible in fielding SFZP management requests An unbiased and independent advisor, EAPS drew on outside resources, banks and other Czech institutions performed objective project analysis, and promoted policy changes

**B1 Objectives of Assistance**

EAPS had three basic objectives in working with the SFZP

**Lessons Learned**

**Collaboration**

- Involving all stakeholders—banks, municipalities the state fund citizens and others—from project start increases the likelihood of success
- Formally involving lenders in project development ensures the project will be developed appropriately for funding
- A donor acting as a responsive unbiased and independent advisor helps stakeholders achieve common goals

- To improve SFZP institutional capabilities, solvency, and operating efficiency by expanding systems and capacity for credit administration and improving public accountability and transparency

All EAPS reports included recommendations and concrete steps to improve fund solvency and sustainability. A system for credit administration established greater accountability, predictability, and transparency for SFZP project selection criteria.

- To provide analysis and recommendations on the risks of extending guarantees for several large and risky loans

As a result of this assistance, the fund established a standardized loan guarantee program.

- To help the SFZP leverage its resources to stimulate environmental investments

EAPS focused first on reducing grant support to projects with the capacity to service debt. EAPS also concentrated on fostering commercial bank financing of municipal environmental projects through standardized loan guarantees.

## B2 Institutional Reforms

EAPS helped the Ministry of the Environment (MOE) and the SFZP implement numerous policy changes, including

- Lengthening loan terms from 5 to 10 years
- Limiting assistance to a maximum of 50 million Kč per project (\$1.75 million)
- Evaluating applications based on ability to self-fund and repay debt
- Reducing subsidy levels from 80 percent of project cost to 60 percent
- Charging interest rates on all loans (previously no-interest loans were offered)
- Initiating a loan guarantee program
- Soliciting support and requests for municipal loan guarantees from commercial banks

### Lessons Learned

#### Fund Effectiveness

- Strengthening transparent governance is an important result of environmental activity
- Funds improve their effectiveness by keeping pace with economic transitions and maturing financial markets
- Market based banking practices accelerate environmental improvement and reduce risk for state funds
- Involving multiple lenders and using alternative financing increases the likelihood of full funding
- Alternative financing enables borrowers to undertake higher risk projects with potentially major benefits

Additionally, Foundation Project North prepared a priority-setting methodology that the SFZP accepted in February 1997. This methodology was also expected to be applied in the MOE.

As another part of its assistance, EAPS provided a number of advisory documents to the SFZP, including the following

- “Developing a Loan Guarantee Program Background, Review and Recommendations” (August 1996)
- “Fundamentals of Loan Guarantees” (February 1997)
- “Analysis of Proposed SFZP Guarantee to ECO GAIA a s , with Recommendations” (October 1996)
- “Analysis of Pending Loan Guarantees by the SFZP, with Recommendations” (November 1996)
- “A Review of Operations and Procedures of the SFZP” (October 1996)
- “Guidelines for Credit Policy for the SFZP” (November 1996)
- “Guidelines for Credit Procedures for the SFZP” (January 1997)
- “Guidelines for Credit Analysis for the SFZP” (May 1997)

### **B3 Expanded Transparency**

By establishing new policies, the SFZP expanded the transparency of its operations and processes. This will strengthen the capacity of applicants, especially municipalities, to evaluate project investments. The fund

- Returned about 1,500 pending applications for resubmission under the new criteria
- Established a regular weekly open-door visitation day on Tuesdays for applicants
- Instituted disbursement controls to avoid the misappropriation of funds
- Included for the first time, in an appendix to its 1996 annual report, a comprehensive listing of projects chosen for financing, with information on type, amount, location, and financing terms
- Expanded its financial project preparation analysis to include more comprehensive evaluation of cash flow and capacity to repay debt and instituted credit procedures protecting solvency

### **C Recommendations**

The EAPS experience in the Czech Republic yielded much information and many lessons learned beyond the program's original objectives. Many of the following recommendations could be effectively implemented with USAID assistance in other developing nations and transition economies

- **Maintain the independence of state environmental funds from institutions with parallel interests, such as banks and other national ministries.** Acting as an independent advisor, a state fund can offer advice in potentially politicized situations and act as an intermediary with other institutions. An advisory board, including members from NGOs, the financial sector, and government, can help a state fund make transparent decisions

- **Institute changes that foster EU accession** EU accession is a priority for most Central European nations U S donor assistance should recognize this as a primary national goal and use it to help expedite institutional reforms in the environmental sector
- **Link environmental projects to local government reform** Individual municipal projects financed by the Czech State Fund resulted in more effective, responsible, and accountable local government and accelerated the development of private enterprises and the financial sector
- **Link environmental fund assistance and banking reform** Fund financing strategies should be consistent with bank reform, regulation, and privatization Funds can more effectively fulfill their objectives by instituting basic bank-like policies and procedures that help them integrate with financial markets
- **Employ public relations and public education to gain long-term support for state funds and environmental improvement** State funds can help increase local recognition of the value of environmental investments and the need for service-based fees to support cost recovery, improve environmental awareness and pollution prevention efforts and generate public support for their work
- **Institutionalize a process to enable funds to respond to economic changes** Funds need procedures to help them keep pace with economic changes For example, early in their life cycle, funds may emphasize market-based financing mechanisms Later, as pollution abates and revenue from fees and fines decreases new sources of financing will be needed Advisory boards can provide guidance in this area
- **Introduce market-based practices that accelerate environmental improvement and reduce risk** These include capitalization grants rather than subsidies, standardized loan guarantees, lending consortia, incentives and disincentives for borrowers, regional borrowing and collateral pools, bond banks to finance small municipal projects, and longer-term loans with staggered amortization
- **Support private investment in infrastructure development** This would be especially useful with larger municipal projects requiring participation financing
- **Build the capacity of private enterprises to prevent pollution** Funds could help educate private enterprises on the long-term financial benefits of pollution prevention
- **Integrate fund financial and technical/environmental functions** All criteria should be integrated for cost-effectiveness and transparency in selecting projects for financing

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## SECTION IV ACHIEVEMENTS

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As EAPS demonstrated in the Czech Republic, donor assistance can help municipalities and environmental funds develop market-based borrowing and lending practices that improve environmental quality over the long run

The EAPS approach was to strengthen both parts of the Czech Republic environmental equation—municipalities and the state environmental fund. To assist municipalities, EAPS emphasized project preparation and training. To assist the SFZP, EAPS provided institutional support to help the fund leverage financial resources, protect long-term solvency, and improve public accountability. In most individual projects, EAPS played an important role in facilitating negotiations between the municipality and the fund.

