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Report No: 19802

**IMPLEMENTATION COMPLETION REPORT
(LOAN 34740; 3474A; 3474S)**

ON A

LOAN

IN THE AMOUNT OF US\$260 MILLION

TO THE

CZECH POWER COMPANY - ČEZ

FOR A POWER AND ENVIRONMENTAL IMPROVEMENT PROJECT

February 25, 2000

**Energy Sector Unit
Europe and Central Asia Region**

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CURRENCY EQUIVALENTS

(Exchange Rate Effective October 1999)

Currency Unit = Czech Crown (Korun = Kc)

1 Kc= US\$ 0.03

US\$ 1 = Kc33.00

FISCAL YEAR

January 1 - December 31

ABBREVIATIONS AND ACRONYMS

BCM	Billion Cubic Meters
CEZ	Ceske Energeticke Zavody (Czech Power Enterprise)
CENTREL	Central European Power Grid
CHP	Combined Heat and Power plant
CZ	Czech Republic
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
ESP	Electrostatic Precipitators
EU	European Union
FGD	Flue Gas Desulfurization
HV	High Voltage
ICB	International Competitive Bidding
LRMC	Long-Run Marginal Cost
MW	Megawatt
Nm ³	Normal Cubic Meter
NO _x	Nitrogen Oxides
PJ	Petajoule
SAL	Structural Adjustment Loan
SAR	Staff Appraisal Report
SO ₂	Sulfur Dioxide
TOE	Tons of Oil Equivalent

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**CZECH REPUBLIC
POWER AND ENVIRONMENTAL IMPROVEMENT PROJECT**

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<i>Project ID:</i> P008381	<i>Project Name:</i> Power and Environmental Improvement Project
<i>Team Leader:</i> Istvan Dobozi	<i>TL Unit:</i> ECSEG
<i>ICR Type:</i> Core ICR	<i>Report Date:</i> January 14, 2000

1. Project Data

Name: Power and Environmental Improvement Project *L/C Number:* 34740; 3474A; 3474S
Country/Department: CZECH REPUBLIC *Region:* Europe and Central Asia Region
Sector/subsector: PD - Distribution & Transmission

KEY DATES

<i>PCD:</i> 12/20/90	<i>Effective:</i> 08/26/92	<i>Original</i>	<i>Revised/Actual</i>
<i>Appraisal:</i> 10/30/91	<i>MTR:</i>		11/20/92
<i>Approval:</i> 05/26/92	<i>Closing:</i> 06/30/97		06/30/99

Borrower/Implementing Agency: CESKE ENERGETICKE ZAVODY (CEZ) / CEZ AND SEP
Other Partners: None

STAFF	Current	At Appraisal
<i>Vice President:</i>	Johannes F. Linn	Wilfried Thalwitz
<i>Country Manager:</i>	Roger Grawe	Kemal Dervis
<i>Sector Manager:</i>	Henk Busz	Bernard Montfort
<i>Team Leader at ICR:</i>	Istvan Dobozi	Dale Gray
<i>ICR Primary Author:</i>	Julius Wilberg	

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: SU
Impact:
Bank Performance: S
Borrower Performance: S

Quality at Entry: QAG (if available) ICR
S
Project at Risk at Any Time: Yes

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

3.1 Original Objective:

The objectives of the project, as stated in the Staff Appraisal Report (SAR), were to: (i) improve power plant efficiency; (ii) reduce air pollution in northern Bohemia and thereby improve the environment and health of the local population; (iii) modernize the transmission system; and (iv) facilitate interconnection of the Ceske Energeticke Zavody (CEZ) and German power grids. These objectives were to be accomplished in the context of overall reform of the energy sector. To this end, the project would: (i) reduce total consumption of pollution-causing lignite through power plant efficiency improvements; (ii) curtail power plant SO₂ emissions by means of flue gas desulfurization; (iii) reduce dust and fly-ash pollution from power plants; (iv) increase the reliability, efficiency and economy of the CEZ transmission system; and (v) assist in improving investment planning and corporate management of CEZ.

The objectives were clearly defined and consistent with the country's strategy for abating air pollution from coal-fired power plants and for modernizing and adapting the Czech power system to the requirements - mainly technical and environmental - of the Western European electricity grid (UCPTE), as a major step towards the country's future accession to the European Union (EU). The project and its objectives were also in line with the Bank's previous work in then Czechoslovakia: the Country Economic Memorandum (CEM) of August 1990, the SAL (signed in 1990), the Energy Sector Review (Report No. 9768-CS) and the Joint Environment Survey (Report No. 9623-CS). The Bank never prepared a CAS for the country, probably because of the small number of projects. The project objectives were also realistic in scope, but somewhat optimistic regarding the implementation schedule.

The borrower and beneficiary of the loan was CEZ, a former state-owned enterprise that was transformed into a joint-stock company in 1992. CEZ at appraisal time was responsible for about 85% of power generation in the country as well as for high voltage (HV) transmission. At that time, the company was still under the stress of internal reorganization, following the transition from state-owned to corporate status.

There were no unusual complexities involved with the project. There was a single implementing agency and the range of policy and institutional improvements was moderate and compatible with CEZ's competence. However, the size and timing of the project, and the fact that CEZ was a first-time Bank borrower, posed a challenge to the company's management. The issues encountered were mainly: (i) the company's lack of experience with ICB, particularly the two-stage bidding process used for the FGD component, and its general lack of familiarity with the Bank's procurement rules; and (ii) the lack of clear definition for the efficiency improvement components at the start of the project.

3.2 Revised Objective:

The original objectives were maintained at all times; and there was no need to revise them.

3.3 Original Components:

The original components of the project as per SAR included: (i) installation of equipment and operational improvements at Prunerov II power station and other large CEZ power plants to reduce lignite consumption; (ii) installation of flue gas desulfurization (FGD) equipment at Prunerov II; (iii) installation of electrostatic precipitators at the worst polluting CEZ power plants; (iv) modernization of five 400 kV substations and construction of a short 400 kV transmission line; and (v) consulting services and staff training. The project locations are shown in Maps IBRD 30579 and 30580 (attached).

The components were reasonably well designed to achieve the objectives of the project and the borrower's administrative and financial management capacity was taken into account. The country had no previous experience with Bank-financed power projects.

3.4 Revised Components:

The original description of the components was not revised. However, the original allocation of the loan funds by component (but not by category) was reviewed with the Bank in 1994 and 1995 and subsequently modified in order to strengthen the scope of the efficiency improvement and pollution control components. The reallocation of funds was approved by the Bank, taking into account the considerable savings gained in the procurement of the FGD component through intense ICB (see para. 5.4). In spite of the reallocation, the final project cost remained below the original estimate. Hence, the remaining cost savings were canceled.

The original and reallocated amounts by component are shown below (in US\$ million):

	<u>Original</u>	<u>Reallocated</u>
Efficiency Improvement	\$ 33.7	\$ 80.8
Pollution Control	173.5	95.7
Transmission	30.4	27.1
Training	8.4	6.2
Cancellation		36.2
Total Loan	\$246.0	\$246.0

3.5 Quality at Entry:

There was no Quality Assurance Group review conducted for this project. At appraisal, the technical and economic preparation of the various project components was assessed to a satisfactory degree. However, not all components were at the same level of readiness. For example, preparation of the efficiency improvement component was deficient, and its scope had to be revised several times during project implementation. On the other hand, the main component, the FGD equipment, was well prepared, and bidding documents were mostly completed during project preparation, although during bid evaluation the initial cost estimates proved too high. Therefore, the ICR rates the quality at entry as "satisfactory".

4. Achievement of Objective and Outputs

4.1 Outcome/achievement of objective:

The project's outcome was *Satisfactory* (S) for all objectives. The project achieved to a satisfactory degree all its relevant physical and institutional development objectives, in particular, those related to the Bank's current environmental goals. No macroeconomic or sector policy objectives were included in the project, which were addressed by the earlier SAL operation instead. Achievement of the environmental objectives is discussed in more detail in Annex 8.

4.2 Outputs by components:

Achievement of all components was *Satisfactory* (S). The design of the project was generally appropriate for achieving the institutional and environmental objectives. There were no performance indicators specified in the SAR, only equipment performance targets. Outputs by component are discussed below.

(a) *Efficiency Improvement.* Reliability and efficiency improvements at seven major power stations, namely, Prunerov II, Detmarovice, Chvaletice, Pocerady, Tusimice, Ledvice and Melnik, were successfully completed during 1994-1998. The improvement in power station reliability cannot be easily quantified, but CEZ reports a decrease in forced generation outages.

The table below shows the decreasing trend in fuel consumption achieved through the boiler efficiency improvement component. For similar boiler loads, the reduction in fuel consumption between 1993 and 1998 resulted in the saving of about 1.4 million tons of coal per year.

Year	Boiler Load (PJ/year)	Fuel Consumption (million tons of coal/year)
1993	311	31.1
1994	293	28.3
1995	305	30.6
1996	312	29.9
1997	316	30.6
1998	307	29.7

The reduction in fuel consumption obviously means less emission of pollutants. The improvement in thermal efficiency allowed the plants to maintain their specific energy consumption at fairly stable levels in spite of the additional energy consumption required by the FGD equipment (see table below):

Specific Energy Consumption (kJ/kWh)

	1993	1994	1995	1996	1997	1998
Net	11,317	11,201	11,164	11,191	11,259	11,202
Gross	10,491	10,403	10,378	10,305	10,301	10,210

(b) *Pollution Component.* A major part of the project was the installation of FGD units at the 5 x 210 MW Prunerov II power station. The FGD units consistently met their guaranteed performance. The decreasing trend of emissions is shown in the table below:

Year	Boiler Load (PJ/year)	Dust Emission (tons/year)	SO ₂ Emission (tons/year)	NO _x (tons/year)
1993	47.7	3,646	146,569	22,849
1994	49.1	1,132	166,055	14,798
1995	39.2	813	131,790	10,404
1996	52.0	1,391	90,173	12,796
1997	47.6	1,443	11,010	11,505
1998	46.7	1,203	10,758	10,163

Other pollution control measures, such as the reconstruction of electrostatic precipitators for dust collection were also completed successfully during 1993-1998 in power stations Prunerov II, Chvaletice and Pocerady, CEZ's worst polluting power plants.

(c) *Transmission.* Under the project, CEZ upgraded ten 400-kV substations, namely, Cechy stred., Sokolnice, Bezdecin, Prestice Stage 1, Prestice Stage 2, Tabor, Vitkov, Malesice, Tilin and Chodov, and built the 400-kV Chrast -Temelin transmission line. Completion of this part of the project enhanced system reliability and contributed to the successful synchronous parallel operation of the CENTREL interconnected system with UCPTE, the Western European grid, starting in October 1997. CENTREL is

the association of electric utilities of the Czech Republic, Poland, Hungary and the Slovak Republic.

(d) *Training.* Consulting and Training activities supported by the project provided effective assistance in Least Cost Development Planning and Nuclear Plant Safety Assessment. In addition, they helped CEZ design and install a state-of-the-art Accounting and Financial Management Information System (AFMIS). CEZ's thus enhanced corporate financial management tools enabled it to access the international bond markets starting in 1994, ahead of any other electric utility in Eastern Europe.

4.3 Net Present Value/Economic rate of return:

The net economic rate of return was recalculated on a time slice of CEZ's total investment program following the same approach as at appraisal (some small differences are listed in Annex 3). The benefits were taken as incremental sales of electricity valued at the actual weighted average sales price (as a measure of consumer willingness to pay), which is assumed to remain constant in real terms at the 1999 level. Since demand for electricity is not projected to return to the 1992 level before 2007, incremental sales were taken to be those sales that would be supplied from retrofitted plus new capacity up to 2006 (the same period as chosen at appraisal). The retrofitted capacity consists of all of CEZ's existing coal-fired generating capacity, which would have been prohibited from being operated without first being altered to meet the country's environmental standards. The costs were taken as CEZ's investment costs for retrofitting the coal plants plus the completion of the Temelin nuclear power station plus transmission investments during the implementation period of the project, and CEZ's fuel and other operation and maintenance expenses. Indirect taxes were excluded. Shadow prices were not used since, as at the time of appraisal, they were not considered to be significantly different from actual prices.