EAPS' main contributions include

- Introducing thorough research, strong technical analysis, complete responses to SFZP guidelines, and clear organization and presentation to the application process. The first-year success rate of 77 percent (13 financing applications developed with EAPS assistance were submitted and 10 were approved by the NPOO Council) is impressive compared with the national average of 8 percent (1 out of 12).
- Assisting in proposal development and packaging for 16 municipal environmental projects that were approved for funding, at a cost to EAPS of \$650,000. Approximately \$18,268,000 in capital was secured for these projects as of August 1, 1997 (see Table II-5). Of major importance in sustainability, local staff were trained in the process. EAPS achieved a leveraging ratio for USAID funds of 1:28 in the Czech Republic.
- Developing criteria for comprehensive evaluation of potential packaging and financing applicants, including technical, environmental, and financial analysis.
- Creating a national network of highly qualified short-term environmental, financial, and technical specialists that will be an important national resource in continuing environmental improvement.
- Developing a methodology for setting regional environmental priorities that was adopted as standard by the SFZP Council and has helped improve transparency and democratic processes.
- Facilitating clear, rational, and independent communication among municipalities, businesses, and financial institutions.
- Providing training and seminars—important tools to improve communication, transparency, and democratic processes.
- Assisting Ministry of the Environment and the SFZP in implementing numerous policy changes, including lengthening loan terms from 5 to 10 years, limiting assistance to a maximum of 50 million Kč per project (\$1.75 million), evaluating applications based on ability to self-fund and repay debt, reducing subsidy levels from 80 percent of project

cost to 60 percent, charging interest rates on all loans, initiating a loan guarantee program and soliciting support and requests for municipal loan guarantees from commercial banks

- Introducing new computer models for financial and environmental analysis
- Supporting innovative solutions such as using waste heat to provide heat to 32 percent of the population of the city of Vratimov and creating the Teplo-Vratimov joint venture to implement this economically and ecologically desirable service

In summary, EAPS made a significant contribution to efficiently allocating financial resources for environmental improvement and developing municipal capacity to undertake successful environmental projects. Its efforts to increase cooperation between the SFZP and commercial financial institutions helped leverage financing for environmental projects.

**ANNEX A**

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**YEAR 1 PROJECTS**

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## BILINA MUNICIPAL GAS CONVERSION

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### Key Elements of EAPS Assistance

- Provided expert opinions on nine projects (six gas line constructions, two gas conversions of smaller boiler houses), as a result, one project was eliminated as not cost-effective
- Assisted in packaging and submitting application to the SFZP

**Status**                      The project was approved by the SFZP Council in spring 1996 and signed by the minister. Construction was completed by fall 1996

**Financing**                60 percent municipal, 40 percent SFZP (grant)

**Leveraging ratio**        74.8 (total project cost \$312,000, EAPS cost \$4,168)

### Reduction in Pollutants in Tons/Year

	PM	SO <sub>2</sub>	NO <sub>x</sub>	CO <sub>x</sub>	C <sub>x</sub> H <sub>y</sub>
Before	12.8	30.4	8.8	75.3	16.8
After	0.7	0.2	4.7	0.8	0.3
Improvement	12.1	30.2	4.1	74.5	16.5

### Project Description

The town of Bilina, located in the North Bohemian brown coal basin, has a population of 5,000. Like many communities in the region, it relied on brown coal for municipal, residential, commercial, and industrial heating. There were limited or no pollution controls for highly polluting coal-burning stoves and boilers. Air quality posed a significant risk to public health.

Bilina sought EAPS assistance to secure an agreement from the SFZP to finance construction of six natural gas pipelines and related facilities, convert households to natural gas heating, and connect municipally owned boilers to the expanded natural gas distribution system. EAPS developed expert assessments of appropriate natural gas technologies and detailed estimates of potential environmental benefits. It also supervised the town's credit assessment to qualify for soft loans and grants from the SFZP.

With EAPS assistance, Bilina secured financing from the fund in 1995 for construction of four pipelines. The town secured 70 percent of total project funding from non-municipal sources.

The project resulted in construction of a gas distribution system, coal/gas conversion of municipally owned residential boilers, and virtual elimination of emissions of sulphur dioxide (SO<sub>2</sub>), particulates, and carbon oxides (CO<sub>x</sub>).

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## CHOMUTOV HOUSEHOLD HEATING CONVERSION

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### Key Elements of EAPS Assistance

- Identified 502 flats owned by the municipality to be converted from brown coal
- Conducted detailed survey of the 502 flats
- Suggested individual solution for each flat, including cost estimates
- Assisted in packaging and submitting application to the SFZP
- Facilitated relationship with the SFZP

**Status**                      Project approved by the SFZP Council in spring 1996 but not signed by the minister as of July 1997. The town began implementing the project with its own funds in accordance with the plan provided by EAPS.

**Financing**                      50 percent municipality, 50 percent SFZP grant (not awarded)

**Leveraging ratio**              136.2 (total project cost \$580,000, EAPS cost \$4,260)

### Reduction in Pollutants in Tons/Year

	PM	SO <sub>2</sub>	NO <sub>x</sub>	CO <sub>x</sub>	C <sub>x</sub> H <sub>y</sub>
Before	30	22.3	3.4	57	1.2
After	0	0	0.6	0.1	0
Improvement	30	22.3	2.8	56.9	1.2

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**LIBEREC MUNICIPAL AIR QUALITY PROGRAM**

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**Key Elements of EAPS Assistance**

- Provided expert opinions on nine projects (gas conversions of small boilers, construction of gas line segments)
- Assisted in packaging and submitting application to the SFZP
- Facilitated negotiations with the SFZP

**Status**                      The project was approved by the SFZP Council in spring 1996 and signed by the minister. Construction was completed by fall 1996.

**Financing**                20 percent municipal, 80 percent SFZP (half loan, half grant)

**Leveraging ratio**        164.7 (total project cost \$916,000, EAPS cost \$5,560)

**Reduction in Pollutants in Tons/Year**

	PM	SO <sub>2</sub>	NO <sub>x</sub>	CO <sub>x</sub>	C <sub>x</sub> H <sub>y</sub>
Before	74.09	116.14	24.97	374.5	83.23
After	0.06	0.02	4.48	0.09	0.33
Improvement	74.03	116.12	20.49	374.41	82.9

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**KRASNA LIPA GAS CONVERSION AND  
PIPELINE EXTENSION**

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**Key Elements of EAPS Assistance**

**General**

- Provided technical assistance in shaping municipal air quality plan
- Introduced focus on energy efficiency by suggesting construction of a cogeneration plant, the municipality accepted the suggestion

**Phase I Construction of Mid-pressure Gas Distribution System**

- Provided expert advice
- Assisted in packaging and submitting application to the SFZP
- Facilitated negotiations with the SFZP

**Phase II Coal to Gas Conversion of 10 Municipal Facilities**

- Contributed 75 percent of the cost of detailed engineering design
- Provided expert advice
- Assisted in packaging and submitting application to the SFZP
- Facilitated negotiations with the SFZP

**Financing**                    28 percent municipality, 72 percent SFZP (40 percent grant and 32 percent loan)

**Leveraging ratio**        101.3 (total project cost \$2,240,000, EAPS cost \$22,120)

**Reduction in Pollutants in Tons/Year**

	PM	SO <sub>2</sub>	NO <sub>x</sub>	CO <sub>v</sub>	C <sub>x</sub> H <sub>v</sub>
<b>Before</b>	51	72.8	21.3	319.4	71
<b>After</b>	0	0	4.7	0.8	0
<b>Improvement</b>	51	72.8	16.6	318.6	71

**Project Description**

Krasna Lipa is a North Bohemian town of 3,500. Like many communities in the region, it relied on highly polluting brown coal as its principal heating fuel. Krasna Lipa had a central steam heating facility equipped with 3 coal-fired boilers servicing 2 textile plants, the town hospital, and 220 residential flats. The resulting poor ambient air quality was a significant public health threat.

A high pressure natural gas pipeline ran just beyond the outskirts of Krasna Lipa. EAPS designed a pollution reduction project that extended a mid-pressure gas transmission pipeline into town, constructed a low-pressure distribution system within the municipality, converted the

municipal boilers to natural gas, and connected 700 residences, the 2 factories, and the town hospital to this system. EAPS technical assistance included assessing all natural gas technologies involved in the pipeline construction and boiler conversions and assessing environmental benefits achieved through this project. EAPS also produced a detailed evaluation of the municipality's creditworthiness, required by the SFZP.

On the basis of supporting documents and studies provided by EAPS experts, the SFZP provided \$1.6 million for this project. Half of the funds defrayed the costs of extending natural gas transmission lines into Krasna Lipa. The remainder paid for converting municipal boilers from coal to natural gas and establishing a fund for subsidizing conversion of individual residences.

The town's conversion program achieved dramatic improvements in ambient air quality. Particulate emissions declined from 173 tons to 1.2 tons annually, a reduction of 99.3 percent. The project completely eliminated sulfur dioxide emissions (SO<sub>2</sub>), formerly averaging 191 tons per year. Reductions in carbon oxides (CO<sub>x</sub>) were equally impressive, falling from an annual average of 993 tons to less than 1 ton per year, a reduction of 99 percent.

On the basis of EAPS success with this project, Krasna Lipa agreed to serve as an EAPS training laboratory for officials implementing municipal gas conversion projects across the region.

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## TEPLO-VRATIMOV MUNICIPAL HEATING DISTRICT CONVERSION

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### Key Elements of EAPS Assistance

- Developed a business plan for Teplo-Vratimov
- Developed a spreadsheet model for capital investment planning and service pricing and applied it to planned Teplo-Vratimov operations, including a capital budget for the joint venture, pro forma balance sheets, an income statement, and a district heating pricing system
- Evaluated various pricing options and made recommendations on heating prices and subsidy levels
- Provided a brief outline of current regulations on district heating
- Provided legal assistance during establishment of the Teplo-Vratimov joint venture between the mill and the town
- Assisted in packaging and submitting application to the SFZP
- Facilitated negotiations with the SFZP

**Status**                      Construction started September 1995 and was concluded on deadline by September 1996. The new system was in operation during the 1996-1997 heating season and achieved excellent results.

**Leveraging ratio**        315.8 (total project cost \$3 million, EAPS cost \$9,500)

### Reduction in Pollutants in Tons/Year

	PM	SO <sub>2</sub>	NO <sub>x</sub>	CO <sub>x</sub>	C <sub>x</sub> H <sub>y</sub>
Improvement	106	178	48	316	12

### Project Description

Vratimov is a municipal suburb of 6,800 bordering Ostrava, the most heavily polluted city in the Czech Republic. The town relied on low stack coal burning block boilers for much of its residential and municipal heating, adding significantly to the town's heavy air pollution.

In 1995, Vratimov formed a joint venture with nearby Nova Hut Steel Mill under which the town channeled waste heat released at the mill to a central heating system, enabling it to discontinue the use of 15 coal-burning block boilers and 1 antiquated gas boiler.

The project fit the mill with heat exchangers, pumping stations, and related electrical equipment, constructed 3.9 kilometers of main conduits to the municipality, and fitted the distribution system with heat exchangers, and metering and regulating devices. This represented a

capital investment of \$3 million in Teplo-Vratimov, a joint venture in which the mill and the town each had 50 percent ownership

EAPS experts were deployed to the Nova Hut mill to evaluate its ability to supply the project with heat through captured waste heat and increase production at the mill's cogeneration plant. EAPS provided detailed analyses of the joint venture's business plan. EAPS also evaluated the overall economic and environmental benefits to the mill and the municipality from developing a district heating system based on use of the mill's waste heat.

The district heating system was designed to rely on waste heat for 80 percent of its needs with the remaining 20 percent generated at the mill for sale to Teplo-Vratimov at prevailing market rates. The mill's increased energy production resulted in a negligible increase of air emissions at the mill. However, by withdrawing 16 block boilers from use within the municipality, Vratimov's particulate emissions fell by 55 percent, sulfur dioxide emissions declined by 72 percent, and carbon oxides emissions dropped by 93 percent.

Waste heat is now used by schools, health and cultural facilities, shops, and offices as well as by 612 city-owned apartments with approximately 1,840 inhabitants, representing 32 percent of the town's population.

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## ORLOVÁ GAS CONVERSION AND POLLUTION REDUCTION PROJECT

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### Key Elements of EAPS Assistance

- Provided expert opinion on environmental impact
- Assisted in assembling documentation and packaging application for the SFZP
- Facilitated negotiations with the SFZP

**Status**                      Project was rejected by the SFZP. After appeal to the SFZP, negotiations continue

**Financing**                60 percent municipal, 40 percent SFZP (grant)

**Leveraging ratio**        129.3 (total project cost \$212,000, EAPS cost \$1,640)

### Reduction in Pollutants in Tons/Year

Emission	Status Before Implementation (t/y)	Status After Implementation (t/y)	Total Reduction (t/y)
Solid substances	64 720	0 018	64 702
SO <sub>2</sub>	26 692	0 009	29 683
NO <sub>x</sub>	6 330	1 440	4 890
CO <sub>x</sub>	94 950	0 288	92 662
C <sub>x</sub> H <sub>y</sub>	21 100	0 115	20 985
Aldehydes	0 005	0	0 005

### Project Description

Orlova is a town of approximately 36,400 residents located in Northern Moravia. Its households relied on brown coal for heating purposes. The resulting poor air quality prompted Karvina District officials to place Orlova at the top of the priority list for remedial air pollution projects.

The project's goal was to improve air quality by replacing solid fuels used in local furnaces (brown coal, black coal sludge, and slate) with natural gas, electric power, remote heat supply, industrial waste heat, and biogas. The project aimed to supply approximately 70 percent of family houses (260 houses) with gas. Removal of 260 local air pollution sources in the town's highly exposed area would result in significant air emissions reduction at a reasonable cost, helping achieve a long-term program for air improvement in Orlova.

EAPS negotiated a cost-sharing agreement with a local natural gas distribution company. Under this agreement, the distributor assumed 30 to 40 percent of the costs of upgrading Orlova's existing natural gas distribution network.

EAPS provided the project with documentation necessary to qualify for SFZP grant support. SFZP grants covered \$221,000, approximately 40 percent of total project costs. The project's estimated cost was approximately \$552,000.