The recalculated rate of return was 6%, which is considerably below the appraisal estimate of 14%. The main reason for the difference is that electricity prices have fallen by nearly 40% in real terms since 1992, whereas they were assumed at the time of appraisal to remain at the end-1991 level in real terms. If electricity prices had remained constant, the recalculated rate of return would have been about 18%. There were several other developments affecting the rate of return, but they tended to offset each other. These include: (i) a failure of demand to return to the 1992 level before 2007, whereas at the time of appraisal it was assumed to grow by 36% over the same period; (ii) more generation eliminated by retirements and replaced by retrofitting than forecast at appraisal, so that incremental sales are shown to be higher in the new calculation; and (iii) the Temelin nuclear power station is not likely to begin operation until 2001, compared with 1995-1996 in the appraisal base case.

While the 6% rate of return is below the estimated opportunity cost of capital in the Czech Republic (12%), CEZ's investments were not necessarily uneconomic. The low estimated rate of return reflects the fact that actual prices are likely well below consumers' willingness to pay for electricity. In addition, the rate of return estimate takes no account of the substantial benefits from the environmental improvements attributable to the retrofitting investments.

4.4 Financial rate of return:

There was no FRR calculation for this project.

4.5 Institutional development impact:

The project enhanced CEZ capabilities in the following manner: (i) the installation of the AFMIS system and related training provided CEZ with a state-of-the-art tool to improve financial management and planning; and (ii) the interaction of CEZ staff with foreign specialists in Least-Cost Planning and Nuclear Safety Assessment provided for transfer of advanced technical know-how. In October 1998, the UCPTE General Conference accepted the CENTREL member companies as associate members. By satisfying the

operational conditions within the UCPTE interconnected network, CEZ took a major step in the process of integrating the Czech Republic into the EU institutional structure.

5. Major Factors Affecting Implementation and Outcome

5.1 Factors outside the control of government or implementing agency:

The only factor outside the government and CEZ's control that affected achievement of the project outcome and objectives/output was a lower than expected electricity consumption. This was mainly due to a slower than expected recovery of the Czech industry during the 1990s, not due to rising prices. This factor adversely affected the economic valuation of the project.

5.2 Factors generally subject to government control:

The development of a new regulatory system for energy utilities was reflected in a draft Federal Energy Policy Paper presented to the Bank in connection with the Structural Adjustment Loan operation in 1991. This policy paper also proposed that energy utilities, including CEZ, be restructured and partially privatized after the first phase of ownership reform and privatization of large industrial companies, planned for the first half of 1992. Surprisingly, however, CEZ was also included in the first phase and became a joint-stock company (with private sector minority participation) between September 1991 and April 1992. This acceleration of CEZ restructuring and privatization placed an additional burden on CEZ's management and delayed project implementation by slowing down the decision-making process. *Therefore, this factor, which was subject to government control, partially affected the implementation of the project.*

5.3 Factors generally subject to implementing agency control:

At the start of the project, CEZ could not yet define the scope of the efficiency improvement component. The number and size of the plants to be refurbished depended on the completion of plants under construction whose schedule for commissioning was highly uncertain. This uncertainty contributed to the two-year delay in project implementation. *Therefore, this factor partially affected the achievement of the project.*

5.4 Costs and financing:

The initial cost estimate for this project was US\$557.5 million, which included price and physical contingencies but excluded interest during construction. The final cost of the project was US\$397.6 million. The cost reduction was due to lower than expected price for the FGD equipment (US\$165.3 million against the initial estimate of US\$249.0 million), stiff competition under ICB procedures and favorable conditions in the equipment market.

The original financing plan provided for Bank funds to cover US\$246.0 million and the remaining US\$311.5 million equivalent to be contributed by CEZ. To decrease its exposure in certain currencies, CEZ decided in 1998 to convert the initial loan into two sub-loans, namely, a US dollar-denominated loan for the disbursed portion of the loan (US\$169.0 million) and a DEM-denominated loan for the non-disbursed portion (DEM135.0 million). In 1999, near the closing date of the loan, CEZ asked for cancellations of about US\$1.3 million and DEM76.5 million (totaling about US\$36.2 million equivalent), respectively. Therefore, the net utilization from these loans was only US\$167.9 million and DEM59.1 million (totaling about US\$209.8 million equivalent), respectively. Project cost estimates versus actual cost and a comparison of initial and final financing arrangements are in Annex 2.

Project implementation and disbursement delays were significant, adding up to about two years. The delays were caused by an unrealistic implementation schedule, which did not adequately take into account the government interference in CEZ's reorganization and partial privatization at the very start of project

implementation. This was compounded by incomplete project preparation for the efficiency improvement component (para 3.4).

6. Sustainability

6.1 Rationale for sustainability rating:

Project sustainability is *likely*. With the Czech Republic now firmly on the path towards EU membership, the Government is committed to complying with major energy sector-related requirements. This includes continued monitoring of pollution from power plants and their adequate operation and maintenance. In 1999, all of CEZ plants were generating environmentally clean energy based on the higher international standard.

On the policy side, the Energy Act of 1994 will be amended by a new Energy Policy Act, to be submitted to the Parliament shortly. This revised Energy Act would provide clear rules for the internal electricity market, including third party access, and an adequate regulatory framework in line with EU Directive No. 96/92/EC.

CEZ's current organization is adequate to assure the long-term economic, financial, technical and environmental viability of the project. The pollution control component had already considerable impact in Northern Bohemia, where the local population is now enjoying improved environmental and living conditions.

In spite of electricity prices being still under government control, the price level and adjustments over the last years have created an adequate financial situation for CEZ, with a net profit of Kc10.3 billion (US\$340 million) in 1997, 97% more than the previous year. Satisfactory financial performance under the present regulatory framework is likely to continue. The financial sustainability of the project is further supported by management's consistent usage of the AFMIS system, allowing for integrated financial planning and record keeping.

Improvements in investment planning and system simulation achieved through the consulting and training component of the project introduced state-of-the-art methods and procedures now regularly used by CEZ. It is highly probable that extensive use of these improvements will continue.

6.2 Transition arrangement to regular operations:

All project components are now fully operational. Appropriate technical provisions to ensure sustainable project operation are in place. This includes adequate staffing and management in operation and maintenance of all project components. Fuel supply to CEZ is based on long-term contracts. In 1999, CEZ bought a 36% stake in the North Bohemian Mining Company. Financial, economic and environmental policies required for continued operation and maintenance are also in place: the transfer price that CEZ charges to the distribution companies is regulated by the government to ensure CEZ's financial viability. In the near future, adequate electricity pricing will be ensured through the amended Energy Act (probable submission to Parliament in 2000), which provides for an independent regulation. As for continued implementation of environmental policies, CEZ's business plan emphasizes strict compliance with the Clean Air Act of 1991. As of January 1, 1999, all CEZ coal-fired plants met applicable emission limits. No performance indicators were included in the SAR. However, the Loan Agreement requires CEZ to continue submitting annual reports to the Bank on its progress in carrying out further reductions of pollutants from all coal-fired power plants. No follow-up project, nor further monitoring except for the above, are recommended.

7. Bank and Borrower Performance

Bank

7.1 Lending:

The Bank carried out project identification, preparation and appraisal in a comprehensive and satisfactory manner. During the *identification* phase, the Bank agreed with the government's strategy for the power sector, namely, the urgent need to decrease air pollution caused by coal-fired power plants. This was one of the basic objectives of the project. During project *preparation*, the Bank provided adequate and timely assistance to the Borrower. Of particular value were: (i) the recommendation for a diagnostic study to strengthen CEZ's financial management capability; (ii) the recommendation to prepare a plan for identifying, monitoring and abating pollution caused by CEZ's power plants; (iii) the recommendation to prepare a long-term, least-cost investment program for the power sector; (iv) a procurement seminar in Prague to familiarize the Borrower with the Bank's procurement standards and guidelines; and (v) the selection of appropriate FGD technology based on economic and efficiency criteria.

During project *appraisal*, the Bank followed up on the issues identified during preparation and paid adequate attention to technical, financial, economic, commercial, institutional and environmental aspects. As for the Borrower's capacity in procurement and finance, the appraisal was realistic on the financial management, but too optimistic on the procurement side, since it did not take adequately into account the Borrower's lack of experience in complex international bidding procedures. The project design was adequate, but the actual FGD cost proved to be much lower than estimated (para 5.4). The project appraisal identified two basic risks, namely: (i) deterioration of CEZ's financial condition; and (ii) implementation delay due to CEZ being a first-time Bank borrower. The concern about implementation delay was warranted, but the apprehension about company's finances proved to be unjustified. The financial covenants of the loan were adequately designed.

As for the project *implementation* schedule, it proved to be too optimistic in some aspects. While the FGD component was adequately timed, the same does not apply to the energy efficiency components where the bidding process took longer than projected. The same Bank team was used for identification, preparation and appraisal of the project, which resulted in consistent recommendations to the Borrower regarding the execution of the physical and institutional components.

7.2 Supervision:

The Bank's supervision performance was *satisfactory*. During the first years of implementation the identification/appraisal team was maintained to ensure continuity of dialogue and follow-up of agreed implementation issues. In 1996, with project implementation firmly established, a smaller team was put in charge up to the closing date of June 30, 1999. Timing of supervision missions was generally adequate and the duration of the missions was well planned. Project implementation progress was regularly reported throughout the life of the project which was made possible by timely and regular Progress Reports provided by the Borrower, in addition to regular supervision missions. The most important implementation issue was procurement, which was identified in early 1993 and immediately addressed. After a series of seminars and special meetings with Czech participants on Bank procurement rules and standard procurement documents, the problem was solved, and project implementation progressed smoothly. The performance ratings given in the PSR/Form 590 were realistic, and the supervision missions paid close attention to the development objectives. The loan covenants were enforced continuously, and besides some initial delays in report deliveries and minor deviations from covenanted financial targets, the Borrower was in compliance throughout project implementation. The financial covenants of the Loan Agreement proved to be instrumental for CEZ to obtain adequate bulk rate increases from the government whenever the covenant compliance was at risk and the financial situation justified such increases. Project

implementation involved no deviations from Bank policies and procedures and only normal reallocation of resources from one component to another took place. For example, the cost savings in the Prunerov FGD component were reallocated to other power plant and transmission system improvements that met the overall project objectives.

7.3 Overall Bank performance:

The Bank planned and implemented this project carefully and with success as to the intended objectives. Relations with the Borrower and the Guarantor were always good and productive. All problems were addressed and jointly solved in a professional way. Therefore, the overall performance of the Bank in this project is considered to have been *satisfactory*.

Borrower

7.4 Preparation:

CEZ prepared the project efficiently. The company staff was active in assisting the Bank missions in the overall design and providing relevant input on technical, financial, economic, environmental and institutional aspects. Moreover, CEZ demonstrated full commitment to the project from its inception. As one of the largest Czech companies, it was well prepared to handle a project of this size and complexity. The company had the operating and managerial experience necessary to manage a large power system and its expansion and modernization. Its performance is considered *satisfactory*.

7.5 Government implementation performance:

The Government, as the Guarantor, was fully committed to the project. The improvement of air quality in the Northern Bohemia region - the infamous "Black Triangle" - was (and still is) a declared priority of the Czech government, and the project was recognized as a decisive factor in the reduction of air pollution from coal-fired power plants. During implementation, government interference in the project was minimal. As Guarantor, the government was required to take all measures to enable CEZ to carry out the project and to comply with the loan covenants. The main area where direct government action was required was in the timely granting of increases in the transfer price of electricity from CEZ to the power distribution companies. This was generally achieved, and therefore the government implementation performance is deemed to be *satisfactory*.

7.6 Implementing Agency:

During implementation from 1993 to 1999, CEZ allocated sufficient human resources to the project, with a Project Manager in charge of each of the main components, procurement and technical aspects. Financial and disbursement matters were centralized in CEZ's financial department in an efficient way. This department was also in charge of preparing the quarterly progress reports, which were of sufficient detail and good quality to allow periodic evaluation of the project. They were sent to the Bank on time. CEZ also complied with the timely preparation of the studies associated with the project: (i) the final report of the "Least-Cost Investment Program 1993-2003" was prepared in 1993; (ii) the "Annual Investment Program" was prepared and updated every year; (iii) the "Action Plan to Reduce Emissions in Northern Bohemia" was prepared and updated periodically; and (iv) the diagnostic study to recommend measures to strengthen the Company's financial management capability was prepared by external consultants and its recommendations were implemented in 1993 and 1994.

The only area of initial client weakness was procurement, especially international competitive bidding. As a result of inadequate procurement capacity, project implementation was delayed and an extension of the closing date was granted from June 30, 1997 to June 30, 1999. The financial management of the Company (and of the project) improved through the AFMIS implementation under the loan. Financial statements and audit reports from external and independent auditors were received on time. The technical management in

CEZ was adequate and consultants were employed effectively.

7.7 Overall Borrower performance:

The professional approach and commitment from the Borrower's side contributed greatly to the success of the project. Taking the above considerations on CEZ into account and with the caveat on the initial procurement weakness, the overall performance of the borrower should be rated as *satisfactory*.

8. Lessons Learned

The key lessons learned from this project are:

- Developing the project and setting its objectives within a macroeconomic and policy framework based on a previous SAL operation and related sector studies was a positive factor for its success.
- Obtaining full commitment right from the start of preparation, from both the government and the Borrower, proved to be instrumental in efficient project appraisal and implementation.
- The setting of realistic objectives, in line with the country's strategy, sector priorities and being consistent with the Borrower's managerial capacity was an important element in the satisfactory project outcome.
- The appraisal of the project should possibly have been postponed until:
 - (a) completion of the power sector's reorganization; and
 - (b) all project components had been fully defined.
- The required strengthening of the Borrower's financial management proved to be valuable in preparing the Borrower to access the international capital markets successfully and to obtain additional resources for its investment program without the need for further government guarantees.
- Frequent and consistent supervision by the same Bank team, particularly of procurement, contributed to the project success.

9. Partner Comments

(a) Borrower/implementing agency:

See Annex 9 for the Borrower's comments on the project.

(b) Cofinanciers:

There were no cofinanciers.

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

There were no other partners in this project.

10. Additional Information

There is no additional information.

Annex 1. Key Performance Indicators/Log Frame Matrix

Outcome / Impact Indicators:

Indicator/Matrix	Projected in last PSR	Actual/Latest Estimate
EFFICIENCY IMPROVEMENT	HS	S
REDUCE AIR POLLUTION	HS	HS
TRANSMISSION LINES	HS	HS
TRAINING & CONSULTANTS	HS	HS

Output indicators:

Indicator/Matrix	Projected in last PSR	Actual/Latest Estimate
COUNTERPART FUNDS	HS	HS
PROJECT MANAGEMENT	HS	HS
PROCUREMENT	HS	S
ENVIRONMENT	HS	HS
FINANCIAL COVENANTS	HS	HS
OTHER LEGAL COVENANTS	S	HS

¹ End of project

Annex 2. Project Costs and Financing

Project Cost by Component (in US\$ million equivalent)

Project Cost By Component	Appraisal Estimate	Actual/Latest Estimate	Percentage of Appraisal
	US\$ million	US\$ million	
Efficiency Improvement	81.00	123.60	153
Pollution Control	309.00	205.10	66
Transmission	41.20	62.70	152
Training and Consultancy	14.70	6.20	42
Total Baseline Cost	445.90	397.60	
Physical Contingencies	44.60	0.00	0
Price Contingencies	67.00	0.00	0
Total Project Costs	557.50	397.60	
Interest during construction	80.60	34.90	43.00
Total Financing Required	638.10	432.50	

Project Costs by Procurement Arrangements (Appraisal Estimate) (US\$ million equivalent)

Expenditure Category	ICB	Procurement Method ¹		N.B.F.	Total Cost
		NCB	Other ²		
1. Works	311.30	0.00	0.00	0.00	311.30
	(139.80)	(0.00)	(0.00)	(0.00)	(139.80)
2. Goods	202.70	0.00	25.00	0.00	227.70
	(85.30)	(0.00)	(12.50)	(0.00)	(97.80)
3. Services	0.00	0.00	18.50	0.00	18.50
	(0.00)	(0.00)	(8.40)	(0.00)	(8.40)
Total	514.00	0.00	43.50	0.00	557.50
	(225.10)	(0.00)	(20.90)	(0.00)	(246.00)

Project Costs by Procurement Arrangements (Actual/Latest Estimate) (US\$ million equivalent)

Expenditure Category	Procurement Method			N.B.F.	Total Cost
	ICB	NCB	Other ²		
1. Works	171.90 (69.50)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	171.90 (69.50)
2. Goods	96.20 (96.20)	0.00 (0.00)	44.60 (37.90)	78.70 (0.00)	219.50 (134.10)
3. Services	0.00 (0.00)	0.00 (0.00)	6.20 (6.20)	0.00 (0.00)	6.20 (6.20)
Total	268.10 (165.70)	0.00 (0.00)	50.80 (44.10)	78.70 (0.00)	397.60 (209.80)

^{1/} Figures in parenthesis are the amounts to be financed by the Bank Loan. All costs include contingencies

^{2/} Includes civil works and goods to be procured through national shopping, consulting services, services of contracted staff of the project management office, training, technical assistance services, and incremental operating costs related to (i) managing the project, and (ii) re-lending project funds to local government units.

Project Financing by Component (in US\$ million equivalent)

Component	Appraisal Estimate			Actual/Latest Estimate			Percentage of Appraisal		
	Bank	Govt.	CoF.	Bank	Govt.	CoF.	Bank	Govt.	CoF.
Efficiency Improvement	33.70	67.60	0.00	80.80	42.70	0.00	239.8	63.2	0.0
Pollution Control	173.50	212.80	0.00	95.70	109.40	0.00	55.2	51.4	0.0
Transmission System	30.40	21.00	0.00	27.10	35.70	0.00	89.1	170.0	0.0
Training & Consulting	8.40	10.10	0.00	6.20	0.00	0.00	73.8	0.0	0.0

Annex 3: Economic Costs and Benefits

Present Value of Flows

	Appraisal	Latest Estimates
Benefits	156.7 billion Kc	85.2 billion Kc
Costs	119.3 billion Kc	121.0 billion Kc
Net Benefits	37.4 billion Kc	-35.8 billion Kc
IRR	14%	6%

Notes:

1. The present value calculations use a discount rate of 12%.
2. Financial rates of return were not calculated at appraisal or for the ICR.
3. The present value calculations for the analysis done at appraisal are not be comparable with the latest estimates for the following reasons:
 - The appraisal estimates included some costs and benefits for generating companies outside CEZ as well as distribution companies, also outside CEZ, and heat-only boilers, also currently outside CEZ. The latest estimates are for CEZ only. This approach is considered as sufficient for re-estimating the EIRR of the investment program of which the project formed a part. Any changes to the EIRR that would result from including the costs and benefits of power sector activities outside CEZ would be unrelated to the project itself.
 - The appraisal estimates of operating and maintenance costs included only the costs of operating plants which met incremental demand after 1998 (when demand was estimated to return to the 1990 level) plus plants which replaced retired plants, and included a benefit consisting of cost savings achieved in retrofitted capacity compared to retired capacity. The latest estimates omit the cost savings benefit and include in operating and maintenance costs all such costs for retrofitted and new generating capacity as well as for the transmission system. This approach serves to capture all the costs associated with constructing and operating the power facilities needed to meet the demand previously served by retired plant and plant that could not legally operate without retrofitting to meet environmental standards.

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
Identification/Preparation 06/1991	1	3 Econ, 1 Envir. Spec, 1 Power Eng, 1 Fin. Analyst		
Appraisal/Negotiation 09/1991	1	3 Econ, 1 Envir. Spec, 1 Power Eng, 1 Fin. Analyst		
06/1992	2	2 Econ, 1 Procur. /Power Eng.		
Supervision 11/1992	1	2 Econ, 1 Power Eng, 1 Fin. Analyst	HS	HS
06/1993	2	5 Econ, 1 Envir. Spec, 1 Procur, 2 Econ, 1 Power Eng.	HS	HS
09/1993	3	1 Envir. Spec, 1 Procur/Power Eng, 1 Fin. Analyst, 6 Econ.	HS	HS
03/1994	4	1 Econ, 1 Fin. Analyst	HS	HS
06/1994	5	1 Econ, 2 Consultants	S	S
01/1995	6	1 Econ, 1 Fin. Analyst, 1 Power Eng.	S	S
05/1995	7	1 Fin. Analyst	S	S
06/1996	8	1 Fin. Analyst	S	S
05/1997	9	1 Fin. Analyst	S	S
02/1998	10	1 Fin. Analyst	S	S
05/1998	11	1 Fin. Analyst	HS	HS
09/1998	12	1 Fin. Analyst	HS	HS
04/1999	13	1 Fin. Analyst	HS	HS
ICR 10/1999	1	1 Econ, 1 Fin. Analyst, 1 Eng.	HS	HS

(b) Staff:

Stage of Project Cycle	Actual/Latest Estimate	
	No. Staff weeks	US\$ (,000)
Identification/Preparation	No data available	No data available
Appraisal/Negotiation	No data available	No data available
Supervision	128.1	421.6
ICR	5.0	5.0
Total	133.1	426.6

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

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

	<i>Rating</i>
<input checked="" type="checkbox"/> <i>Macro policies</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input checked="" type="radio"/> NA
<input checked="" type="checkbox"/> <i>Sector Policies</i>	<input type="radio"/> H <input type="radio"/> SU <input checked="" type="radio"/> M <input type="radio"/> N <input type="radio"/> NA
<input checked="" type="checkbox"/> <i>Physical</i>	<input type="radio"/> H <input checked="" type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input type="radio"/> NA
<input checked="" type="checkbox"/> <i>Financial</i>	<input type="radio"/> H <input checked="" type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input type="radio"/> NA
<input checked="" type="checkbox"/> <i>Institutional Development</i>	<input type="radio"/> H <input checked="" type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input type="radio"/> NA
<input checked="" type="checkbox"/> <i>Environmental</i>	<input checked="" type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input type="radio"/> NA
<i>Social</i>	
<input checked="" type="checkbox"/> <i>Poverty Reduction</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input checked="" type="radio"/> NA
<input checked="" type="checkbox"/> <i>Gender</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input checked="" type="radio"/> NA
<input checked="" type="checkbox"/> <i>Other (Please specify)</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input checked="" type="radio"/> NA
<input checked="" type="checkbox"/> <i>Private sector development</i>	<input type="radio"/> H <input checked="" type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input type="radio"/> NA
<input checked="" type="checkbox"/> <i>Public sector management</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input checked="" type="radio"/> NA
<input checked="" type="checkbox"/> <i>Other (Please specify)</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input checked="" type="radio"/> 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

- CEZ a.s. Annual Report 1998.
- CEZ a.s. Report on the State of Air Pollution in North-West Bohemia, March 1999.
- CEZ a.s. "Prospectus" for the Kc 3,000,000,000 bond issue, May 1999.
- CEZ a.s. Hodnoceni Vysledku SPEZO - Rok 1998.
- CEZ a.s. Czech Power Company - Presentation on Internet, September 1999.

Annex 8. Beneficiary Survey Results - Performance Assessment of Environment Objective

Air pollution from electricity generation causes severe health and environmental damage. The Czech power sector relies heavily on coal-fired power plants, burning low quality, high sulfur lignite. It is the largest source of pollution in the Czech Republic in regard to SO₂ and dust (fly-ash or particulate matter). The extensive use of lignite over the 40 years before the start of the project resulted in major environmental damage, especially in the region of Northern Bohemia, where large parts of the forests died and the health of the population deteriorated. CEZ's plans for reducing air pollution included cleaning up the stack gases from large point sources. Total emissions of SO₂ in Northern Bohemia reached about 960,000 tons in 1990, which amounted to more than 1,900 kg/person in the region, more than 10 times the amount for the rest of the country. Lowering emissions of air pollutants in Northern Bohemia was a major objective of the project. Specifically, the project was intended to reduce SO₂ emissions at power station Prunerov II by 190,000 tons/year through the use of FGD equipment, and dust emissions from 400-450 mg/Nm³ to 50-100 mg/Nm³ by means of installing electrostatic precipitators. The project achieved its environmental objectives substantially, as shown in the table below:

Prunerov II Power Sector: Pollutant Emissions

Year	Boiler Load (PJ/year)	SO ₂ (tons/year)	Dust (tons/year)
1993	47.7	146,569	3,646
1994	49.1	166,055	1,132
1995	39.2	131,790	813
1996	52.0	90,173	1,321
1997	47.6	11,010	1,443
1998	46.7	10,758	1,203

The dust emission figure for 1998 (1,203 tons/year) is equivalent to a concentration of about 65 mg/Nm³ in the stack gases.