A total of 230 residences were converted from coal heat to natural gas, with another 30 residences converted to electricity. The conversions reduced total emissions of particulate matter from 740 tons to 340 tons per year, a 46 percent reduction. Sulphur dioxide emissions (SO<sub>2</sub>) declined from 500 tons to 300 tons per year, a reduction of 60 percent, while carbon oxides emissions (CO<sub>x</sub>) dropped from 650 tons to 400 tons annually, a reduction of 62 percent.

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**PETROVICE U KARVINE SOLID FUEL/NATURAL GAS CONVERSION**

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**Key Elements of EAPS Assistance**

- Provided expert opinion on environmental impact
- Provided expert assessment of client's creditworthiness
- Assisted in assembling documentation and packaging application for the SFZP
- Facilitated negotiations with the SFZP

**Status**                      Project was approved by the SFZP Construction was completed by fall 1996

**Financing**                20 percent municipality, 40 percent SFZP (half grant, half loan)

**Leveraging ratio**        105.3 (total project cost \$300,000, EAPS cost \$2,850)

**Reduction in Pollutants in Tons/Year**

Emission	Status Before Implementation (t/y)	Status After Implementation (t/y)	Total Reduction (t/y)
Solid substances	23 107	0 016	23 091
SO <sub>2</sub>	15 465	0 008	15 457
NO <sub>x</sub>	6 933	1 298	5 635
CO <sub>x</sub>	77 850	0 260	77 590
C <sub>x</sub> H <sub>y</sub>	17 300	0 104	17 196
Aldehydes	0 004	0	0 004

**Project Description**

Petrovice u Karvine is a town of 5,000 residents in Northern Moravia. The town had previously invested a total of \$21 million to construct and extend a natural gas distribution system and convert the town's residences to gas heat. Many residences, however, continued to rely on highly polluting brown coal for home heating. The result that the town's poor air quality made it the second highest priority in the District of Karvina for air quality improvement. The town applied to the SFZP for grant funding to support the conversion of 220 residences and several municipal buildings, including 2 schools, from coal to natural gas heating.

EAPS experts developed technical plans and documentation required for loan and grant applications to the SFZP. These included evaluations of proposed pipeline and furnace technologies and estimates of emissions reductions to be achieved through conversion. EAPS also conducted a detailed financial and credit analysis of the town to determine its capacity to fund the project through increased debt. EAPS experts estimated that converting 220 residences and additional municipal buildings would cost \$505,000. Equipped with the technical support provided by EAPS experts, municipal officials succeeded in securing \$447,000, or 88 percent of the total project cost, from non-municipal sources. The project reduced particulate emissions by 48.5 percent, sulfur dioxide emissions by 32 percent, and carbon oxides by 32 percent.

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**POLANKA GAS NETWORK**

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**Key Elements of EAPS Assistance**

- Provided expert opinion on environmental impact
- Assisted in assembling documentation and packaging application for the SFZP
- Facilitated negotiations with the SFZP

**Status**                      Project was approved by the SFZP Construction of Stage 2 is completed  
Stage 3 is under construction

**Financing**                The SFZP provided a grant for 18 percent of the funding over five years

**Leveraging ratio**        191 (total project cost \$560,000, EAPS cost \$2,880)

**Reduction in Pollutants in Tons/Year  
After Stage 2**

Emission	Status Before Implementation (t/y)	Status After Implementation (t/y)	Total Reduction (t/y)
Solid substances	74 313	0 024	74 289
SO <sub>2</sub>	32 832	0 012	32 820
NO <sub>x</sub>	9 180	1 941	7 239
CO <sub>x</sub>	145 620	0 388	145 232
C <sub>x</sub> H <sub>y</sub>	32 360	0 155	32 205
Aldehydes	0 008	0	0

**Project Description**

The project's goal was to improve air quality in Polanka by replacing solid fuels such as coke, black coal, and black coal sludge with natural gas

The project called for gas heat to be introduced in three stages Under the project's first stage (1993 to 1994), 300 family houses received gas In the second stage (1995 to 1996), gas was introduced to 325 family houses and 10 buildings, including a nursery school, a town district office building a church, a pub, grocery shops, and greenhouses In the third stage (1997 to 1998) gas was introduced to approximately 275 family houses In total the project supplied 900 family houses and 10 buildings with gas heat, or more than 80 percent of heated buildings in the community

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**SVINOV CONVERSION FROM COAL TO NATURAL GAS**

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**Key Elements of EAPS Assistance**

- Provided expert opinion on environmental impact
- Assisted in assembling documentation and packaging application for the SFZP
- Facilitated negotiations with the SFZP

**Status**                      Part A of the project was approved by the SFZP. Construction was completed by fall 1996. Part B was rejected because of changes in SFZP rules.

**Financing**                Part A: 20 percent municipal, 80 percent SFZP (half loan, half grant)

**Leveraging ratio**        144.6 (total project cost \$256,000, EAPS cost \$1,770)

**Reduction in Pollutants in Tons/Year**

Emission	Status Before Implementation (t/y)	Status After Implementation (t/y)	Total Reduction (t/y)
Solid substances	7 646	0 005	7 641
SO <sub>2</sub>	3 718	0 001	3 717
NO <sub>x</sub>	0 960	0 141	0 819
CO <sub>x</sub>	16 380	0 079	16 301
C <sub>x</sub> H <sub>y</sub>	3 640	0 031	3 609
Aldehydes	0 029	0	0 029

**Project Description**

In accordance with SFZP requirements, the project was divided in two parts. The project's first part involved converting fuel to natural gas in two schools, a fire brigade center, and a municipal maintenance center. The second part concerned converting fuel in 8 municipal apartment buildings with 46 apartments. These were Svinov's last municipal pollution sources.

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**ANNEX B**

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**YEAR 2 PROJECTS**

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## TANEX CO BOILER CONVERSION

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### Key Elements of EAPS Assistance

- Conducted survey and evaluation and recommended environmental improvements
- Conducted feasibility study including alternative solutions, technology suppliers analysis of investment and operational costs financial analysis of options, and recommendation on optimal alternative

**Status (at the end of July 1997)**      The tannery hired an engineering firm to design drawings and technical specifications for the alternative selected and is negotiating the terms of a loan agreement with a commercial bank

**Leveraging ratio**      49.8 (total project cost \$640,000 EAPS cost \$12,860)

### Reduction in Pollutants in Tons/Year

	PM	SO <sub>2</sub>
<b>Before</b>	22	92
<b>After Option 1</b>	1	90
<b>Option 2</b>	0.2	0.1

Option 1 cloth filter    option 2 change of fuel to natural gas

### Project Description

The Tanex leather factory, located approximately 400 meters from the historic center of the municipality of Litomerice in Northern Bohemia, significantly contributed to the town's poor air quality. Emissions from the factory's coal-burning boiler exceeded allowable air quality standards. The factory requested technical assistance from EAPS to determine the best method to bring total emissions into compliance with national air quality regulations. (The tannery could be shut down after 1998 if it does not comply with strict new emissions limits.)

EAPS experts conducted a detailed analysis of the composition and concentration of Tanex air emissions, evaluated alternatives to existing boiler operations, including retrofitting the boiler with emissions monitoring and control technologies and converting it to natural gas. In addition, EAPS prepared corporate credit and financial analyses required for loan applications to the SFZP and other potential investment sources.

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## DOLNÍ POUSTEVNA ENVIRONMENTAL ANALYSIS

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### Key Elements of EAPS Assistance

- Provided expert advice on air quality, assessed technical, economic, environmental, and legal aspects of potential alternatives
- Conducted feasibility study of central district heating system to design options for heat supply
- Developed financing alternatives for option chosen through the feasibility study
- Submitted application to EU-PHARE Black Triangle Programme for financial assistance

**Status (at the end of July 1997)**      Project is pending PHARE approval      Municipality is taking steps to implement the project

**Leveraging ratio**      112.4 (total project cost \$1,500,000, EAPS cost \$13,350)

### Reduction in Pollutants in Tons/Year

	PM	SO <sub>2</sub>	NO <sub>x</sub>	CO <sub>x</sub>
<b>Before</b>	85	96	12	21
<b>After Option A</b>	0.085	0.17	14.2	4.2
<b>Option B</b>	0.028	0.013	4.63	0.319
<b>Option C</b>	0.024	0.011	3.89	0.319
<b>Option D</b>	0.032	0.015	5.7	0.45
<b>Option E</b>	35	37	15.9	5.3

### Project Description

The municipality of Dolní Poustevna is situated in the Decín District in Northern Bohemia, along the Czech-German border. To meet the rigors of the region's cold climate, Dolní Poustevna's extensive but obsolete central heating system featured a steam boiler house fired by solid fuel-burning, low-quality brown coal. The heating system, which exceeded national emissions limits, had an added polluting effect because the central boiler was in the city's center. Boiler efficiency was low, the distribution system suffered from high losses, and the supplied heat was insufficient and low in quality. The system posed a threat both to the environment and to public health. The municipality sought EAPS assistance to design alternative heat supply options to reduce emissions.

EAPS analyzed the municipal district heating system's status and estimated future power demands, evaluating possible savings from updating heat generation, distribution, measurement, and regulation technologies. EAPS experts assessed locations for heat and electricity cogeneration efficiency for central heating distribution. They also compared the estimated emissions levels of proposed options.

EAPS specialists approached economic analysis from the point of view of both investors and the municipality. They based their analysis on economic parameters and criteria such as internal rate of return, investment pay-back period, and minimum reference unit price of heat. EAPS also carried out a sensitivity analysis incorporating prices for alternative fuels, equipment configurations, and demand levels.

The project developed an environmental improvement plan and facilitated investment preparation for municipal facilities to improve air quality.

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## HAVIŘOV ENVIRONMENTAL POLICY ASSESSMENT

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### Key Elements of EAPS Assistance

- Evaluated environmental policy
- Suggested improvements

### Project Description

The city of Haviřov, located in Northern Moravia, has a population of approximately 120,000. Haviřov had significant environmental problems in almost every sector: air and water pollution, waste management, soil protection, nature conservation, forest protection, and accidental hazardous contamination from industrial sources. Recognizing the severity of its problems, the city worked out a draft environmental policy that needed refining. EAPS was commissioned to evaluate the city's environmental condition and formulated recommendations on environmental policy.

After evaluating the city's environmental policy, EAPS recommended conducting a SWOT analysis to determine overall project goals. The SWOT analysis identified problems and shortages in each environmental sector and established priorities according to consequence and urgency. EAPS experts recommended developing recreational activities in the city such as bicycle paths, and sporting areas and involving the public through environmental education.

This activity improved Haviřov's environmental policy, which will lead to improvements in area air, water, soil, and nature. Additionally, Haviřov's environmental policy is a potential model for other municipalities.

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## JÍLOVÉ AIR QUALITY ASSESSMENT

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### Key Elements of EAPS Assistance

- Provided expert opinion on air quality, including assessing technical, economic, environmental, and legal aspects of alternatives

**Status (at the end of July 1997)**

Due to changes in legislation, the project has not been implemented

**Leveraging ratio**

271.8 (total project cost \$1,400,000, EAPS cost \$5,150)

### Reduction in Pollutants in Tons/Year

	PM	SO <sub>2</sub>	NO <sub>x</sub>
<b>Before</b>	10	37	17
<b>After Option A</b>	1	35	15
<b>Option B</b>	0	0	5

Option 1 cloth filter option 2 change of fuel to natural gas

### Project Description

The housing estate heating plant at Jilove, according to the Clean Air Act, was a major source of pollution, with a thermal output exceeding 5 MW. Average annual concentrations of sulphur dioxide at Jilove equaled or exceeded the country's emissions limit of 60 µg/m<sup>3</sup> and air quality was worsening. The town commissioned EAPS to provide expert advice on its housing estate heating plant.

EAPS established that the housing estate heating plant would have to bring its emissions to 150 mg/m<sup>3</sup> (fly ash) to comply with the Clean Air Act.

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## LUDGEŘOVICE CONVERSION OF HOME HEATING TO NATURAL GAS

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### Key Elements of EAPS Assistance

- Provided expert opinion on environmental impact
- Assisted in assembling documentation and packaging application for the SFZP
- Facilitated negotiations with the SFZP

**Status**                      Project was approved by the SFZP Construction was completed by fall 1996

**Financing**                62 percent municipal, 38 percent SFZP (grant)

**Leveraging ratio**        236.3 (total project cost \$579,000, EAPS cost \$2,450)

### Reduction in Pollutants in Tons/Year

Emission	Status Before Implementation (t/y)	Status After Implementation (t/y)	Total Reduction (t/y)
Solid substances	107 964	0 033	107 931
SO <sub>2</sub>	45 927	0 016	45 911
NO <sub>x</sub>	13 140	2 650	10 490
CO <sub>x</sub>	210 600	0 530	201 070
C <sub>x</sub> H <sub>y</sub>	44 800	0 212	44 588
Aldehydes	0 011	0	0 011

### Project Description

The project's goal was to reduce emissions in Ludgeřovice by replacing solid fuels such as coke, black coal, and black coal sludges with natural gas. The project introduced gas to 470 family houses and 3 small businesses. The entire municipality was then supplied with gas.

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## ROŽNOV SEWAGE SYSTEM CONSTRUCTION

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### Key Elements of EAPS Assistance

- Prepared study of sewage system for parts of Rožnov
- Participated in creating development strategy for project
- Identified suitable financial sources for implementing project

### Project Description

Rožnov's insufficient sewage system in two parts of the city—Tylovice and Hazovice—limited city development. Untreated sewage from Tylovice and Hazovice on the banks of the Hazuvka River polluted the river, detracted from the quality of the natural surroundings, and created a serious health risk. EAPS worked out two alternatives for constructing a sewage system. Two USAID programs—Municipal Finance Program and EAPS—cooperated in this effort.