In addition to financing the Prunerov II FGD system, the project was instrumental in getting CEZ started on one of the largest environmental improvement programs in Europe during 1992-1998. The program was formulated by the Czech authorities with strong support from international environmental specialists. A Joint Environmental Survey carried out by the Bank, EU, USAID, and the Czech authorities, along with several other feasibility studies, laid the ground work for the development of the National Environmental Plan, including the CEZ pollution abatement and control program. Under the program, CEZ installed 28 flue gas desulfurization units and seven fluidized bed combustion (FBC) boilers in 1992-1993. The program included also reconstruction of electrostatic precipitators for dust control and upgrading of automatic controls in selected power stations. A total of Kc 46 billion (US\$1.5 billion) was invested under the program:

The environmental improvement program carried out by CEZ complies fully with the requirements of the Czech Clean Air Act of 1991. It is aimed at cleaning up Northern Bohemia, a part of so-called Black Triangle in Central Europe and one of the most polluted regions of the world. The program, in which the project played a significant catalyst role in defining appropriate FGD technology, has been recognized as highly successful. The following table shows the trend in reduction of emissions achieved through the program.

Emissions Reduction in the Czech Republic (tons/year)

Year	1993	1994	1995	1996	1997	1998
Fly-ash	53,393	17,663	11,480	11,350	10,625	7,021
SO ₂	719,149	644,831	609,544	481,163	310,030	159,625
NO _x	122,212	77,387	75,258	71,044	67,448	56,884
CO	17,099	12,196	10,586	9,301	8,910	6,270

Implementation of the project had no significant unintended negative effects on the environment. On the contrary, the project has brought about considerable improvement in the environment in Northern Bohemia. In accordance with the Bank's Operational Directive 4.00, Annex 4, the project was rated B, taking the project's positive impact on the environment into account.

CEZ' environmental strategy emphasizes the need for a responsible approach to the environment. An important part of the company's strategy is to achieve compliance with CSN EN ISO 14001 Environmental Management Quality Standards (Czech National Standards for Environment), which is identical to the international EN ISO 14001 standard. As part of its approved restructuring program, CEZ is implementing an environmental management system (EMS). In 1998, the EMS was implemented at Prunerov power stations as a pilot project. Another demonstration of CEZ commitment to its environmental strategy is the company's recognition of the principles set forth in the Business Charter for Sustainable Development. The company's fundamental goal is to achieve the following emission reductions by 2000 (in comparison with 1993 levels):

- Solid pollutants (fly-ash) by approximately 90%
- Sulfur dioxide by approximately 90%
- Nitrogen oxide by approximately 55%
- Carbon monoxide by approximately 45%

In accordance with provisions of the Loan Agreement, CEZ is committed to: (i) maintain policies and procedures adequate to enable it to carry out the action plan to reduce SO₂ emissions agreed with the Bank in December 1992; (ii) report to the Bank each year on the progress achieved in the carrying out of such action plan; and (iii) revise the action plan as required with prior consultation with the Bank. CEZ has been diligent in complying with this requirement and the Bank will continue to monitor CEZ's performance during the life of the loan.

As part of the pollution monitoring system agreed with the Bank under the action plan, CEZ measures ambient air quality in its own measuring stations located in the neighborhood of its power plants, in cooperation with the Czech Hydrometeorological Institute. In addition, CEZ conducts studies of air pollution from its power plants through computer modeling and simulations. All computations are based on the official methods, currently in use for this purpose in the Czech Republic. These methods are consistent with comparable methods used in the US and the EU.

Annex 9. Partner Comments

IMPLEMENTATION COMPLETION REPORT
(BORROWER'S VERSION)

November 19, 1999



CONTENTS

- A PROJECT OBJECTIVES AND DESCRIPRION
- B IMPLEMENTATION OF THE PROJECT
- C MAJOR FACTORS AFFECTING THE PROJECT
- D PROJECT SUSTAINABILITY
- E BANK PERFORMANCE
- F BORROWER PERFORMANCE
- G EVALUATION OF PROJECT RESULTS
- H CONCLUSIONS/LESSONS

A PROJECT OBJECTIVES AND DESCRIPTION

The Project of reducing of the negative impacts of power electricity production on the environment (Project ENERGY I) has been the first significant investment in the Czech and Slovak Federal Republic and one of the largest ecological projects presented until that time. The Project has been aimed at reduction the air pollution in the region of Northern Bohemia, and thus at improving the environment and the health of the people in this region, at improving the efficiency of power plants, and at facilitating the interconnection of our power system with that of Western Europe.

The Project has been aimed at:

- reduction of total consumption of pollution-causing lignite through power plant efficiency improvements
- curtailment of power plant SO₂ emissions by means of flue gas desulfurization
- reduction of dust and fly-ash pollution from power plants
- increase of the reliability, efficiency and economy of the ČEZ, a. s., transmission system
- assistance in improving investment planning and corporate management and organization

B IMPLEMENTATION OF THE PROJECT

From 1992 to 1998, the power company ČEZ, a. s., realized what was apparently the largest and quickest environmental program in Europe. Within the scope of this Program, a total number of 28 flue gas desulphurization units and 7 fluidized-bed boilers were installed in its power plants, fly-ash precipitators were reconstructed, and the power plant control systems were modernized. Altogether, CZK 46 billion were invested in modernization and flue gas desulphurization systems of the coal power plants.

The World Bank was supposed to advance a loan for a whole range of significant ČEZ's ecological projects. The preparation of all significant ecological projects from 1991 to 1993 was being performed in compliance with the World Bank's directives for the selective tendering procedures. In this way, the projects of installation of the flue gas desulphurization systems in Power Plants Prunéřov I and II, Tušimice II, and Ledvice, and the project of installation of the first fluidized-bed boiler in Power Plant Poříčí were being undertaken. Finally, the fundamental part of the ENERGY I Project became the construction of the combustion product desulphurization system in Power Plant Prunéřov II. The next loan for the ENERGY II Project was intended to finance the projects prepared for flue gas desulphurization of the Power Plants Dětmarovice and Chvaletice. The cooperation with the World Bank on the loan for the ENERGY II Project was terminated after the World Bank's conference in December 1993, when our government announced that it could no longer continue to provide guarantees for additional World Bank's loans.

The preparation of projects financed within the scope of the ENERGY I Project was guided in compliance with the World Bank's directives for the selective tendering procedures in the form of either the International Competitive Bidding (ICB) or the Limited International Bidding (LIB). For a limited range of projects, it was possible to use both the International Shopping

(IS) and the Direct Contracting (DC). The World Bank was continuously being consulted so that the Tender Documents agreed with them. The ICB tendering procedures were being announced in world trade-paper advertising. ČEZ, a. s., very much appreciated that, in the course of drawing on the loan, the World Bank agreed with the LIB organization during implementation of the selected capital projects from the selected subcontractors, which allowed a certain unification of the equipment purchased, as well as that during the ICB procedure, it was possible to prefer the domestic manufacturers to the amount of 15 % of the CIF price.

(a) installation of equipment and operational improvements at Prunéřov II power station and other large ČEZ power plants to reduce lignite consumption

Within the scope of the project of increasing the reliability and efficiency of ČEZ's power plants, the individual partial projects were realized as provided in the table below:

Power plant	Turbine	Generator	Boiler	Electro	I & C	Others	TOTAL
Prunéřov II	4	1	7	-	1	-	13
Dětmárovice	3	1	2	-	1	1	8
Chvaletice	7	4	-	5	1	1	18
Počerady	-	-	-	-	1	-	1
Tušimice	-	-	4	-	-	-	4
Ledvice	-	1	-	2	-	1	4
Mělník	1	-	3	-	-	-	4
Total	15	7	16	7	4	3	52

Between the years 1994 to 1999, 13 partial projects were implemented in Power Plant Prunéřov II, seven (7) in the area of the boiler, four (4) in the area of the turbine, one (1) in the area of the Computer-Assisted Technological Process Management System, and one (1) in the area of the generator. An additional 39 partial projects were implemented in other power plants, eleven (11) in the area of the turbine, nine (9) in the area of the boiler, seven (7) in the area of the electrical equipment, six (6) in the area of the generator, three (3) in the area of the Computer-Assisted Technological Process Management System, and three (3) in other areas. The distribution of partial projects among the individual power plants is evident from the above table.

The projects were discussed with the World Bank and agreed upon during the negotiations in Washington on April 5 to 8, 1994, and April 18 to 21, 1995, while other partial projects were being agreed to as needed.

The implementation of partial projects took place from 1994 to 1999. The course of implementation of the individual projects was proceeding in compliance with the conditions determined in the individual contracts, and no negative comments concerning the activities of the individual contractors were made.

(b) installation of flue gas desulfurization equipment (FGD) at Prunéřov II

The main part of Project ENERGY I was the installation of the FGD system in 5 x 210 MW units of Power Plant Prunéřov II, which represented one of the major air pollution sources in the region of Northern Bohemia. The FGD was necessitated by the need to conform to Act

No. 309/1991 Coll. under which the limits on solid airborne pollutants, sulfur dioxide, nitrogen oxides and carbon monoxide were set. The deadline for compliance with the new limits was set at December 31, 1998. After that date, ČEZ a. s., was no longer allowed to operate any units failing to meet the new emission limits. Therefore, in keeping with the ČEZ, a. s., mission to produce electric power in an environmentally-friendly manner, the decision to improve the environmental management at the power plant Prunéřov II was taken.

The international selective tendering procedure for the building contractor was undertaken in compliance with the World Bank's directives. The bidding procedure was held in two rounds. The uniform definition of criteria set in advance resulted in maximum objectivity in the selection of the contractors. All bidders in the tender were advised on the method of economic evaluation and on the option to amend their bids to include additional details including the guaranteed operating materials. The sufficient number of tender bidders, their merits and their territorial origin allowed highly competitive conditions to be achieved and maintained, resulting ultimately in the favorable price of 128 USD/kW of installed capacity which was less than the expected price by USD 60.

In the presence of the World Bank's representative, the consortium of enterprises Mitsubishi Corporation Japan, and ZVU Czech Republic, was selected out of the presented bids.

The consortium realized the construction of the flue gas desulphurization system operating on the principle of the wet limestone wash-out by applying its own know-how in cooperation with the other subcontractors. The milestones constituting the base of the construction progress were adhered to with negligible deviations. The last unit was put into operation in advance, which can be considered, in a capital construction projects of such a large extent, an extraordinary success, especially when taking into account the fact that the capital costs were not exceeded, and that the flue gas desulphurization units met their guaranteed values as specified in the contract. For the whole range of parameters, considerably better values were achieved than those specified in the performance job and/or required by the current applicable legislation.

The construction project was financed with 45 % from the World Bank's credit, and 55% from the resources of ČEZ, a. s.

(c) improvements and equipment for dust collection, i. e., electrostatic precipitators at the worst polluting ČEZ power plants

From 1993 to 1998, the following partial projects in the area of environmental improvement were implemented in the following power plants:

The reconstruction of electrostatic fly-ash precipitators in units B21 to B25 in the power plant Prunéřov II was performed from 1993 to 1998.

The reconstruction of electrostatic fly-ash precipitators in units B3, B4 and B2 in the power plant Chvaletice was performed from 1996 to 1998.

The reconstruction of electrostatic fly-ash precipitators in unit B2 in the power plant Počerady was performed in 1995, and in unit B5 in 1998.

The implementation of the reconstruction of electrostatic fly-ash precipitators was being undertaken in compliance with the dates stipulated in the individual contracts, and no negative comments concerning the activities of the individual contractors were made.

(d) modernization of 400kV substations Přeštice, Bezděčín, Sokolnice, Čechy střed, control systems for substations Malešice, Milín, Vítkov, Chodov and construction of the 400kV transmission line

From 1993 to 1998, the most important projects of capital construction of the transmission system were implemented in Substations Čechy střed, Sokolnice, Bezděčín, Přeštice Stage I, Přeštice Stage 2, Tábor, Vítkov, Malešice, Milín and Chodov. These involved the purchase and installations of control and protection systems, transformers, surge arresters, circuit-breakers, lightning arresters, disconnecting switches, insulators, bus-bars, digital protective devices, cables, and failure recorders. These projects were financed out of the World Bank's credit to the amount of 100 %.

In the course of drawing on the loan, the World Bank agreed with the use of the LIB organizational structure during implementation of the selected capital projects by the selected subcontractors, which allowed a certain unification of the purchased equipment.