**Leveraging ratio**      360.5 (total project cost \$3,533 million, EAPS cost \$9,800)

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**OPAVA HOME HEATING CONVERSION**

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**Key Elements of EAPS Assistance**

- Provided technical assistance to municipal staff to prepare SFZP finance application

**Financing**                    20 percent municipal, 30 percent SFZP grant, 50 percent Regional Gas Distribution Company

**Status**                        Project was submitted to the SFZP Because of the change in SFZP rules Opava was asked to rewrite its application

**Leveraging ratio**        322 (total project cost \$1,880,000, EAPS cost \$5,840)

**Reduction in Pollutants in Tons/Year**

Emission	Status Before Implementation (t/y)	Status After Implementation (t/y)	Total Reduction (t/y)
Solid substances	114 440	0 037	114 403
SO <sub>2</sub>	50 560	0 018	50 542
NO <sub>x</sub>	14 130	2 990	11 140
CO <sub>x</sub>	224 250	0 600	223 65
C <sub>x</sub> H <sub>y</sub>	49 830	0 240	49 590
Aldehydes	0 01	0	0 01

**Project Description**

The Opava home heating project involved converting a total of 1,135 houses and 2 schools from brown coal to natural gas in the neighborhoods of Vavrovice and Jaktar. Of the houses, 80 to 90 percent were connected to the city's gas network.

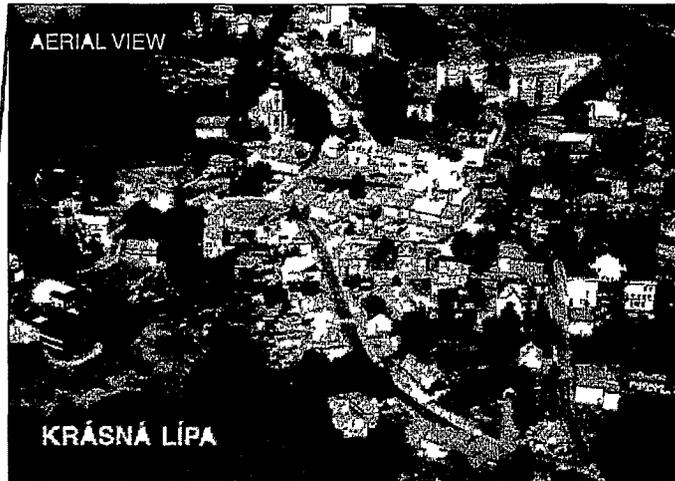
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**ANNEX C**

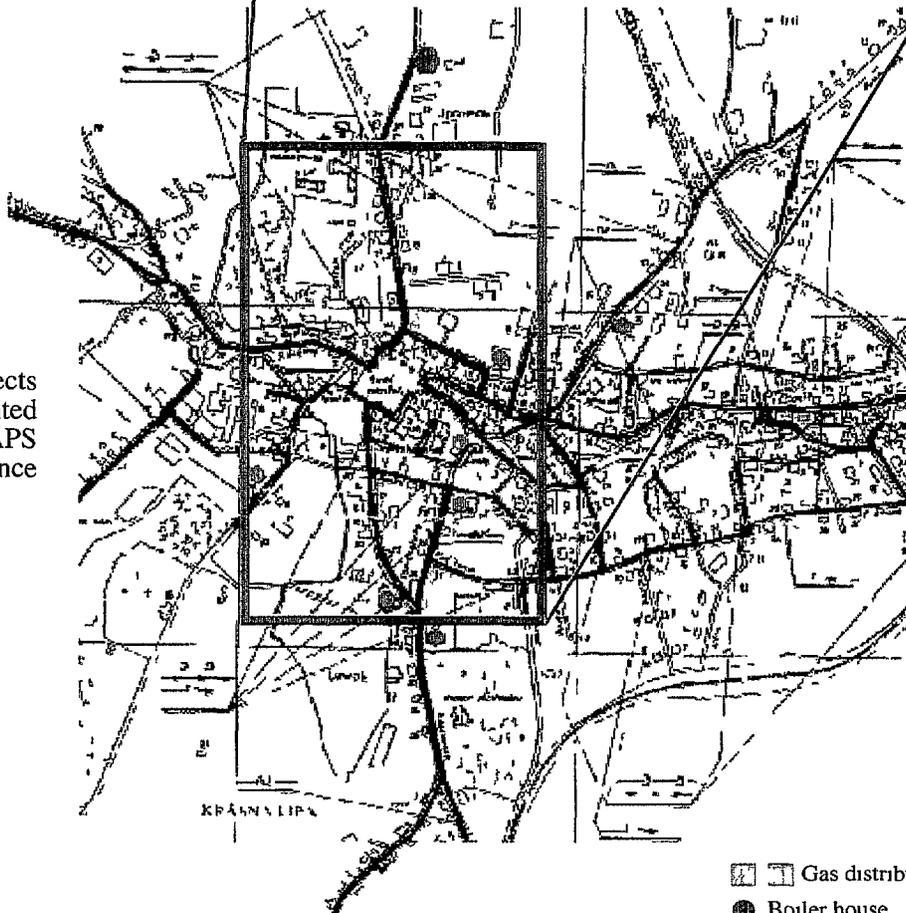
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**CASE STUDIES**

# Krásná Lípa Case Study: Effects of Monopoly Practices



Projects  
Implemented  
With EAPS  
Assistance



- □ Gas distribution system
- Boiler house
- Cogeneration plant

**KRASNA LIPA CASE STUDY DEVELOPING AND  
FINANCING A GAS-BASED SYSTEM**

With 3,400 inhabitants, the town of Krasna Lipa is located in the northernmost part of the country, at the border of the proposed national park Bohemian Switzerland. All of the town's industries, businesses, municipal facilities, and households burned low-quality brown coal. This, together with the fact most of the town is located at the bottom of a small valley, resulted in poor air quality. The city's economy has been declining since 1989 and its unemployment rate in 1995 of 7 percent was twice the national average of 3.5 percent.

**A Municipal Air Quality Plan**

After the Czech Republic's National Air Quality Program (NPOO) was launched, the town developed a municipal air quality plan, which inventoried local air pollution sources and described measures to lessen pollution. The plan's main thrust was to convert all boilers and stoves to natural gas, except in a few isolated locations, which would be electrified. To do this, a mid-pressure gas distribution system covering the entire town would be constructed and all boilers and stoves connected to the system.

**Municipal Air Quality Plan (in million Kč)—Original**

	Total Cost	Own Sources	SFZP Assistance		
			Total	Subsidy	Loan
Gas Distribution System	33	6.6	26.4	13.2	13.2
Conversion of Municipal Boilers	19.1	3.8	15.3	7.65	7.65
Household Conversion	45.2	21.2	24	24	0
Industrial Conversion	31.3	9.4	21.9	0	21.9
<b>Total</b>	<b>128.6</b>	<b>41</b>	<b>87.6</b>	<b>44.85</b>	<b>42.75</b>

In early 1995, the town applied for 88 million Kč in assistance from NPOO. In October 1995, the Ministry of Environment preselected Krasna Lipa to apply to the SFZP for up to 40 million Kč. First, however, the town had to revise the plan by reducing assistance to households, cutting all assistance to industries, and reducing the gas distribution system. Based on the updated plan, the cost was:

**Municipal Air Quality Plan (in million Kč)—Updated**

	Total Cost	Own Sources	SFZP Assistance		
			Total	Subsidy	Loan
Gas Distribution System	30	6	24	12	12
Conversion of Municipal Boilers	15	3	12	6	6
Household Conversion	12	8	4	4	0
<b>Total</b>	<b>57</b>	<b>17</b>	<b>40</b>	<b>22</b>	<b>18</b>

## B EAPS Assistance

The assistance to Krasna Lipa consisted of several elements

- Helping Krasna Lipa restructure its plan
- Contributing 75 percent of the design's cost to convert municipal facilities
- Packaging two applications to the SFZP
- Facilitating negotiations between the town and the SFZP
- Assessing the gas distribution system's value

EAPS experts reviewed the city's plan and made two principal suggestions, which were accepted by the municipality

- To reconstruct the largest plant as a cogeneration unit
- To design the plant heat distribution system to allow later expansion

EAPS provided \$17,000—75 percent of the total cost—to develop options for the plant. EAPS assistance was an important contribution to the municipality. The assistance also boosted EAPS credibility in Northern Bohemia.

EAPS experts prepared two applications to the SFZP for 40 million Kč.

The first application concerned construction of the city's gas distribution system. When completed, the new system had a total length of 11 km with 200 connections. Natural gas replaced the 7,000 tons of brown coal previously used each year in the area served. The system would connect 400 individual houses, 7 block flats, 20 small businesses, and 5 industrial enterprises to the gas line.

The second application involved conversion of 10 municipal boiler houses from brown coal to natural gas and construction of a gas-based cogeneration unit serving 7 block flats and a hospital. The boiler houses were connected to the gas distribution system described above.

### Final Structure of Financing (in million Kč )

	Cost	Own Resources	SFZP Assistance		
			Total	Grant	0% Loan
Application 1	30	6	24	12	12
Application 2	25	9	16	10	6
Total	55	15	40	22	18

Both packages were successfully submitted, funding received, and construction completed. The loans were negotiated and approved for a seven-year payback period, including a five-year grace period at no interest. After the SFZP received the applications, EAPS experts helped maintain effective communications between the town and SFZP officials. Both the distribution system and the boiler houses are now in operation.

The project's environmental benefits are shown in the table on the following page.

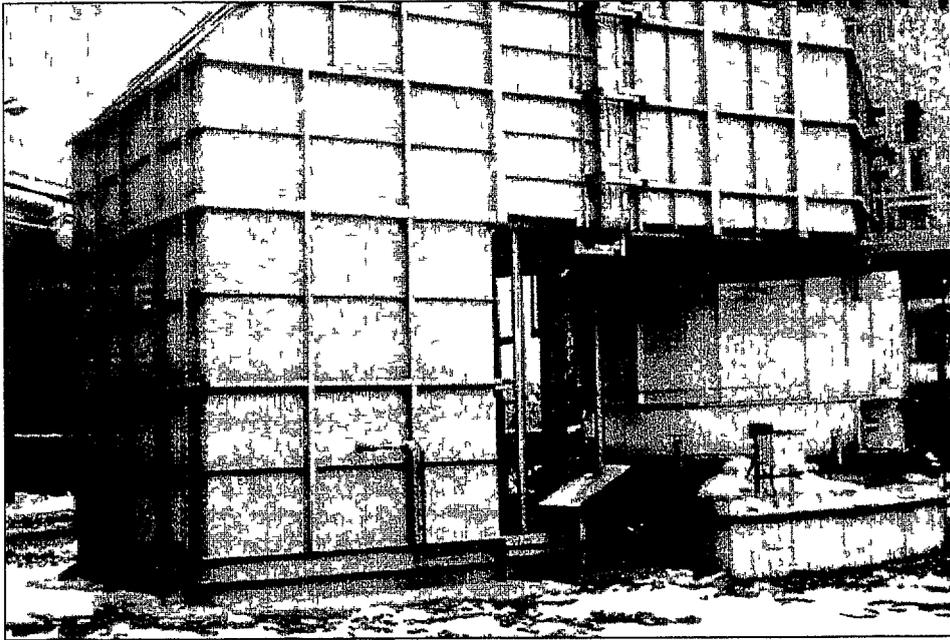
### Reduction in Pollutants in Tons/Year

	Particulates	SO <sub>2</sub>	NO <sub>x</sub>	CO <sub>x</sub>	C <sub>x</sub> H <sub>y</sub>
Before	51	72.8	21.3	319.4	71
After	0	0	4.7	0.8	0
Improvement	51	72.8	16.6	318.6	71

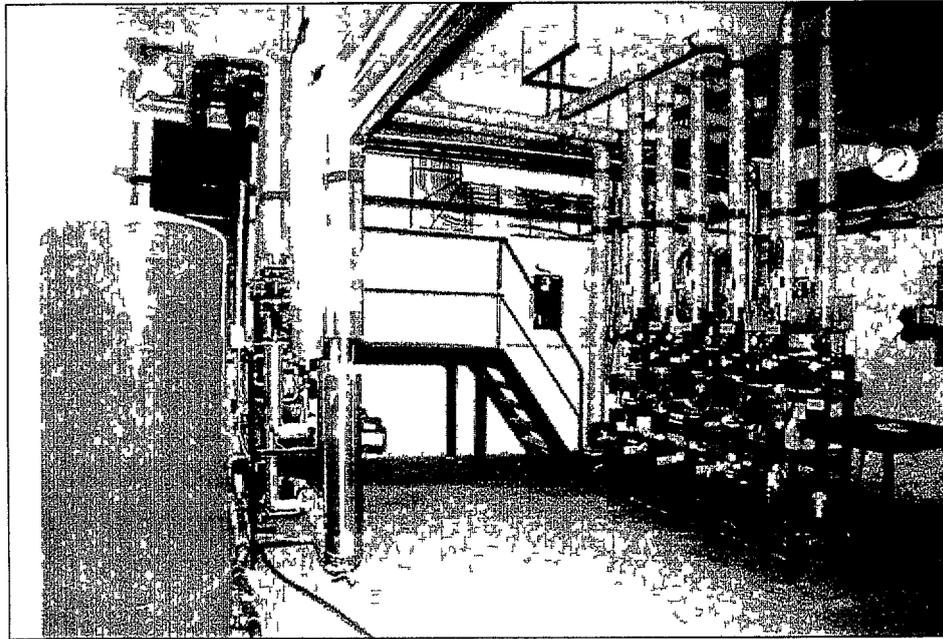
#### C Effect of Monopoly on Krásna Lupa

There are regional monopolies in gas supply and distribution system operation in the Czech Republic. In the case of Krasna Lupa, the North Bohemian Gas Utility serves the city. The utility was required to approve Krasna Lupa's application to the SFZP before submission and certify that it would supply gas to the system. While negotiating its approval, the utility asked to purchase the entire distribution system. It offered 70 percent of the system's total cost, with payment in advance. Because of the monopoly, the town was forced to accept the offer. The positive result of the sale was that it produced sufficient funds to finance the project without investing municipal funds. On the negative side, the town did not receive the full market value for the distribution system—about 63 million Kc, according to the model EAPS developed for assessing gas distribution system value.