The construction of the 400-kV transmission line - the inlet of line Chrást-Temelín in Substation Přeštice - was financed from credit amounting to 83.5 % while 16.5 % was covered out of the resources of ČEZ, a. s. This construction was added into Project ENERGY I in May 1995.

(e) consulting services and staff training

Within the ENERGY I Project, the contract of consulting services for the AFMIS (Accounting and Financial Management Information System) Project with Coopers & Lybrand was financed, as was the contract for the safety audit of Nuclear Power Plant Temelín with Halliburton NUS, which at the time of its elaboration represented the most extensive and independent expert's report on the nuclear safety of the nuclear power plants with the pressurized water reactors of the Russian design.

C MAJOR FACTORS AFFECTING THE PROJECT

The preparation of transformation of the state enterprise České energetické závody (Czech Power Company) to the joint-stock company (September 1991 to April 1992) was running in a very excited and unstable external environment. The decision on placing ČEZ in the first wave of the coupon privatization program initiated by the management of the state enterprise represented, under the conditions of that time, an extraordinary significant strategic decision. It created conditions for maintenance and further development of the power company ČEZ, a. s. The process of selection of the path of development of the production basis of the Czech power engineering was being verified by various independent subjects, particularly by the World Bank (as a basis for advancing the loan for Project ENERGY I) and the European Union (Project A.3 of the PHARE Program "Power Sector Least Cost Development Study for the Power Sector in the Czech and Slovak Federal Republic"). Simultaneously, this Program was being closely scrutinized by the relevant bodies of state administration as well as by the public.

In cooperation with the World Bank, works on the development study concerning the power sources and the transmission system of the former Czech and Slovak Federal Republic until the year 2010 were initiated. The works were initiated and coordinated in compliance with the terms of reference but by the middle of 1992 it was already apparent that the common solution would not be successfully completed. Beginning in July 1992, the study started focusing separately on the Czech Republic and on Slovakia. Under the uncertain conditions and environment, we succeeded, thanks to utilization of results of the study, in delimitation of the strategic path of development of ČEZ, a. s., for a decisive portion of the 1990s.

The priority of restoration of the production basis became a radical reduction of negative impacts of electricity generation on the environment. The preparatory works were initiated in 1990, however, the Clean Air Act passed by the Parliament of the Czech and Slovak Federal Republic in 1991 represented a vast burden due to the rate of required changes, unprecedented anywhere in the world power engineering sector. This included not only its labour intensity, but also the demands imposed on the competency of employees, on the procurement of financial sources, and on the implementation of the entire program. In addition, the fact cannot be ignored that a decrease in the economic activity and its related decrease in demand for electricity during the first years following 1989 allowed the restoration of the production and technical base under the time-limited conditions, and the parallel decommissioning of the most obsolete lignite power plants.

D PROJECT SUSTAINABILITY

The mission of our company and the strategy of its implementation accepted by the general meeting of shareholders are binding ČEZ, a. s., to carefully and responsibly handle the environment, its components and the natural resources. ČEZ's careful handling with and responsible approach to the environment are being supported by the attained results, especially in air protection, by the open-door policy in supplying information, and by the step-by-step integration of environmental protection into the company management system.

An important part of our Company's strategy is to achieve compliance with the ČSN EN ISO 14001 environmental management quality standard, which is identical to the international EN ISO 14001 standard. As part of the approved ČEZ Restructuring Program, we are implementing an Environmental Management System (EMS). In 1998, the EMS was implemented at Prunéřov Power Stations as a pilot project. Another demonstration of ČEZ's commitment to its business strategy is the Company's recognition of the principles set forth in the Business Charter for Sustainable Development.

Among the Company's fundamental environmental goals, it is proposed to achieve the following emission reductions by the year 2000 (in comparison with 1993 levels):

- solid pollutants (fly ash) by approximately 90%
- sulfur dioxide by approximately 90%
- nitrogen oxides by approximately 55%
- carbon monoxide by approximately 45%

By December 31, 1998, ČEZ had created conditions of compliance with the new emission limits pursuant to the "Clean Air Act" in all of its coal-fired power stations. ČEZ thus made significant progress towards its emission reduction goals for the year 2000.

The completion of the flue gas desulphurization program of the coal power plants represents the most significant ČEZ success reached during its entire seven-year existence. All coal power plants currently in operation already meet the demanding criteria of the Clean Air Act, and their refurbishment has secured extension of their service life until about the year 2015.

These results will ensure that implementation of the projects financed out of the World Bank's loan will bring a long-term benefit for the environment.

E BANK PERFORMANCE

The World Bank has played a key role in the preparation of development of ČEZ, a. s., and of its environmental program. We take this opportunity to thank the World Bank for its favorable attitude shown not only in advancing the loan but also in providing various consultations, expert's reports and numerous verifications of analyses and documents elaborated and supported by our company, as well as for the introduction of international procedures at the beginning of the loan, which became extremely important in subsequent years, and without which our environmental program would have been feasible only with difficulties.

The World Bank's supervision missions have always been conducted effectively and have contributed to a successful course for the individual projects. The support provided by the World Bank in the course of planning the projects and their implementation has been of a high standard. The exchange of standpoints to the individual problems has taken place effectively, and all matters have been settled immediately without unnecessary delays.

F BORROWER PERFORMANCE

As a result of the intensive international selective tendering procedure for the flue gas desulphurization system of Power Plant Prunéřov II, the costs were cut by an amount equal to approximately USD 46 million, and for this reason, ČEZ, a. s., requested that USD 16 million be used for installation of the flue gas desulphurization unit in Power Plant Ledvice II. The World Bank was carefully following the preparation and elaboration of the tender documents for the selective tendering procedure concerning Power Plant Ledvice II. Since the study aimed at the environmental conditions did not prove an urgent need to invest in this area (the values given in the study complied with those of EU), the World Bank did not allow financing of the installation of the FGD unit in Power Plant Ledvice out of the World Bank's loan.

Owing to the time-consuming character of the tendering procedures in accordance with the World Bank's directives and to a limited selection of partial projects that could be included in the ENERGY I Project of reduction of the negative impacts of power engineering on the environment, ČEZ, a. s. applied for extension of the loan until June 30, 1999, and for the approval of other projects for increasing the efficiency of power plants so that it would be possible to at least partly finish drawing on the saving of costs attained during installation of the FGD unit in Power Plant Prunéřov II.

Drawing on the World Bank's loan, provided in various currencies, was affecting the valuation of the exposure to risk, and for this reason, ČEZ, a. s., with a view to secure itself against the currency risk, made use of the World Bank's offer, and applied for the allocation of a loan and

for the conversion to the DEM LIBOR-based Single Currency Loan and the Single Currency Pool Loan.

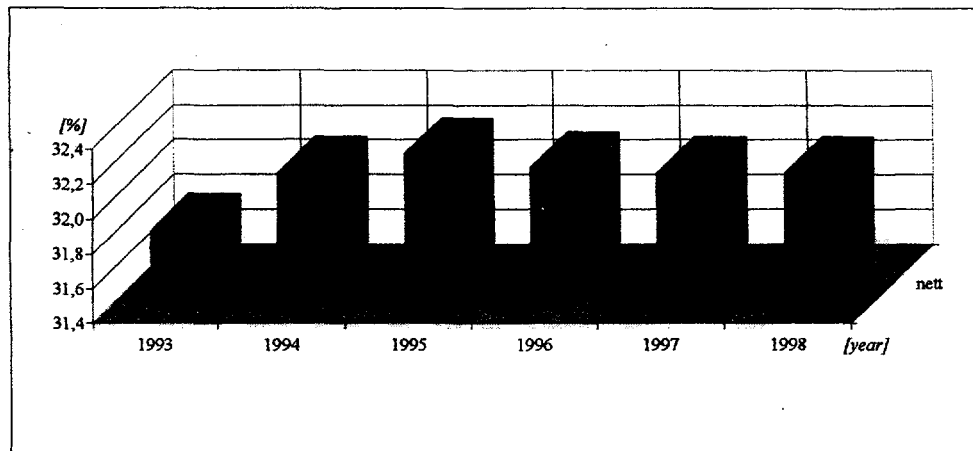
G EVALUATION OF PROJECT RESULTS

- reduction of total consumption of pollution-causing lignite through power plant efficiency improvements

In 1992 when the joint-stock company ČEZ was formed, all power generation units were not equipped with any high-quality and necessary environmentally-friendly technological equipment. During the entire period from 1993 to 1998, the total (net) efficiency was practically constant, and was being affected by an increased consumption of electric power by the retrofitted flue gas cleaning equipment. This means that since 1994 when the new equipment began to be gradually put into service, the efficiency of boilers and of turbo-generators adequately increased.

Total efficiency of ČEZ's coal power plants in per cent:

	1993	1994	1995	1996	1997	1998
nett	31,81	32,14	32,25	32,17	32,14	32,14

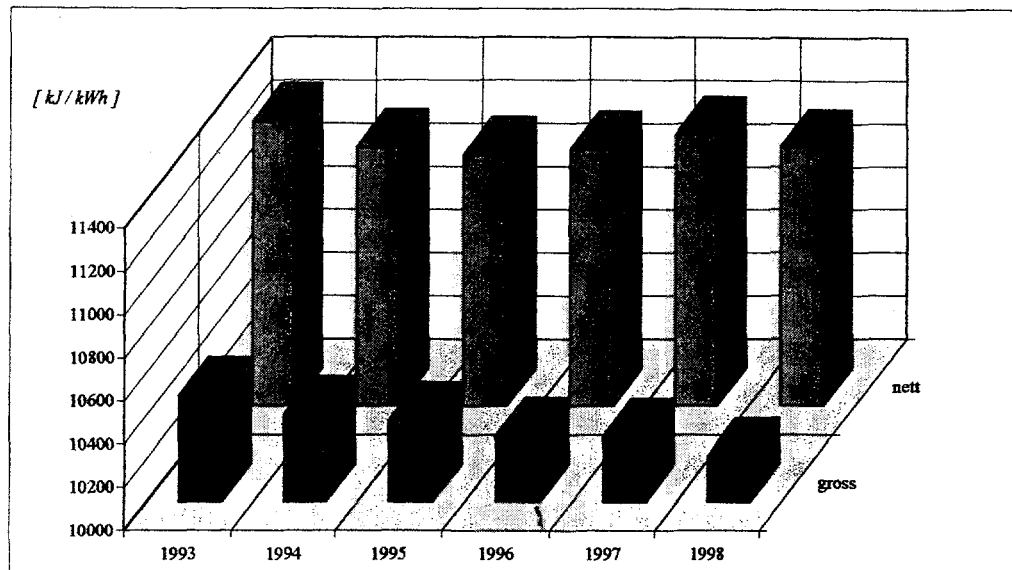


Within the ENERGY I project, projects which provided a major contribution towards improving the environment in the Czech Republic and which helped to enhance the efficiency and dependability of the generating plant have been implemented since 1993 at seven power plants of ČEZ, a. s.

Thanks to repairs of boilers and turbines, replacement of parts of generators accessory systems and exchange of control and management systems that were implemented, the net efficiency of the power generating plants rose by 2 to 2.5%. The specific demand for fuel energy for power supply at these plants has remained stable although the newly installed flue gas desulphurizing equipment resulted in a 1.5 to 2.0% increase in the plant's electricity consumption.

Specific energy consumption (kJ / kWh) in ČEZ's coal power plants:

	1993	1994	1995	1996	1997	1998
nett	11317	11201	11164	11191	11259	11202
gross	10491	10403	10378	10305	10301	10210



- curtailment of power plant SO₂ emissions by means of flue gas desulfurization

In accordance with the applicable acts of the Czech Republic (the Environmental Protection Act and the Clean Air Act), ČEZ, a. s., is obliged to be aware of and monitor the impacts of operation of its coal power plants on the atmosphere. ČEZ, a. s., has been monitoring this matter very carefully, especially by measuring emissions of air pollutants, by measuring emissions in the neighborhood of power plants, and by monitoring each power plant's contribution to air pollution.

ČEZ, a. s., keeps measuring the emissions by applying the methods as stipulated in the respective legal air-protection regulations of the Czech Republic. The results of measurements confirm that, in compliance with the ČEZ's and World Bank's intentions, emissions of air pollutants (such as sulphur dioxide, solids, nitrogen oxides and carbon oxide) and concentrations of these substances in combustion products have successfully been decreased. This reduction is notable especially in Northern Bohemia.

ČEZ, a. s., keeps monitoring the air pollution by measurements of emissions taken in its own measuring stations situated in the neighborhood of its power plants, and in cooperation with the Czech Hydrometeorological Institute. The results of measurements of emissions of sulphur dioxide taken in Northern Bohemia in 1991 and 1997 are depicted in Fig. 1 and 2, and can demonstrate an improvement in the air conditions in Northern Bohemia between the years 1991 to 1997.

Since 1993, ČEZ, a. s., continues to monitor the contribution of coal power plants to air pollution by applying model computations. An example of computation results is presented in diagrams illustrating a comparison of computed emission concentrations of sulphur dioxide in

Northern Bohemia in 1991 and 1997 (Figs 3 and 4) and a comparison of the part ČEZ's coal power plants contributed to this pollution in the same years (Figs 5 and 6). These diagrams can also graphically document both the reduction of the emission burden of this region and the reduction of contribution of ČEZ's coal power plants to air pollution.

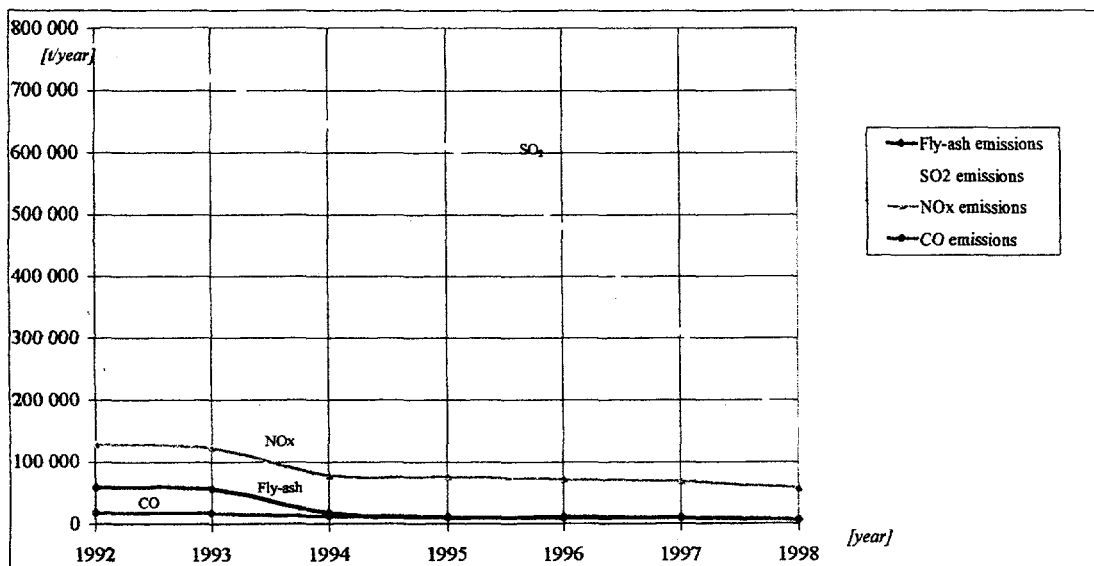
The computations are based on the official methods currently used for this purpose in the Czech Republic. On the basis of recommendations of the World Bank's mission, the methods have been proven to be applicable by their comparison with the SCREEN computation model used for an analogue purpose in the USA and the EU's countries. The results of model computations of emission concentrations correspond to the results obtained from measurements of emissions.

- reduction of dust and fly-ash pollution from power plants

As compared to the year 1993, in 1998 the emission of solids (fly-ash) was reduced by 87 %. Graph 3 demonstrates the reduction of emissions in the Czech Republic. One of the fundamental aims in the environmental protection is to attain reduction of fly-ash emissions by 90 % as compared to 1993 by the year 2000.

Reduction of emissions

	1992	1993	1994	1995	1996	1997	1998
Fly-ash emissions	57 855	55 393	17 663	11 480	11 350	10 625	7 021
SO ₂ emissions	769 128	719 149	644 831	609 544	481 165	310 030	159 625
NO _x emissions	128 522	122 212	77 387	75 258	71 044	67 448	56 884
CO emissions	17 713	17 099	12 196	10 586	9 301	8 910	6 270



The repairs to equipment have been implemented mainly during shutdowns due to general repairs of production units. Concurrently, the reconstruction of the electric ash precipitators was also carried out at the different units. This type of reconstruction project has been characterized by an increase of the precipitator efficiency from the former average of 99.60% to the current 99.85%. For example, in a 200 MW unit, this increase means a reduction in the

concentration of solid pollutants by 160 metric tones per year at unit service utilization of 6000 hours per year.

- increase of the reliability, efficiency and economy of the ČEZ transmission system

The ČEZ transmission system consists of all 400 kV and 220 kV equipment, i.e. equipment in 37 substations, 2,916 km of 400 kV line and 1,485 km of 220 kV line. Also part of the transmission system are two 110 kV substations and 134 km of 110 kV line, whose purpose is to transmit the output of ČEZ power stations to the 110 kV networks. The overall operation of the transmission system can be described as balanced, reliable, and relatively calm, due to favorable meteorological conditions, among other reasons. In comparison with 1997, the number of failures during 1998 declined by 7.2%. There were a total of 130 breakdowns and 72 malfunctions during the year, of which 16 breakdowns caused equipment damage (5 of the breakdowns damaged transformers).

The implementation of capital projects allowed ČEZ, a. s., to meet the strategic goal of creating the conditions for the synchronous cooperation of its transmission system with the UCPTE Western-European system, including acceptance of the conceptual and operational rules of this system, and further to stabilize the output power and frequency parameters of the transmission system, to reduce the power failures in the transmission system, to allow the real-time dispatching control, and last but not least to also represent the saving of labour.

On October 1, 1997, the annual operating test of the synchronous cooperation of the association CENTREL (involving the electricity companies of the Czech Republic, Poland, Hungary, and the Slovak Republic) was successfully finished. On the basis of affirmative results of this test, the member electricity companies applied for corporate membership in the UCPTE. On October 29, 1998, ČEZ, a. s., was accepted as associated member of UCPTE.

The ČEZ Central Control Center oversees the operation of the Czech power system within the framework of the synchronous interconnection with the UCPTE (Union for the Coordination of Production and Transmission of Energy) interconnected electricity network. Throughout the year, quality parameters of electricity supplied through the transmission system were maintained within prescribed limits and no failure or malfunction occurred that could affect the reliability and availability of electricity. The ČEZ Central Control Center successfully continued the pilot projects of remote-controlled operation of the Tábor, Chodov and Malešice substations. Concurrently, work continued on implementing remote control systems for other transmission system substations.

- assistance in improving investment planning and corporate management and organization

The safety audit of Nuclear Power Plant Temelín documented that nuclear power plants of the Russian design, Type VVER 1000, can meet the requirements for securing nuclear safety, and confirmed the expediency of changes in design planned beforehand, which should allow the attainment of results comparable to the existing requirements of the European and American nuclear power plants. The results of the audit were part of the documents of the ČEZ proposal to continue the construction of the Nuclear Power Plant Temelín and subsequently in 1992 and 1993 for the government's decision to continue in the above activity. The report in its simplified form was presented to both the Czech public and the Austrian government.

The CODA-OAS 2.308 Accounting and Financial Management Information System was implemented in all power plants as well as at the general management of our company, under the supervision of the consulting agency Coopers & Lybrand. Putting the Accounting and Financial Management Information System into service during the course of the year 1996 allowed the balance of accounts for the whole company to be worked out by December 31, 1996 using the new accounting system. No reservations concerning the system's suitability were made in the auditor's award.

H CONCLUSIONS/LESSONS

When drawing up the report presented to the World Bank's managers for approval of the loan, most of the ČEZ, a. s., sections were cooperating and obtained experience with the presentation of the company and of its activities, and this experience proved to be very useful during the subsequent negotiations with the rating agencies. The Staff Appraisal Report was a document which included brief characteristics of the Czech Republic and presented the results of a survey of the electricity supply sector in the Czech Republic, including its control system and existing structure. The document also described the power company ČEZ, a. s., from the point of view of production, including its environmental impacts, the future development of supply and demand and their future trends, as well as the price policy, the investment program and a detailed description of the project which is intended to be financed by the World Bank, including its risk rating.

Three months after establishment of the joint-stock company ČEZ, the World Bank, as the first foreign subject, provided a loan for the ENERGY I Project. Taking this action, the World Bank deserves full credit for the financial feasibility of the development program, for achievement of our credibility for the other creditors, and for the creation of conditions for financing the decisive part of the development program without any guarantees of government, i.e. on its own account.

This emitted a signal from a financial institute with a high international authority, confirming that ČEZ, a. s., is a credible company capable of long-term maintenance of its financial health and of meeting its accepted engagements, and that its development program corresponds to the demands of the Czech Republic's economy. Such a signal significantly supported ČEZ's effort to subsequently provide a considerable portion of financial means on its own behalf, without any guarantees from the government.

However, the entry into the international market of bonds was conditional on obtaining an investment rating from the rating agencies accepted by the financial circuits. The power company ČEZ, a. s., obtained the first rating, namely BBB-, from Standard & Poors in May 1994. It was this investment rating that allowed the afore-mentioned emission of eurobonds in 1994 and the entry of ČEZ, a. s., as the first company from the former Eastern block, into this financial market.

The cooperation with the World Bank proved to be a significant benefit not only from the point of view of financing some capital projects. The benefit also consisted in the acquisition of know-how during the international selective tendering procedure (the preparation of the tender documents, the declaration of the international selective tendering procedure in the form of the world trade-paper advertising, the procedure of answering the inquiries concerning uncertainties, the annexes to the tender documents, the procedure of opening the bids, the

memorandum of the procedure of opening the bids, the report on evaluation of the bids, and the selection of the general contractor).

The advantage of international selective tendering procedures consisted in the fact that the bidders were aware of the competitive environment which was finally leading to optimization of the prices of the individual bids and to the selection of a suitable contractor who was able to offer the lowest price under comparable technical and commercial conditions.

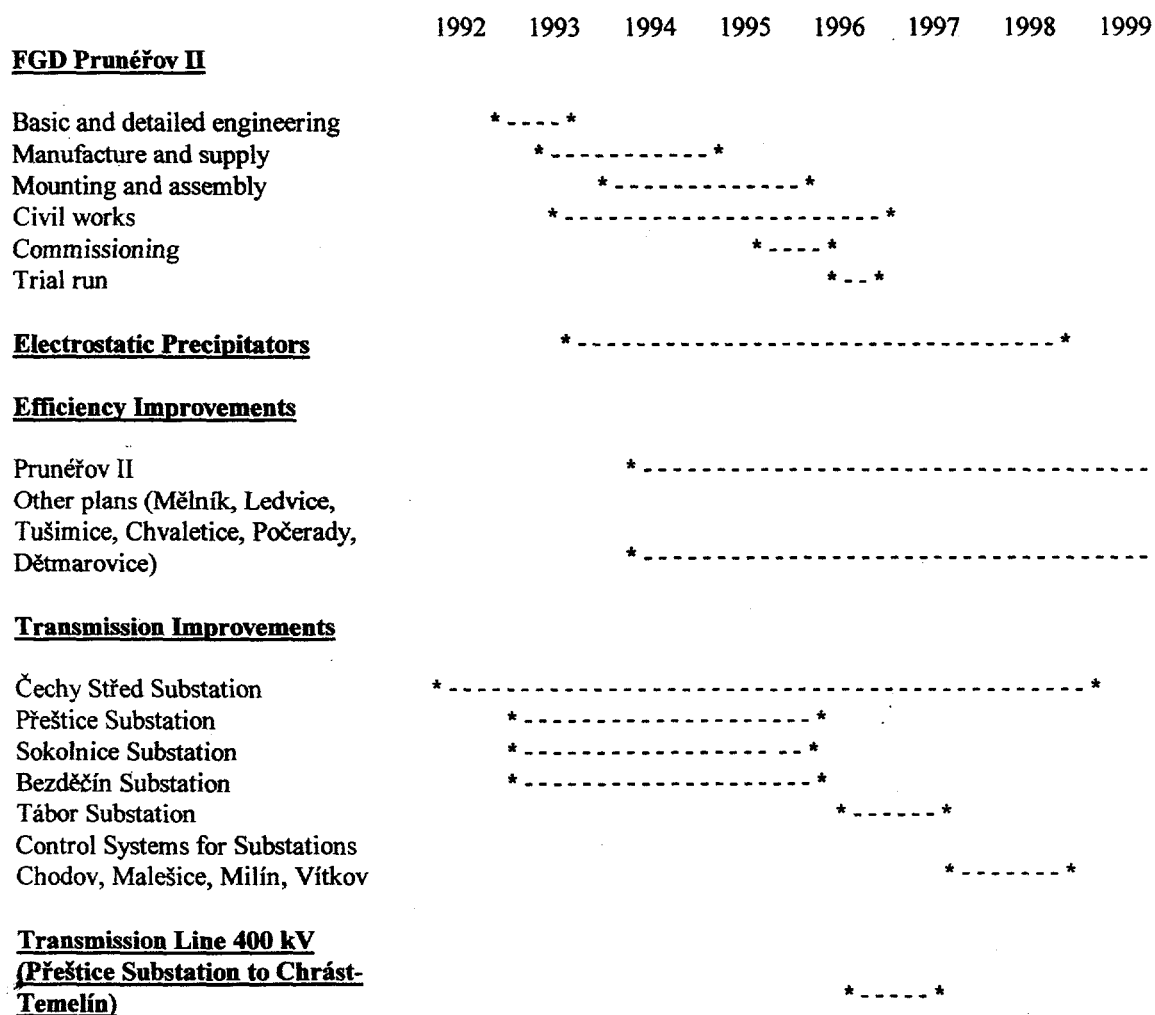
For development of the prospective planning, the role of the World Bank was important in two levels. Through its requirement for elaboration of the least-cost study, the World Bank connected ČEZ, a. s., with the Belgian firm Tractebel. At that time, ČEZ, a. s., already possessed some developed partial planning procedures, and for this reason it was able to prepare the necessary documents relatively quickly as well as to acquire the respective procedures and connections. Of significant importance was the fact that ČEZ, a. s., was given a unique opportunity "to have a look into the laboratory" of the Tractebel team, and thus to utilize its support when preparing ČEZ's applications of its own business prospectus. Already, in 1993, ČEZ, a. s., prepared a prospectus of its own up to the year 2000, adjusting the initial assumptions of ČEZ's future development in the areas of financing, profit formation, and the development of economic indices.