## Vratimov Case Study: Using Waste Heat for the District Heating System



Heat exchanger in rolling mill, to extract waste heat to provide heating services to 32 percent of city population



Gas-burning distribution device installed in former coal boiler room in each city-owned apartment building

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## VRATIMOV CASE STUDY USING WASTE HEAT FOR A DISTRICT HEATING SYSTEM

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Vratimov, with a population of approximately 6,800, is located in the northeastern part of the Czech Republic, near the Ostrava industrial sites. Nearby industry adversely affected air quality and residents' health. The town's air pollution problems were aggravated by emissions from 16 coal-burning block boiler plants that provided heating for the 5,700 inhabitants of Vratimov's central district. Emissions from obsolete solid fuel-based heating plants with low chimneys also adversely affected residents' health and the environment.

As in many Eastern European countries, the Vratimov steel mill (Nova Hut) faced possible downsizing and a reduction in capacity. But there was a possibility that waste heat taken from the rolling mill and directed through a heating plant could provide an alternative heating source for the town. As waste heat pricing is not directly linked to interest rates or coal prices, a long-term fixed-pricing strategy would not be risky. Such a strategy was created for the city/factory district heating joint venture, called Teplo-Vratimov.

### **A Technical Solution**

The project's aim was to reduce polluting emissions in Vratimov by eliminating 15 block boiler plants and 1 industrial boiler plant, which also supplied heat to flats. When the project was completed, a single block boiler plant was left in the city, which was converted to gas fuel. Thermal energy for the system was provided by extracting waste heat from the rolling mill furnaces at Nova Hut steel mill. Two furnaces connected to the system ensured continual service. Energy needs during peak consumption periods required additional energy from the power station at the Nova Hut facility.

Project planners expected that waste heat from the rolling mill would produce approximately 70 to 80 percent of the heat required, the power plant would generate the remaining 20 to 30 percent. It was forecast that eliminating the boilers would reduce particulate emissions by approximately 106 tons/year, sulphur dioxide (SO<sub>2</sub>) by about 178 tons/year, and carbon oxides (CO<sub>x</sub>) by approximately 316 tons/year.

Heat transfer (exchange) stations were installed and connected to the secondary central heating and hot water distribution system in buildings. Heat exchange stations were equipped with modern computer control systems. The transfer stations received hot water from a new supply line in Nova Hut Ostrava-Kunčice.

The total cost of the project was estimated at 80 million Kc (\$3 million).

Construction started in September 1995 and concluded on schedule in September 1996. The new distribution system was in operation during the heating season of 1996-1997 and citizens expressed satisfaction with the service to the City Council. The system supplied schools, nursery schools, health facilities, cultural facilities, shops, and offices as well as 612 city-owned apartments with approximately 1,840 inhabitants, 32 percent of the city's total population.

## **B Establishment of the Teplo-Vratimov Joint Venture**

The Teplo-Vratimov joint venture was established to implement and operate the new district heating system. The joint venture company was set up through equal investments by Nova Hut and the city totaling 120,000 Kc (\$4,000).

The Teplo-Vratimov joint venture purchases, distributes, and resells heat to residential, commercial, and industrial, and other sectors in Vratimov. Its mission is to

- Serve customers in a safe and reliable manner
- Provide heat at reasonable prices
- Expand service only when cost-effective to do so

## **C Financing**

The project was financed from two sources: the U.S. Housing Guarantee Fund (MUFIS), a revolving fund for developing municipal infrastructure, and the SFZP. The city applied for a loan from MUFIS, providing the Nova Hut steel mill as collateral. The SFZP financed part of the interest on the MUFIS loan. The final structure of the financing was

<b>Financial Institution</b>	<b>Amount of Loan</b>	<b>Conditions</b>
U.S. Housing Guarantee Fund (MUFIS)	\$3 million	Period of repayment 15 years Interest rate 11.5% Collateral Nova Hut
SFZP	Subsidy	Covered 5 percent of interest rate for 5 years
<b>Total Cost</b>	<b>\$3 million</b>	

## **D EAPS Assistance**

To secure financing to implement the Vratimov project, EAPS prepared the following materials, analyses, and activities:

- Business plan for Teplo-Vratimov, including setting the optimal price of heat
- Economic and financial assessment
- Environmental assessment
- Brief outline of regulations related to district heating
- Legal assistance to establish the Teplo-Vratimov joint venture
- Assistance filing an application with the SFZP
- Assistance during negotiations with the SFZP

## **E Summary of Case Study**

The Vratimov project had a number of noteworthy aspects, including

- Waste heat, an economical and ecologically sound heating method and a new technical approach
- Multiple-source financing
- Positive impact on an entire city
- Public/private partnership involving the cooperation of municipality, industry and financial institutions
- Project's status as a pilot for future efforts
- Increased public environmental awareness, supporting demand side management

This project's implementation stimulated the interest of other municipalities and private entities in developing public/private partnerships for environmental projects

**ANNEX D**

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**SFZP FINANCIAL OVERVIEW FROM ANNUAL REPORTS**

## SFZP FINANCIAL OVERVIEW

The figures in the table below describing the SFZP's financial status come from the organization's annual report

### Financial Status

Kč in millions	1992	1993	1994	1995	1996
Fees/Fines	2 422 5	2 727 4	3 287 6	3 042 5	2,837 3
Loan Repayments	0	40 2	201 5	317 0	516 9
Air Program National Property Fund	0	0	1 000 0	1 600 0	2 000 0 <sup>1</sup>
Total Revenue	2 422 5	2 767 6	4 489 1	4 959 5	5 354 2 <sup>2</sup>
Grant/Loan Ratio	94% grant 6% loan	71% grant 29% loan	59% grant 41% loan	52% grant 48% loan	56% grant 44% loan
Outstanding Loan Balance	not available	not available	not available	not available	5 664 <sup>3</sup>

\$1 USD = 28 Kc (Czech crowns) at the end of 1996

### SFZP Revenues by Sector

Kč in millions	Revenues by Source/Sector 1996
Water	613
Air (Including APP)	3 320
Waste	274
Soil	441
Interest on Loans/Deposits	190
Loan Repayments	517

<sup>1</sup> Final installment of the Kč 6 1 billion transfer from the National Property Fund was made in March 1997

<sup>2</sup> In 1996 the SFZP received 955 applications requesting total financing of Kč 12,101 billion. By the end of 1996 604 were in process 65 had signed support agreements, 154 had been approved for support agreements 65 rejected 64 had an "unclear status," and 3 were returned. All pending applications were returned for resubmission under newly established criteria after the end of 1996

<sup>3</sup> Of the Kc 5663 7 in outstanding loans, Kc 101 6 (1 8 percent) was past due according to a Czech accounting firm. This firm did not perform a standard audit. It should be noted that the SFZP often gives grace periods to past-due loans, considering them current. But the number and amount of such loans was not reported by the SFZP or its accounting firm

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