The other level of importance of the World Bank role in ČEZ's prospective planning consisted in the provision of the credit contract, requiring ČEZ to regularly inform the Bank (and the guarantor) not only about the company's existing results but also about the assumptions of the economic development in the near future.



Ing. Jaroslav Suk
Director of Finance Section

Enclosures:
Figures 1 to 6
Annex I

Czech RepublicPower and Environmental Improvement ProjectProject Implementation Schedule

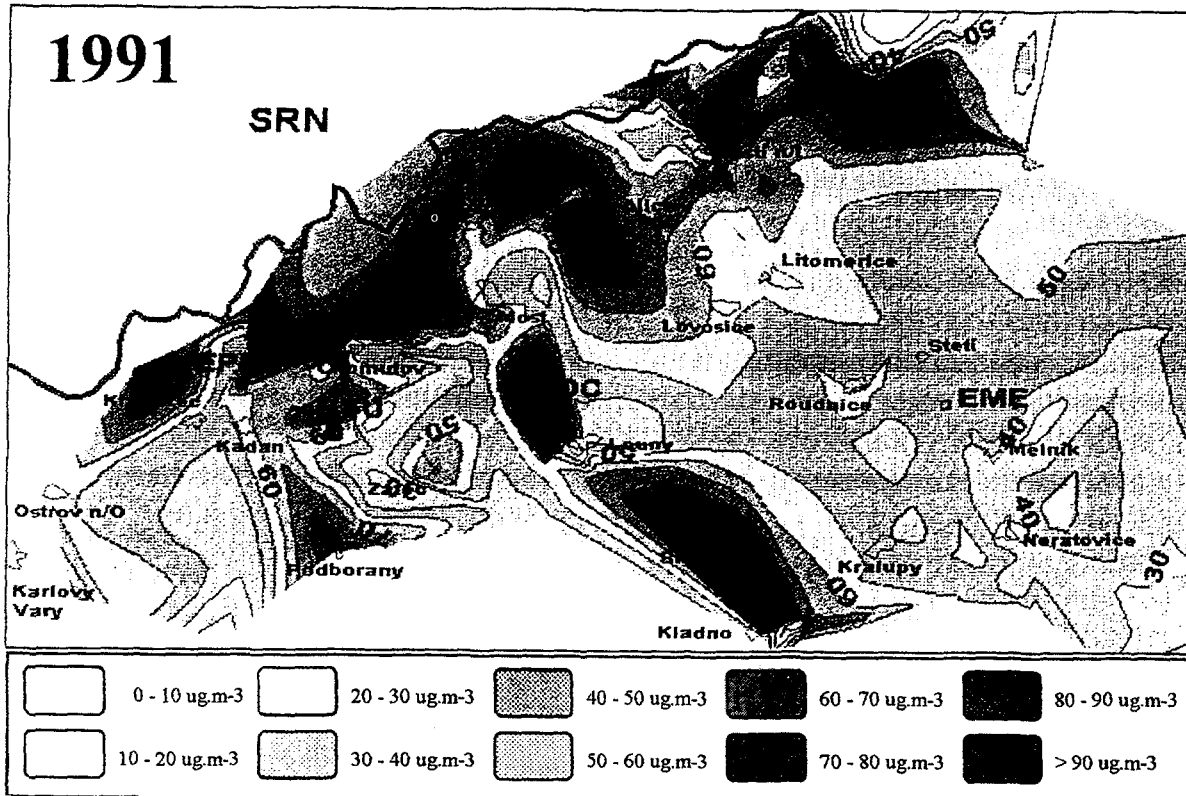


Fig. 1 Isolines of the measured sulphur dioxide immission in North-West Bohemia for the year 1991

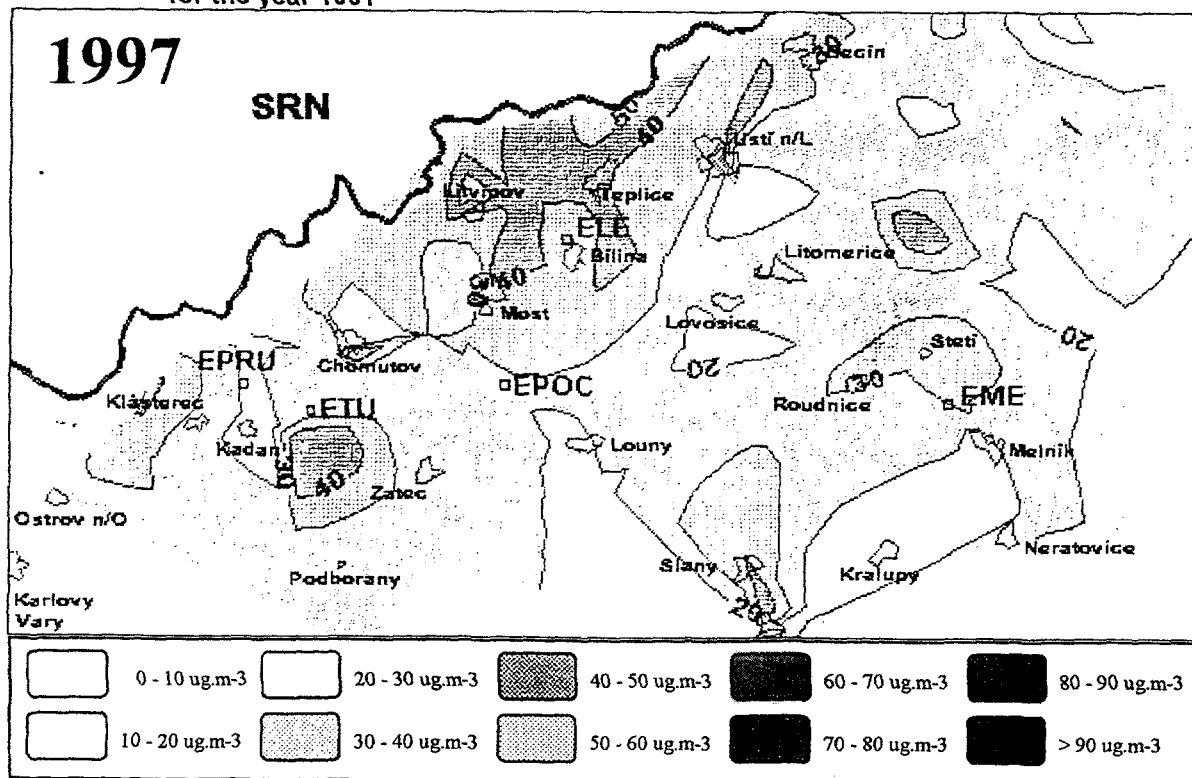


Fig. 2 Isolines of the measured sulphur dioxide immission in North-West Bohemia for the year 1997

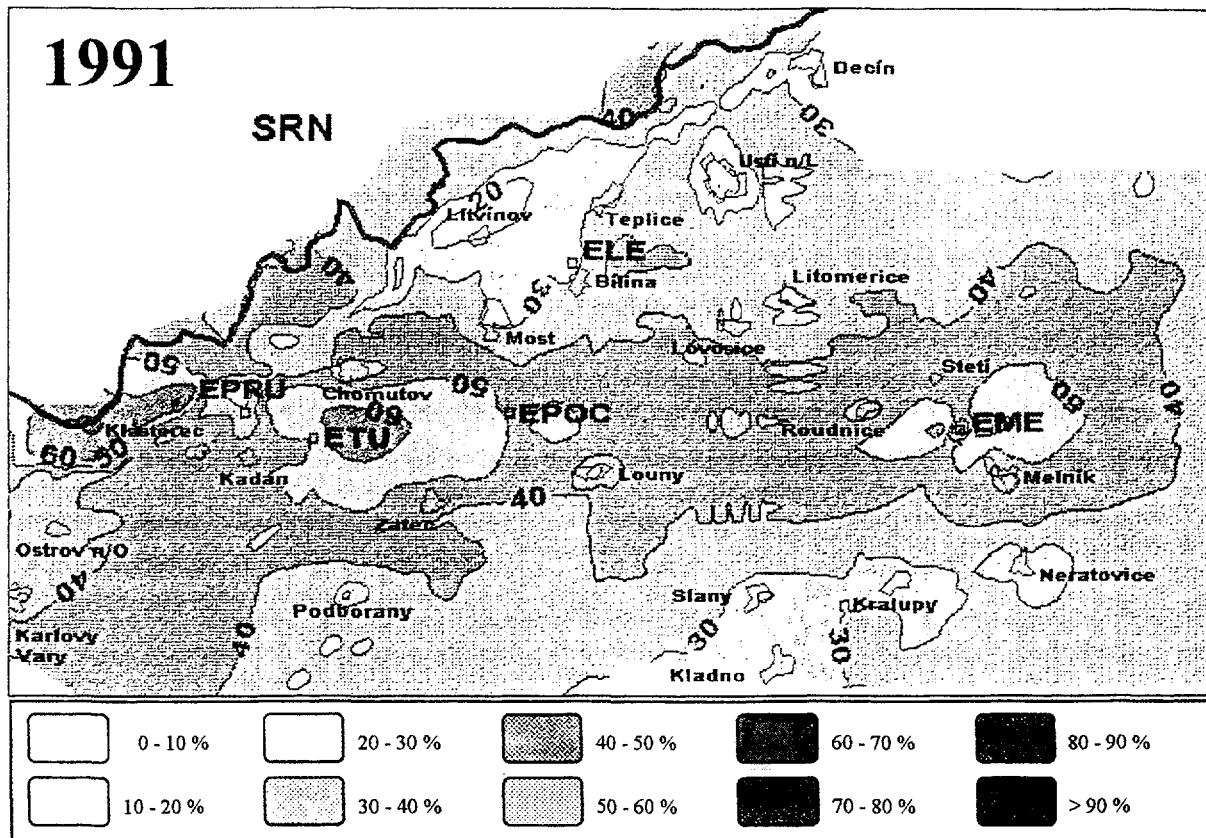


Fig. 5 Share of ČEZ, a. s., power plants on calculated sulphur dioxide immission concentrations in North-West Bohemia for the year 1991

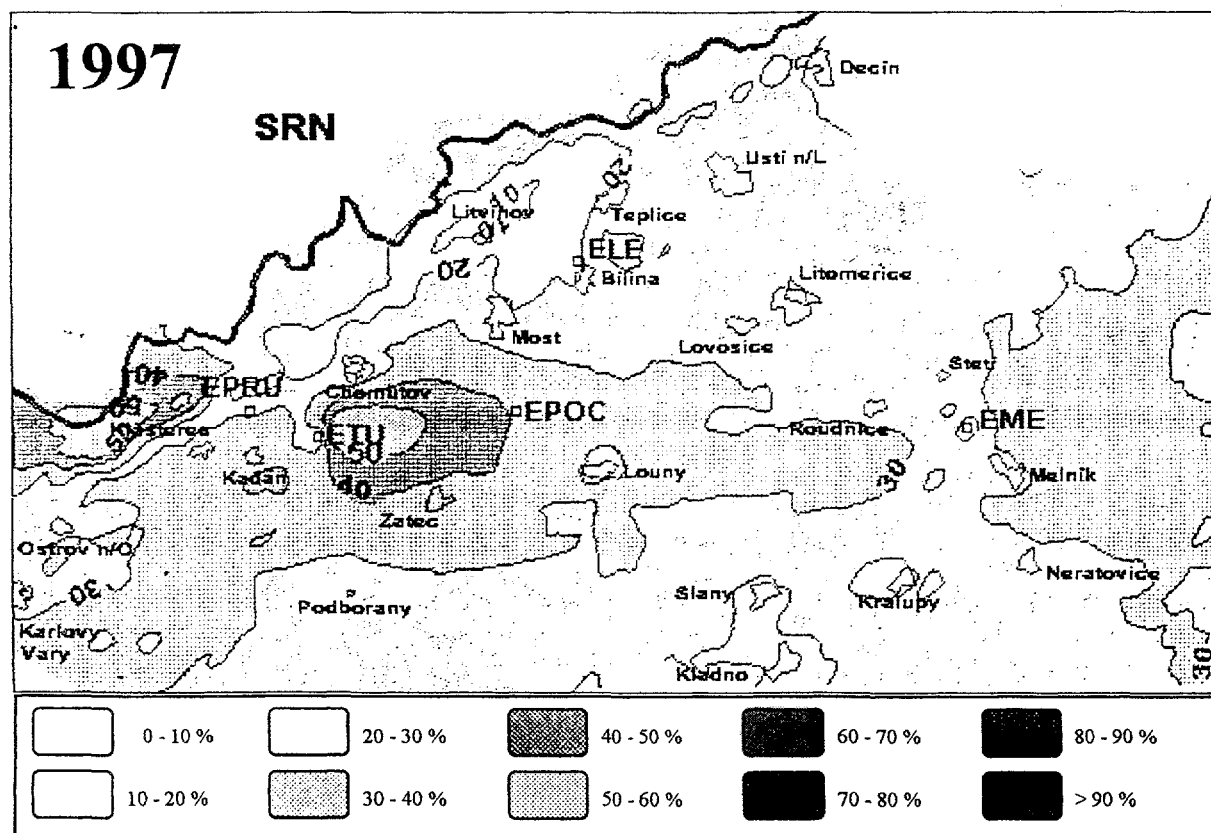
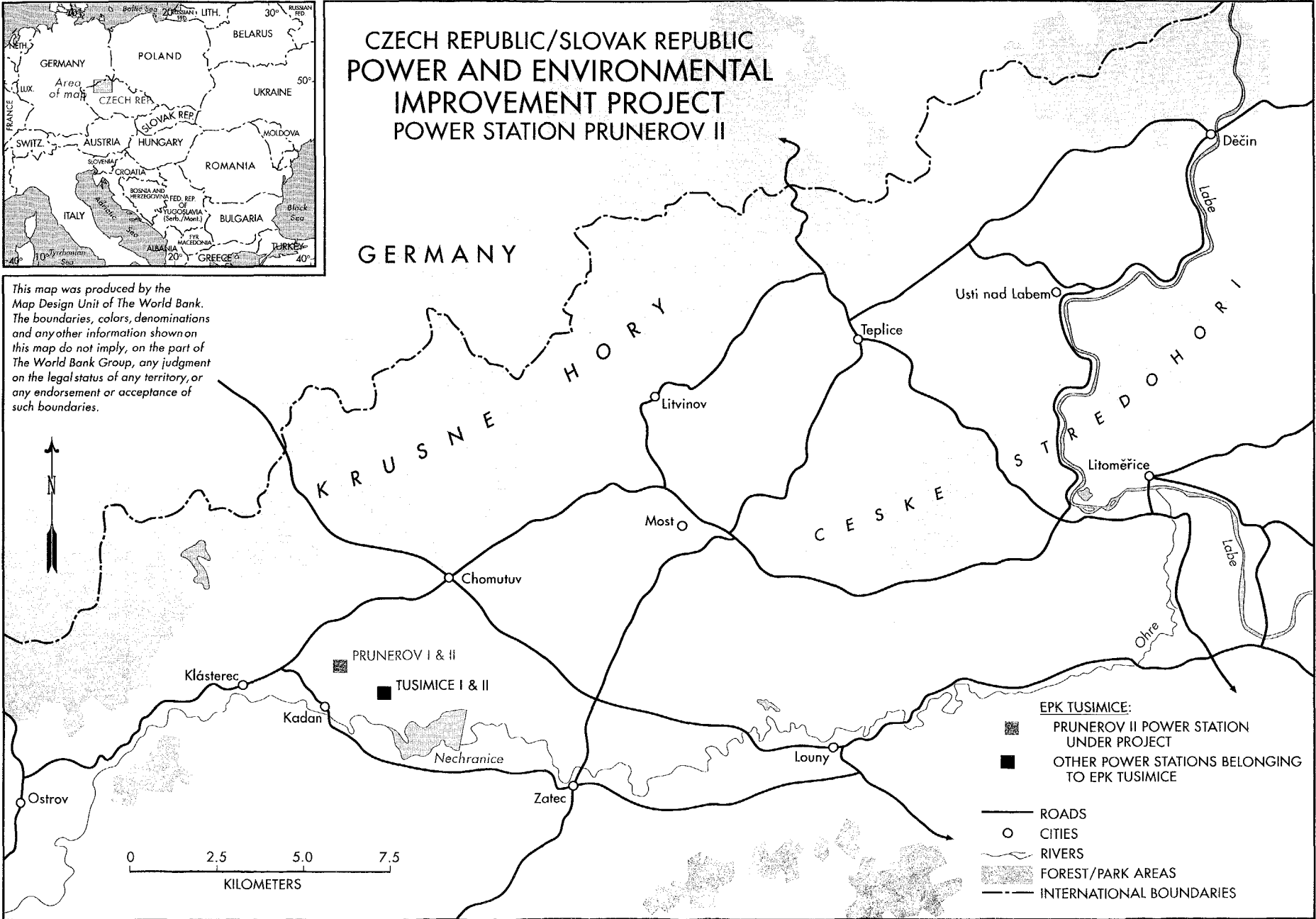


Fig. 6 Share of ČEZ, a. s., power plants on calculated sulphur dioxide immission concentrations in North-West Bohemia for the year 1997

CZECH REPUBLIC/SLOVAK REPUBLIC POWER AND ENVIRONMENTAL IMPROVEMENT PROJECT POWER STATION PRUNEROV II



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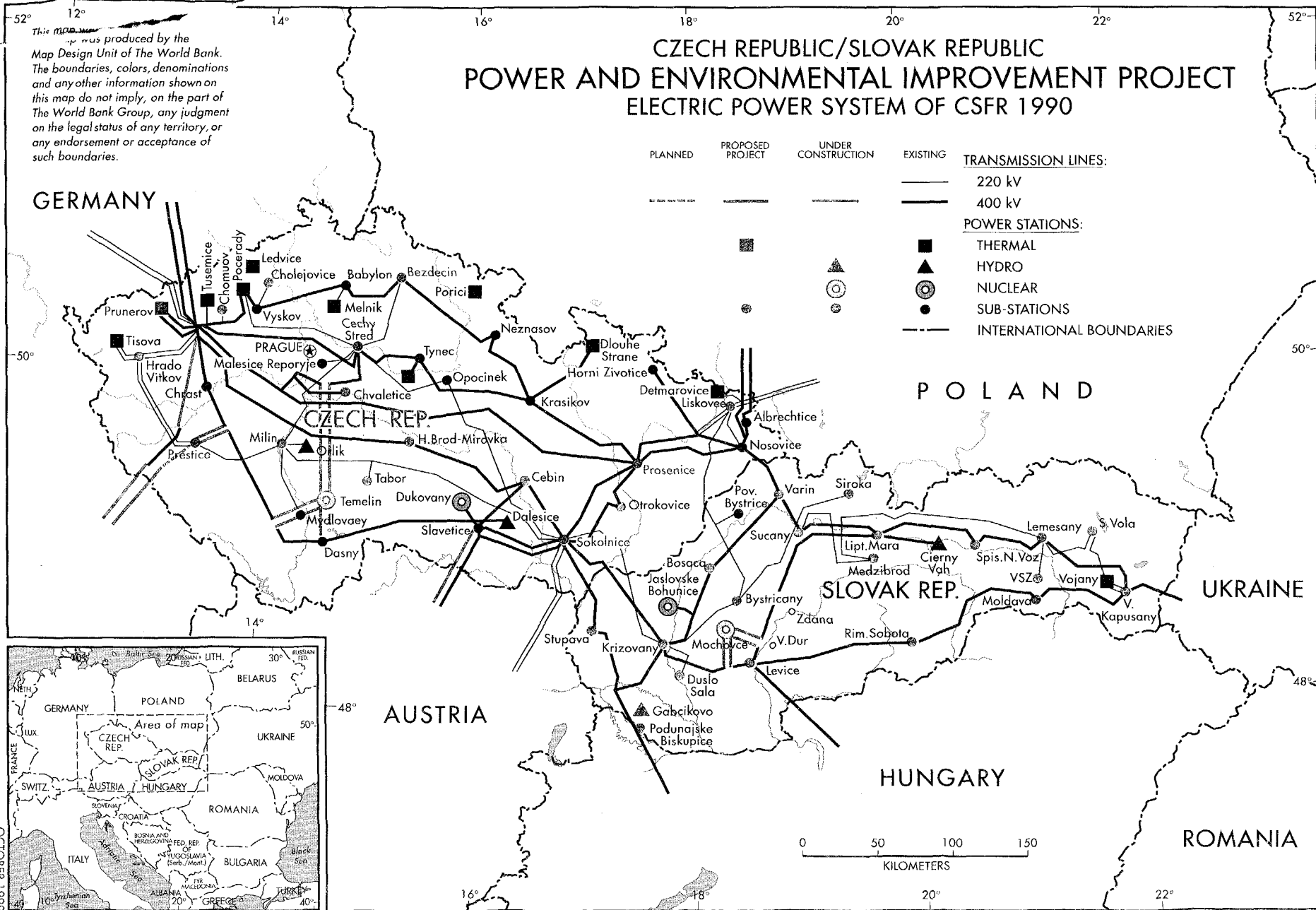
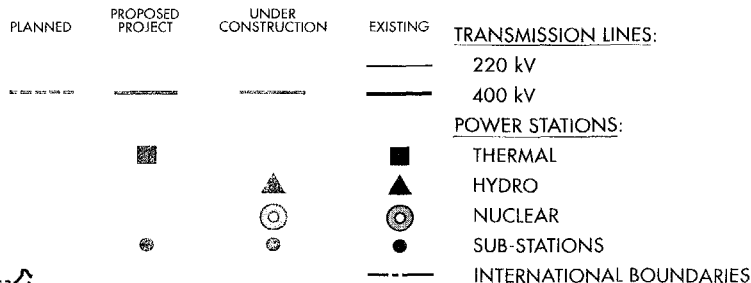


- EPK TUSIMICE:**
- PRUNEROV II POWER STATION UNDER PROJECT
 - OTHER POWER STATIONS BELONGING TO EPK TUSIMICE
- ROADS
 - CITIES
 - RIVERS
 - FOREST/PARK AREAS
 - INTERNATIONAL BOUNDARIES



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CZECH REPUBLIC/SLOVAK REPUBLIC POWER AND ENVIRONMENTAL IMPROVEMENT PROJECT ELECTRIC POWER SYSTEM OF CSFR 1990



OCTOBER 1999

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